

August 30, 2002

Mr. Daniel Clanton  
Whirlpool Corporation  
8001 National Drive  
Post Office Box 8913  
Little Rock, Arkansas 72219-8913

W.O. #581-007



Subject: February 2002 Semi-Annual Ground Water Monitoring Report

Dear Mr. Clanton:

Environmental Resources Management (ERM) is pleased to provide the historical ground water monitoring data you requested during the Whirlpool Fort Smith facility scoping meeting held on August 13, 2002.

Semi-annual ground water monitoring was initiated at the facility during 1999 with the most recent event occurring in February of 2002. The following documents providing the requested available historical ground water data are attached:

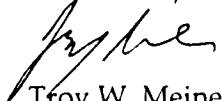
- Attachment 1: February 2002 Semi-Annual Ground Water Sampling Report
- Attachment 2: TCE Isoconcentration Maps and Potentiometric Surface Maps for Sampling Events in 1999, 2000, and 2001
- Attachment 3: Summary of CPT Grab Ground Water Sample Data conducted October 1999.

In reviewing the Conceptual Site Model (CSM) in the meeting, we noticed that Figure 5-1 of the CSM was incorrect. Therefore, we are also providing you with a replacement for Figure 5-1 as Attachment 4.

If you have any questions concerning the attached data or other information provided in the conceptual site model, please do not hesitate to call.

Sincerely,

Environmental Resources Management



Troy W. Meinen

TWM/mnt  
Attachments

cc: Mr. Michael Hill, Arkansas Department of Environmental Quality  
Ms. Linda Hanson, MsC, P.G., Arkansas Department of Environmental Quality  
Mr. Benjamin May, Arkansas Department of Environmental Quality  
Mr. Scott Horton, Whirlpool Corporation  
Mr. Bob Karwowski, Whirlpool Corporation  
Mr. Steven P. Willis, Whirlpool Corporation  
Mr. Larry Yinger, Whirlpool Corporation  
Mr. Andy Huggins, Environmental Resources Management (Exton)  
Mr. H. Reiffert Hedgcoxe, P.G., Environmental Resources  
Management (Houston)

**February 2002 Semi-Annual Ground Water  
Sampling Report**  
*Attachment 1*

*August 30, 2002*  
*W.O. #481-007*

**Environmental Resources Management**  
16300 Katy Freeway, Suite 300  
Houston, Texas 77094-1611  
(281) 600-1000

April 12, 2002

Mr. Scott Horton  
Senior Environmental Engineer  
Whirlpool Corporation  
6400 Jenny Lind Road  
P.O. Box 17001  
Fort Smith, AR 72917-7001

W.O. #581-009

Subject: February 2002 Semi-Annual Ground Water Monitoring  
Whirlpool Corporation, Fort Smith, Arkansas



Dear Mr. Horton:

Environmental Resources Management (ERM) is pleased to provide this letter report summarizing the subject monitoring event. This work was conducted in accordance with the scope of work authorized under Whirlpool's PAF FTS-109. The purpose of this letter is to document the sampling activities and to present the data. An evaluation of the results from this monitoring event will be conducted with the data analysis after the second semi-annual event is completed.

### *Scope of Work*

The first round of semi-annual ground water monitoring at the Whirlpool Fort Smith facility for 2002 was performed on February 18 through February 22, 2002. All wells were sampled for volatile organic compounds (VOCs). Monitoring wells MW-1 through MW-37 were purged and sampled using traditional pump and bail methods. In addition, 17 of those wells were also sampled using low-flow methodology (MW-1, MW-5, MW-7, MW-10, MW-11, MW-12, MW-13, MW-15, MW-16, MW-17, MW-19, MW-20, MW-23, MW-25, MW-26, MW-28 and MW-37). Wells sampled using the traditional method were gauged for pH, specific conductivity (SC) and temperature. Wells sampled using the low-flow method were gauged for pH, SC, temperature, dissolved oxygen (DO) and redox potential (ORP). Samples from the low-flow wells were also sampled for nitrate and sulfate at a local Fort Smith laboratory, and for iron using a field test kit.

### *Well Purging*

Following mobilization to the Site on February 18, 2002, water levels were measured in each well. A summary of the recorded water level measurements is provided as Table 1, Attachment 1. The measurements were then used to calculate the appropriate purge volume for each location. The volume of standing water in each well casing and annular sand pack was calculated based on the static water level and the known depth of the well.

At wells scheduled to be sampled using both traditional and low-flow methods, low-flow sampling was performed first using a peristaltic pump and dedicated polyethylene tubing. The tubing was placed in the middle of the screened interval, or water column depending on depth to water. During low-flow purging, the wells were pumped at a sufficiently low rate (generally less than 0.5 L/min) so that drawdown during purging did not exceed 0.3 ft. The drawdown and flow rate were monitored continuously. The flow rate was checked using a stop-watch and a graduated Pyrex measuring cup. Water quality parameters were monitored using a YSI 650XL multiprobe and flow-thru cell. Readings were recorded approximately every 5 minutes until parameters stabilized. Stabilization parameters include: pH within 0.1 units; SC  $\pm 3\%$ ; turbidity  $\pm 10\%$ ; DO  $\pm 10\%$ ; ORP  $\pm 10$  mV; all for three successive readings. In the event all parameters did not stabilize within approximately 45 minutes, low-flow purging was terminated and samples were collected. In general, turbidity and DO were the only parameters that did not reach stabilization in some wells.

For traditional purging methods, three borehole volumes were purged using dedicated inline 12-volt submersible electrical pumps and dedicated polyethylene tubing. Purge water generated during development was placed in drums, provided by Whirlpool, and labeled according to the date and drum contents.

Upon completion of the purging, the pump and associated tubing from each well was individually double-bagged, labeled and stored on-site for use during future semiannual sampling events.

### *Sampling and Analyses*

When using low-flow techniques, wells were sampled using the same flow rate maintained during the purging activities. These samples were labeled with the well ID and "L", indicating they were sampled using the low flow method. Low-flow ground water samples were collected directly from the tubing into laboratory supplied

sample jars. Samples for volatile analysis were collected in three 40-ml vials preserved with hydrochloric acid (HCl). Samples collected for nitrate, sulfate, and chloride analysis were collected in a neat 500 ml plastic jar. Samples for potassium analysis were collected in a 250 ml neat plastic jar. Samples for iron analysis were collected in a pyrex beaker and tested in the field.

Wells purged using traditional purge methods were sampled using dedicated, 2-inch disposable polyethylene bailers following removal of the dedicated pump and tubing. A total of three preserved 40-ml vials were filled at each location. These samples were labeled with the well ID and "T", indicating they were sampled using the traditional purging and sampling method.

Four blind duplicate samples, one field blank sample and one trip blank sample were collected during this event. Additional duplicate samples were collected during this event to provide quality assurance data on the samples collected by both traditional and low-flow methods. VOC samples were labeled, stored on ice, and shipped to Severn Trent Laboratory (STL) in Houston, Texas for analyses by SW-846 Method 8260 for trichloroethylene and related chlorinated solvents and degradation products that have been identified in previous sampling events. Potassium, chloride, nitrate and sulfate samples were labeled, stored on ice, and delivered to Data Testing, Inc. in Fort Smith, Arkansas for analyses by EPA water/wastewater methods. Samples for Ferrous iron analysis were analyzed in the field by Hach DR820 colorimeter glass ampule method 8146. Chain of custody procedures were established and followed from the time of sample collection until the analyses were complete.

Upon completion of sampling activities, the 2-inch bailers from each well were individually double-bagged, labeled and stored on-site for use during the next semi-annual sampling event.

All samples were submitted for volatile analysis by GCMS, method SW-846 8260.

### *Comparison of Low-Flow vs Traditional Purging/Sampling Methods*

A review of the February 2002 data indicate that, in general, the data obtained via the low-flow methodology correlates well with the "traditional" data for most of the wells across the Site (Figures 1 and 2, Attachment 2). The primary exception is that data from wells in the vicinity of the in situ chemical oxidation pilot study area (MW-11, MW-12, MW-15, etc.) are not well correlated. This is not unexpected since ground water in the pilot study area is not in chemical equilibrium with the surrounding ground water. Compared to low-flow, traditional purging method ground water pulls a relatively large volume of water from a larger portion of the aquifer. As a result, the

low-flow data are likely to be more representative of the ground water concentrations in the immediate vicinity of each well. Based on this comparison, it appears that switching to low-flow sampling will not prohibit comparison of such data to the substantial historical ground water data set that exists for the Fort Smith Facility.

With a few exceptions, the February 2002 semi-annual sampling data appears similar to historical data. Concentrations at off-site wells (MW-31 through MW-36) have decreased. The maximum off-site TCE concentration reported is 0.325 mg/L; down from 1.03 mg/L in September 2001. Other results are consistent with previously observed changes related to the seasonal shift in ground water flow direction between the spring and fall sampling events. The TCE concentration reported this period at MW-25 (29.9 mg/L (L) and 24.3 mg/L (T)), is the lowest concentration reported since February 1999. Other notable changes in concentrations observed during this event include the decrease in TCE concentration at MW-20. In September 2001, TCE was reported at MW-20, near the propane tanks on the west side of the property, for the first time since 1996; however, the February 2002 data indicate that MW-20 has no detectable concentrations, suggesting that the September 2001 data may be anomalous.

A summary of the data is provided in Table 2, Attachment 1. A TCE Concentration vs. Time plot is presented as Figure 3, Attachment 2, and demonstrates concentration trends over time in a south-north transect from MW-19 to MW-34. Since not all wells were sampled using low-flow methods, data collected using traditional sampling methods is used in the development of this figure.

### *Ground Water Flow Evaluation*

Ground water elevations for the February 2002 (Figure 4, Attachment 2) event appear similar to previous March sampling events (Table 1, Attachment 1). The data continue to suggest that, during the fall time frame, the predominate flow direction in the vicinity of the apparent source area is toward the south-southwest and then predominately to the south-southeast during the spring time frame.

Evaluation of the water level data also continues to show the presence of a ground water divide oriented northwest to southeast in the general area of well MW-26. Flow directions northeast of the apparent divide are toward the east While flow in the vicinity of MW-20 and MW-21 is more toward the southeast. As was apparent in the September 2001 data, February 2002 data shows that there appears to be a flattening of the ground water gradient in the vicinity of MW-33, MW-35 and MW-36. The February data, however, indicates that this area of flattened gradient extends into the area of wells MW-23 and MW-24. As has been indicated previously, this may indicate the presence of a more permeable zone that would trend to the north across Ingersoll

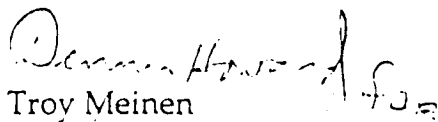
Avenue. However, additional data is needed before reaching any conclusions about flow in this area.

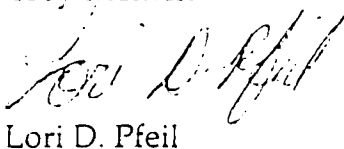
Natural attenuation data (nitrate, sulfate and ferrous iron) will be discussed in the September semi-annual monitoring report after another round of data has been collected using the low-flow sampling method.

We appreciate the opportunity to continue to assist Whirlpool with this important project. If you have any questions concerning the scope of work or need additional information, please do not hesitate to call.

Sincerely,

ENVIRONMENTAL RESOURCES MANAGEMENT

  
Troy Meinen

  
Lori D. Pfeil

LDP:vjm

cc: Mr. Bob Karwowski, Whirlpool Corporation  
Mr. Steven P. Willis, Whirlpool Corporation  
Mr. Larry Yinger, Whirlpool Corporation  
Mr. Andy Huggins, ERM, Exton  
Mr. H. Reiffert Hedgcoxe, P.G., ERM, Houston



**Tables**  
*Attachment 1*

*April 12, 2002*  
W.O. #581-009

**Environmental Resources Management**  
3204 Long Prairie Road, Suite C  
Flower Mound, TX 75022  
(972) 355-2100

TABLE 1

## Water Level Elevations, Conventional Monitoring Wells

Whirlpool Corporation  
Fort Smith, Arkansas

Well ID	Easting (ft)	Northing (ft)	Top of Pipe (ftAMSL)	Depth to Water (ftBTOP) 22 Feb. 1999*	Water Level (ftAMSL) 28 Oct. 1999	Water Level (ftAMSL) 10 Dec. 1999	Water Level (ftAMSL) 27 Mar. 2000	Water Level (ftAMSL) 18 Sept. 2000	Depth to Water (ftBTOP) 26 Mar. 2001	Water Level (ftAMSL) 26 Mar. 2001	Depth to Water (ftBTOP) 10 Sep. 2001	Water Level (ftAMSL) 10 Sep. 2001	Depth to Water (ftBTOP) 18 Feb. 2002	Water Level (ftAMSL) 18 Feb. 2002
ITMW-1	8259.51	9007.54	476.93	12.86	469.03	464.39	463.79	464.70	14.09	462.84	12.61	464.32	14.15	462.78
ITMW-2	8058.55	9103.07	477.58	12.82	465.21	464.57	464.41	464.91	13.72	463.86	13.03	464.55	14.03	463.55
ITMW-3	8169.81	9165.86	474.72	10.32	465.19	464.47	464.08	464.83	11.32	463.40	10.22	464.50	11.54	463.18
ITMW-4	8170.16	8296.26	478.19	13.91	465.25	464.53	463.82	464.58	15.30	462.89	13.99	464.20	15.29	462.90
ITMW-5	7902.33	8278.92	478.93	14.84	465.05	464.33	463.68	464.38	16.07	462.86	14.95	463.98	16.16	462.77
ITMW-6	7858.85	8042.21	483.04	19.05	464.79	464.18	463.54	464.14	20.37	462.67	19.30	463.74	20.35	462.69
ITMW-7	7461.02	8370.89	481.95	17.87	464.21	463.83	463.83	463.85	18.43	463.52	18.43	463.52	18.52	463.43
ITMW-9	8179.81	8237.69	481.90	17.74	465.16	464.44	463.73	464.47	19.10	462.80	17.81	464.09	19.09	462.81
ITMW-10	7901.42	8230.16	480.84	16.78	465.01	464.33	463.64	464.46	18.04	462.80	17.81	464.09	18.29	462.55
ITMW-11	7846.97	9109.44	476.50	11.52	465.15	464.44	463.73	464.47	12.31	464.19	11.84	464.66	12.68	463.82
ITMW-12	7869.05	9077.56	476.67	11.76	465.19	464.60	464.59	464.85	12.51	464.15	12.05	464.62	12.76	463.91
ITMW-13	7915.02	9124.81	477.79	12.82	465.19	464.60	464.58	464.92	13.64	464.15	13.19	464.60	13.99	463.80
ITMW-14	7966.02	9131.80	477.30	12.38	465.19	464.67	464.54	464.93	13.22	464.08	12.70	464.60	13.57	463.73
ITMW-15	7812.25	9109.60	476.49	11.47	465.15	464.58	464.63	464.88	12.28	464.21	11.91	464.58	12.65	463.84
ITMW-16	7831.59	9168.78	478.79	13.57	465.34	464.77	464.68	465.09	14.36	464.43	14.02	464.77	14.70	464.09
ITMW-17	7732.61	9112.96	477.90	12.54	465.12	464.54	464.63	464.92	14.66	464.33	13.32	464.58	13.91	463.99
ITMW-18	7849.92	9023.55	473.55	8.64	465.16	464.55	464.55	464.89	9.42	464.13	8.99	464.56	9.77	463.78
ITMW-19	7763.78	9024.94	476.25	11.28	465.15	464.52	464.61	464.95	11.51	464.74	11.40	464.85	12.47	463.78
ITMW-20	7238.94	9074.08	477.87	12.55	464.93	464.55	464.82	464.73	13.12	464.75	13.45	464.42	13.33	464.54
ITMW-21	7506.54	8945.65	476.52	11.21	464.93	464.59	464.90	464.68	11.69	464.83	11.90	464.62	12.26	464.26
ITMW-22	8726.94	9038.96	473.93	9.64	465.64	464.91	464.23	465.20	10.71	463.22	9.11	464.82	10.82	463.11
ITMW-23	7747.16	9303.10	475.80	10.95	465.27	464.70	464.65	464.04	11.39	464.41	11.10	464.07	11.73	464.07
ITMW-24	7738.13	9198.53	476.39	11.25	465.27	464.69	464.82	465.04	12.01	464.38	11.70	464.69	12.31	464.08
ITMW-25	7614.43	9060.33	476.89	11.68	465.28	464.77	464.86	465.09	12.41	464.48	12.16	464.73	12.74	464.15
ITMW-26	7421.64	9273.87	478.05	12.36	465.32	464.89	465.10	465.09	13.07	464.98	13.27	464.78	12.33	465.72
ITMW-27	7932.29	9302.59	475.42	--	--	464.70	464.61	465.02	11.04	464.38	10.71	464.71	11.43	463.99
ITMW-28	8180.18	9301.14	470.49	--	--	464.39	464.41	464.92	6.25	464.24	5.66	464.83	6.76	463.73
ITMW-29	7092.87	8392.87	474.91	--	--	464.07	464.59	463.91	10.47	464.44	11.32	463.59	10.62	464.29
ITMW-30	7485.76	8480.10	478.99	--	--	464.22	464.35	464.24	14.95	464.04	15.07	463.92	15.30	463.69
ITMW-31	7675.36	9348.43	476.03	--	--	--	--	--	11.25	464.78	10.68	463.55	12.02	464.01
ITMW-32	7760.17	9347.50	475.68	--	--	--	--	--	11.36	464.32	10.97	464.71	11.62	464.06
ITMW-33	7845.31	9348.62	474.88	--	--	--	--	--	10.50	464.38	10.18	464.70	10.84	464.04
ITMW-34	7760.24	9404.60	474.29	--	--	--	--	--	11.90	462.39	9.56	464.73	10.15	464.14
ITMW-35	7841.74	9406.36	473.90	--	--	--	--	--	9.24	464.66	9.20	464.70	9.83	464.07
ITMW-36	7927.38	9405.11	473.30	--	--	--	--	--	8.61	464.69	8.60	464.70	9.11	464.19
ITMW-37	7839.60	9101.64	473.57	--	--	--	--	--	--	--	--	--	9.46	464.11
ITMW-38	7840.94	9115.29	474.60	--	--	--	--	--	--	--	--	--	10.62	463.98

## NOTES:

ft = feet

AMSL = above mean sea level

BTOP = below top of pipe

Co-ordinates provided by EDM Consultants, Inc.

Elevations are taken from Table 3-1, "Draft Report, Remedial Investigation, North Side Ground Water", Malcolm Pirnie, Inc., with the exceptions of ITMW-4 and MW-22 through MW-26 (EDM Consultants, Inc.) and MW-27 through MW-30 (Philip J. Lerraris, P.E., I.S.)

\* - Depth to water measurements for MW-24 through MW-26 were taken on 25 February 1999.

TABLE 2

## Historic Analytical Data, Selected VOCs in Ground Water

Whirlpool Corporation  
Fort Smith, Arkansas

Well	Date	Sampler	PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC
ITMW-1	Nov-89	IT	ND	ND	NT	ND	ND	ND
	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Nov-93	MP	ND	0.01	NT	ND	ND	ND
	Dec-96	MP	ND	0.021	NT	ND	ND	ND
	Feb-99	ERM	ND	0.037	ND	ND	ND	ND
	Mar-00	ERM	ND	0.125	0.008	ND	ND	ND
	Sep-00	ERM	ND	0.031	0.007	ND	ND	ND
	Mar-01	ERM	ND	0.03	0.006	ND	ND	ND
	Sep-01	ERM	ND	0.027	0.009	ND	ND	ND
	Feb-02	ERM (T)	ND	0.026	0.006	ND	ND	ND
	Feb-02	ERM (L)	ND	0.025	0.007	ND	ND	ND
ITMW-2	Oct-89	IT	ND	ND	NT	ND	ND	ND
	Nov-89	IT	ND	ND	NT	ND	ND	ND
	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Nov-90	IT	ND	ND	NT	ND	ND	ND
	Nov-90 (dupl.)	IT	ND	ND	NT	ND	ND	ND
	Mar-91	IT	ND	ND	NT	ND	ND	ND
	Nov-93	MP	ND	0.004	NT	ND	ND	ND
	Dec-96	MP	ND	0.0034	NT	ND	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	0.006	ND	ND	ND
ITMW-3	Oct-89	IT	ND	ND	NT	ND	ND	ND
	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Nov-93	MP	ND	0.003	NT	ND	ND	ND
	Dec-96	MP	ND	0.0017	NT	ND	ND	ND
	Feb-99	ERM	ND	ND	ND	ND	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-00 (Dup)	ERM	ND	ND *	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
ITMW-4	Oct-89	IT	ND	ND	NT	ND	ND	ND
	Nov-89	IT	ND	ND	NT	ND	ND	ND
	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Nov-93	MP	ND	ND	NT	ND	ND	ND
	Dec-96	MP	ND	0.075	NT	ND	ND	ND
	Feb-99	ERM	ND	0.093	0.054	ND	ND	ND
	Mar-00	ERM	ND	0.022	0.016	ND	ND	ND
	Sep-00	ERM	ND	0.014	0.011	ND	ND	ND
	Mar-01	ERM	ND	0.009	ND	ND	ND	ND
	Sep-01	ERM	ND	0.006	0.008	ND	ND	ND
	Feb-02	ERM (T)	ND	0.034	0.005	ND	ND	ND
ITMW-5	Oct-89	IT	ND	ND	NT	ND	ND	ND
	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Dec-96	MP	ND	0.021	NT	ND	ND	ND
	Feb-99	ERM	ND	0.086	0.039	ND	0.007	ND
	Mar-00	ERM	ND	0.073	0.059	ND	ND	ND
	Sep-00	ERM	ND	0.085	0.064	ND	0.006	ND
	Mar-01	ERM	ND	0.1	0.046	ND	ND	ND
	Sep-01	ERM	ND	0.072	0.064	ND	ND	ND
	Feb-02	ERM (T)	ND	0.093	0.066	ND	ND	ND
	Feb-02	ERM (L)	ND	0.081	0.068	ND	ND	ND

NOTE:

Footnotes on last page of table.

TABLE 2 (Cont'd)

## Historic Analytical Data, Selected VOCs in Ground Water

Whirlpool Corporation  
Fort Smith, Arkansas

Well	Date	Sampler	PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC
ITMW-6	Oct-89	IT	ND	ND	NT	ND	ND	ND
	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Dec-96	MP	ND	0.0068	NT	ND	ND	ND
	May-97	MP	ND	0.007	ND	ND	ND	ND
	Feb-99	ERM	ND	ND	ND	ND	ND	ND
	Feb-99	ERM (CoreLab)	ND	0.025	ND	NT	ND	ND
	Feb-99	ERM (CoreLab Dupl.)	ND	0.006	ND	NT	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	ND	ND	ND	ND	ND
ITMW-7	Nov-89	IT	ND	ND	NT	ND	ND	ND
	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Dec-96	MP	ND	0.29	NT	ND	ND	0.003
	May-97	MP	ND	0.38	0.18	ND	ND	ND
	Feb-99	ERM (SPL)	ND	ND	ND	ND	ND	ND
	Jun-99	ERM (SPL)	ND	0.32	0.14	ND	ND	ND
	Jun-99	ERM (SPL Dupl.)	ND	0.3	0.14	ND	ND	ND
	Jun-99	ERM (CoreLab)	ND	0.306	0.144	ND	ND	ND
	Mar-00	ERM	ND	0.262	0.1	ND	ND	ND
	Mar-00 (dup)	ERM	ND	0.207	0.092	ND	ND	ND
	Sep-00	ERM	ND	0.207	0.1	ND	ND	ND
	Sep-00 (dup)	ERM	ND	0.109	ND	ND	ND	ND
	Mar-01	ERM	ND	0.161	0.066	ND	ND	ND
	Sep-01	ERM	ND	0.139	0.068	ND	ND	ND
	Feb-02	ERM (T)	ND	0.261	0.107	ND	ND	ND
	Feb-02	ERM (L)	ND	0.119	0.070	ND	ND	ND
ITMW-8	Jan-90	IT	ND	ND	NT	ND	ND	ND
ITMW-9	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Dec-96	MP	ND	0.23	NT	ND	0.015	ND
	May-97	MP	ND	0.007	ND	ND	ND	ND
	Feb-99	ERM	ND	0.04	0.024	ND	ND	ND
	Mar-00	ERM	ND	0.069	0.045	ND	ND	ND
	Sep-00	ERM	ND	0.057	0.014	ND	ND	ND
	Sep-00 (dup)	ERM	ND	0.055	0.014	ND	ND	ND
	Mar-01	ERM	ND	0.04	0.012	ND	ND	ND
	Sep-01	ERM	ND	0.04	0.012	ND	ND	ND
	Feb-02	ERM (T)	ND	0.046	0.023	ND	ND	ND
ITMW-10	Jan-90	IT	ND	ND	NT	ND	ND	ND
	Dec-96	MP	ND	0.004	NT	ND	0.002	ND
	Feb-99	ERM	ND	0.025	0.013	ND	ND	ND
	Mar-00	ERM	ND	0.023	0.017	ND	ND	ND
	Sep-00	ERM	ND	0.018	0.016	ND	ND	ND
	Mar-01	ERM	ND	0.04	0.021	ND	ND	ND
	Sep-01	ERM	ND	0.029	0.028	ND	ND	ND
	Sep-01 (dup)	ERM	ND	0.027	0.03	ND	ND	ND
	Feb-02	ERM (T)	ND	0.056	0.048	ND	ND	ND
	Feb-02	ERM (L)	ND	0.044	0.038	ND	ND	ND

NOTE:

Footnotes on last page of table.

TABLE 2 (Cont'd)

## Historic Analytical Data, Selected VOCs in Ground Water

Whirlpool Corporation  
Fort Smith, Arkansas

Well	Date	Sampler	PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC
ITMW-11	Jan-90	IT	0.015	19	NT	3.6	ND	0.18
	Nov-90	IT	ND	4.7	NT	1.5	0.009	0.093
	Feb-91	IT	0.0089	3.4	NT	1	ND	ND
	Nov-93	MP	0.001	2.3	NT	ND	ND	0.043
	Dec-96	MP	ND	0.51	NT	0.011	ND	ND
	Feb-99	ERM	ND	0.65	0.01	ND	ND	ND
	Mar-00	ERM	ND	3.37	0.206	ND	ND	ND
	Sep-00	ERM	0.006	8	0.330	ND	ND	0.01
	Mar-01	ERM	ND	7	0.200	ND	ND	ND
	Sep-01	ERM	ND	6	0.183	ND	ND	ND
	Feb-02	ERM (T)	ND	6.8	ND	ND	0.010	ND
	Feb-02	ERM (L)	ND	2.48	0.123	ND	ND	ND
ITMW-12	Nov-90	IT	ND	2.4	NT	1.3	0.0099	0.14
	Feb-91	IT	ND	2.1	NT	1	ND	ND
	Nov-93	MP	ND	2.5	NT	0.002	0.004	0.035
	Dec-96	MP	ND	1.2	NT	ND	ND	ND
	Feb-99	ERM	ND	3.1	0.48	ND	ND	0.034
	Mar-00	ERM	ND	3.11	0.32	ND	ND	0.019
	Sep-00	ERM	ND	3.3	0.18	ND	ND	0.01
	Mar-01	ERM	ND	3.9	0.2	ND	ND	0.02
	Sep-01	ERM	ND	3.1	0.159	ND	ND	ND
	Feb-02	ERM (T)	ND	3.51	0.275	ND	0.007	0.023
	Feb-02	ERM (L)	ND	3.6	ND	ND	0.008	0.019
ITMW-13	Nov-90	IT	ND	0.034	NT	0.19	ND	0.018
	Feb-91	IT	ND	0.032	NT	0.17	ND	0.035
	Nov-93	MP	ND	NA	NT	NA	NA	0.029
	Dec-96	MP	ND	0.036	NT	0.0013	0.0016	0.036
	Feb-99	ERM	ND	0.036	0.14	ND	ND	0.048
	Mar-00	ERM	ND	0.037	0.121	ND	ND	0.053
	Sep-00	ERM	ND	0.022	0.112	ND	ND	0.05
	Mar-01	ERM	ND	0.044	0.092	ND	ND	0.04
	Sep-01	ERM	ND	0.035	0.111	ND	ND	ND
	Feb-02	ERM (T)	ND	0.129	0.195	ND	ND	0.035
	Feb-02	ERM (L)	ND	0.048	0.080	ND	ND	ND
ITMW-14	Nov-90	IT	ND	ND	NT	0.03	ND	0.013
	Feb-91	IT	ND	ND	NT	ND	ND	ND
	Nov-93	MP	ND	0.006	NT	ND	ND	ND
	Dec-96	MP	ND	ND	NT	ND	ND	ND
	Feb-99	ERM	ND	ND	0.029	ND	ND	0.02
	Mar-00	ERM	ND	ND	0.024	ND	ND	0.012
	Sep-00	ERM	ND	ND	0.014	ND	ND	ND
	Mar-01	ERM	ND	ND	0.024	ND	ND	0.01
	Sep-01	ERM	ND	ND	0.005	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	0.023	ND	ND	ND
ITMW-15	Nov-90	IT	ND	2.5	NT	1.5	0.0081	0.055
	Feb-91	IT	ND	1.7	NT	0.87	ND	ND
	15-Apr-91	IT	ND	2	NT	0.6	ND	ND
	19-Apr-91	IT	ND	2.1	NT	1	ND	ND
	20-Apr-91	IT	ND	2.4	NT	1.1	ND	ND
	Nov-93	MP	ND	4.3	NT	0.001	ND	0.01
	Dec-96	MP	ND	0.24	NT	ND	ND	ND
	Feb-99	ERM	ND	0.4	0.12	ND	ND	ND
	Mar-00	ERM	ND	0.339	0.097	ND	ND	ND
	Sep-00	ERM	ND	0.36	0.093	ND	ND	ND
	Sep-00 (dup)	ERM	ND	0.38	0.091	ND	ND	ND
	Mar-01	ERM	ND	0.29	0.057	ND	ND	ND
	Sep-01	ERM	ND	0.38	0.087	ND	ND	ND
	Sep-01 (dup)	ERM	ND	0.37	0.08	ND	ND	ND
	Feb-02	ERM (T)	ND	0.186	0.064	ND	ND	ND
	Feb-02	ERM (L)	ND	0.311	0.108	ND	ND	ND

NOTE:

Footnotes on last page of table.

TABLE 2 (Cont'd)

## Historic Analytical Data, Selected VOCs in Ground Water

Whirlpool Corporation  
Fort Smith, Arkansas

Well	Date	Sampler	PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC
ITMW-16	Feb-91	IT	ND	0.031	NT	0.06	ND	ND
	Nov-93	MP	ND	0.041	NT	ND	ND	0.007
	Dec-96	MP	ND	ND	NT	ND	ND	ND
	Feb-99	ERM	ND	ND	ND	ND	ND	ND
	Mar-00	ERM	ND	0.007	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	ND	ND	ND	ND	ND
ITMW-17	Feb-91	IT	ND	21	NT	ND	ND	ND
	15-Apr-91	IT	ND	18	NT	0.76	ND	ND
	24-Apr-91	IT	ND	21	NT	0.58	ND	ND
	Nov-93	MP	0.004	18	NT	0.003	ND	0.015
	Dec-96	MP	ND	9.3	NT	ND	ND	ND
	Feb-99	ERM	ND	11	0.24	ND	0.013	ND
	Mar-00	ERM	ND	6.78	0.171	ND	ND	ND
	Sep-00	ERM	ND	5.5	0.18	ND	0.009	ND
	Jan-01	ERM	ND	8.3	0.179	ND	ND	ND
	Mar-01	ERM	ND	6.7	0.134	ND	0.007	ND
	Sep-01	ERM	ND	6.3	0.158	ND	0.007	ND
	Feb-02	ERM (T)	ND	6.07	0.149	ND	ND	ND
	Feb-02	ERM (L)	ND	6.29	0.174	ND	0.011	ND
ITMW-18	Feb-91	IT	ND	3.7	NT	0.33	ND	ND
	Nov-93	MP	ND	4.5	NT	ND	0.009	0.006
	Dec-96	MP	ND	1.6	NT	ND	ND	ND
	Feb-99	ERM	ND	6.3	0.48	ND	ND	ND
	Mar-00	ERM	ND	3.56	0.401	ND	ND	ND
	Sep-00	ERM	ND	4.1	0.4	ND	0.007	ND
	Mar-01	ERM	ND	4	0.4	ND	0.006	ND
	Sep-01	ERM	ND	4.1	0.3	ND	ND	ND
	Feb-02	ERM (T)	ND	5.26	0.426	ND	ND	ND
ITMW-19	Feb-91	IT	ND	9.9	NT	ND	ND	ND
	Nov-93	MP	0.005	27	NT	ND	NA	0.007
	Dec-96	MP	ND	25	NT	ND	ND	ND
	Feb-99	ERM	0.008	33	0.15	ND	0.04	ND
	Mar-00	ERM	0.007	33.1	0.128	ND	0.029	ND
	Sep-00	ERM	0.01	36	0.197	ND	0.056	ND
	Jan-01	ERM	0.01	34	0.166	ND	0.04	ND
	Mar-01	ERM	0.01	38	0.119	ND	0.037	ND
	Sep-01	ERM	ND	19	0.132	ND	0.034	ND
	Feb-02	ERM (T)	0.0062	26.1	ND	0.006	0.047	ND
	Feb-02	ERM (L)	0.0051	24.6	0.192	ND	0.065	ND
ITMW-20	Mar-91	IT	ND	ND	NT	ND	ND	ND
	Nov-93	MP	ND	ND	NT	ND	ND	ND
	Dec-96	MP	ND	0.29	NT	ND	ND	ND
	May-97	MP	ND	ND	ND	ND	ND	ND
	Feb-99	ERM	ND	ND	ND	ND	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	0.021	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	ND	ND	ND	ND	ND

NOTE:

Footnotes on last page of table.

TABLE 2 (Cont'd)

## Historic Analytical Data, Selected VOCs in Ground Water

Whirlpool Corporation  
Fort Smith, Arkansas

Well	Date	Sampler	PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC
ITMW-21	Mar-91	IT	ND	0.021	NT	ND	ND	ND
	Nov-93	MP	ND	0.037	NT	ND	ND	ND
	Dec-96	MP	ND	0.15	NT	ND	ND	ND
	Feb-99	ERM	ND	0.19	ND	ND	ND	ND
	Mar-00	ERM	ND	0.196	ND	ND	ND	ND
	Sep-00	ERM	ND	0.192	ND	ND	ND	ND
	Mar-01	ERM	ND	0.123	ND	ND	ND	ND
	Sep-01	ERM	ND	0.116	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	0.152	ND	ND	ND	ND
MW-22	Dec-96	MP	ND	ND	NT	ND	ND	ND
	May-97	MP	ND	ND	0.005	ND	ND	ND
	Feb-99	ERM	ND	ND	0.005	ND	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
MW-23	Dec-96	MP	ND	0.21	NT	ND	ND	ND
	May-97	MP	ND	2.4	NT	ND	ND	ND
	Feb-99	ERM	ND	0.35	0.01	ND	ND	ND
	Feb-99 (dup)	ERM	ND	0.44	0.01	ND	ND	ND
	Mar-00	ERM	ND	0.147	ND	ND	ND	ND
	Sep-00	ERM	ND	0.067	ND	ND	ND	ND
	Jan-01	ERM	ND	0.137	ND	ND	ND	ND
	Mar-01	ERM	ND	0.087	ND	ND	ND	ND
	Sep-01	ERM	ND	0.023	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	0.063	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	0.098	ND	ND	ND	ND
MW-24	Feb-99	ERM	ND	1.4	0.049	ND	ND	ND
	Mar-00	ERM	ND	0.403*	0.025*	ND	ND	ND
	Mar-00 (dup)	ERM	ND	0.595*	0.024*	ND	ND	ND
	Sep-00	ERM	ND	0.128	0.011	ND	ND	ND
	Jan-01	ERM	ND	0.25	0.012	ND	ND	ND
	Mar-01	ERM	ND	0.33	0.011	ND	ND	ND
	Sep-01	ERM	ND	0.124	0.006	ND	ND	ND
	Feb-02	ERM (T)	ND	0.204	0.006	ND	ND	ND
MW-25	Feb-99	ERM	0.011	29	0.17	ND	0.069	0.1
	Feb-99 (dupl.)	ERM	0.012	27	0.18	ND	0.074	0.11
	Feb-99	ERM (CoreLab)	0.009	24.8	0.149	ND	0.057	0.074
	Dec-99	ERM (ERM)	ND	94.5	ND	ND	ND	ND
	Mar-00	ERM	0.011	35.9	0.245	ND	0.066	0.063
	Sep-00	ERM	0.014	59	0.3	ND	0.092	0.05
	Mar-01	ERM	0.012	34	0.117	ND	0.047	0.06
	Sep-01	ERM	0.011	60	0.3	ND	0.101	ND
	Feb-02	ERM (T)	ND	24.3	0.326	ND	ND	ND
	Feb-02	ERM (L)	0.007	29.9	0.369	0.005	0.052	0.052
MW-26	Feb-99	ERM (SPL)	ND	0.36	0.15	ND	ND	ND
	Jun-99	ERM (SPL)	ND	ND	ND	ND	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01 (dup)	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	ND	ND	ND	ND	ND

NOTE:

Footnotes on last page of table.

TABLE 2 (Cont'd)

## Historic Analytical Data, Selected VOCs in Ground Water

Whirlpool Corporation  
Fort Smith, Arkansas

Well	Date	Sampler	PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC
MW-27	Dec-99	ERM	ND	ND	ND	ND	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Jan-01	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
MW-28	Dec-99	ERM	ND	ND	ND	ND	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	ND	ND	ND	ND	ND
MW-29	Dec-99	ERM	ND	ND	ND	ND	ND	ND
	Mar-00	ERM	ND	ND	ND	ND	ND	ND
	Sep-00	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
MW-30	Dec-99	ERM	ND	0.115	0.034	ND	ND	ND
	Mar-00	ERM	ND	0.086	0.025	ND	ND	ND
	Sep-00	ERM	ND	0.102	0.025	ND	ND	ND
	Mar-01	ERM	ND	0.043	0.011	ND	ND	ND
	Sep-01	ERM	ND	0.063	0.018	ND	ND	ND
	Feb-02	ERM (T)	ND	0.067	0.021	ND	ND	ND
MW-31	Jan-01	ERM	ND	ND	ND	ND	ND	ND
	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	ND	ND	ND	ND	ND
MW-32	Jan-01	ERM	ND	0.108	ND	ND	ND	ND
	Mar-01	ERM	ND	0.174	ND	ND	ND	ND
	Sep-01	ERM	ND	0.095	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	0.0536	ND	ND	ND	ND

NOTE:

Footnotes on last page of table.



TABLE 2 (Cont'd)

## Historic Analytical Data, Selected VOCs in Ground Water

Whirlpool Corporation  
Fort Smith, Arkansas

Well	Date	Sampler	PCE	TCE	c-1,2-DCE	t-1,2-DCE	1,1-DCE	VC
MW-33	Jan-01	ERM	ND	0.12	0.034	ND	ND	ND
	Mar-01	ERM	ND	0.26	0.007	ND	ND	ND
	Sep-01	ERM	ND	0.31	0.008	ND	ND	ND
	Feb-02	ERM (L)	ND	0.115	ND	ND	ND	ND
MW-34	Mar-01	ERM	ND	0.083	ND	ND	ND	ND
	Sep-01	ERM	ND	0.061	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	0.0214	ND	ND	ND	ND
MW-35	Mar-01	ERM	ND	0.91	0.034	ND	ND	ND
	May-01	ERM	ND	0.86	0.036	ND	ND	ND
	Sep-01	ERM	ND	1.03	0.04	ND	ND	ND
	Feb-02	ERM (L)	ND	0.325	0.0133	ND	ND	ND
MW-36	Mar-01	ERM	ND	ND	ND	ND	ND	ND
	Sep-01	ERM	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	ND	ND	ND	ND	ND
MW-37	Sep-01	ERM	ND	5	0.34	ND	ND	ND
	Feb-02	ERM (T)	ND	ND	ND	ND	ND	ND
	Feb-02	ERM (L)	ND	0.773	3.25	0.052	0.01	ND
MW-38	Sep-01	ERM	ND	0.62	0.09	ND	ND	ND

MW-38 was used as an injection well for the pilot study and was not sampled in February 2002.

## NOTES:

Units used are mg/L. ND = not detected NT = not tested NA = not available

(L) = Sample collected using low-flow sampling methods.

(T) = Sample collected using traditional purge and sample methods.

IT = International Technology Corporation, Inc.

ERM = Environmental Resources Management

MP = Malcolm Pirnie, Inc.

PCE = perchloroethylene (tetrachloroethene)

TCE = trichloroethylene

c-1,2-DCE = cis-1,2-dichloroethylene (not an analytical parameter until May 1997)

t-1,2-DCE = trans-1,2-dichloroethylene

1,1-DCE = 1,1-dichloroethylene

VC = vinyl chloride

\* = Analysis was re-run due to Q/A/QC concerns. Data reported is for the second run.

SPL was used as the subcontract laboratory from 1996 to June 1999. ChemLab was

used for earlier MP sampling events. The current laboratory is STL in Houston, Texas.

Pre-1999 data reproduced from "Remedial Investigation, North Side Ground Water, Whirlpool Corporation".

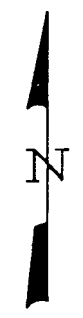
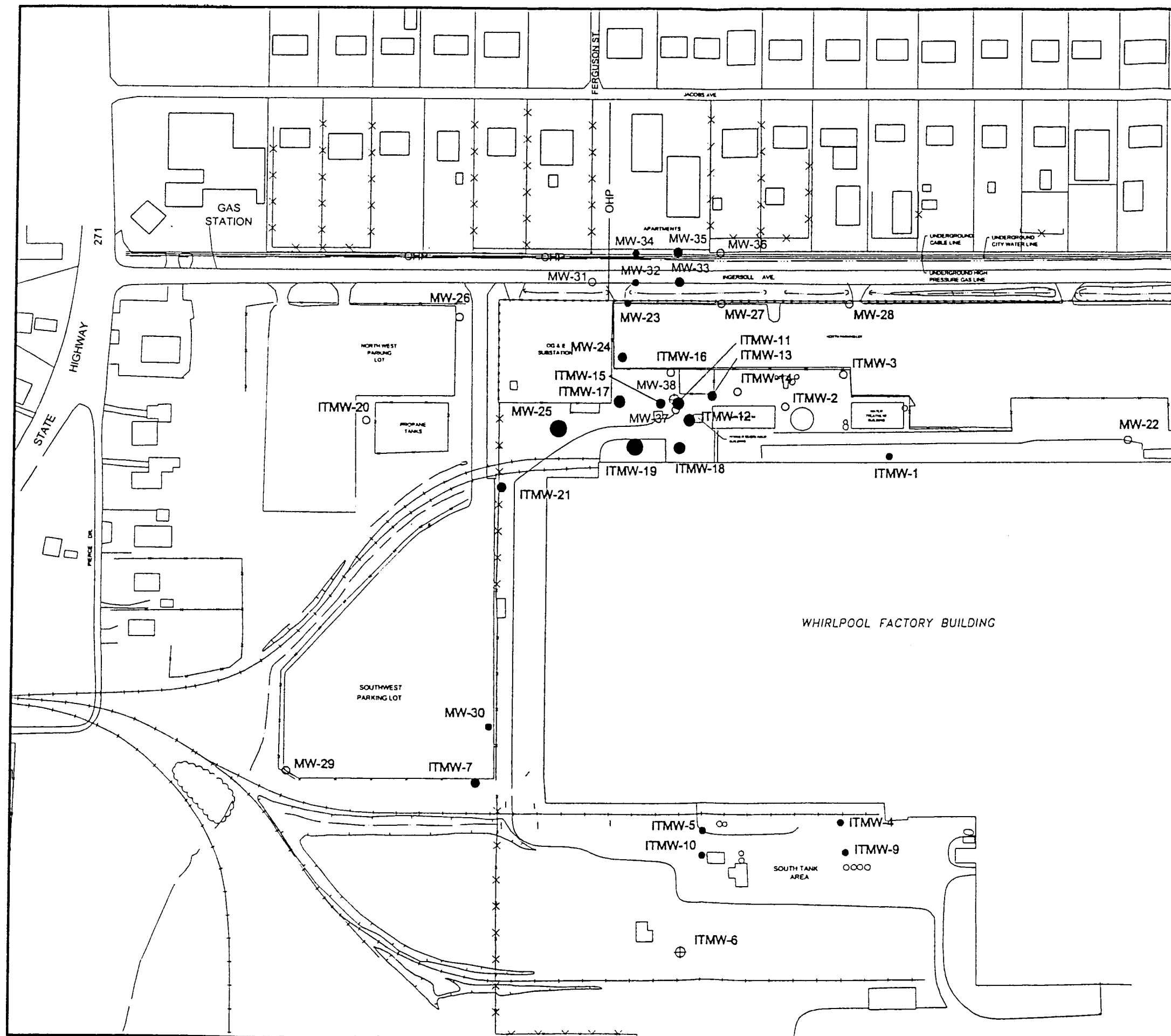
Malcolm Pirnie, Inc., January 1997, (revised entry for MW-11, Jan-90) and SPL Certificates of Analysis.

May 1997, supplied by Whirlpool Corporation.

**Figures**  
*Attachment 2*

*April 12, 2002*  
W.O. # 581-009

**Environmental Resources Management**  
3204 Long Prairie Road, Suite C  
Flower Mound, TX 75022  
(972) 355-2100



**LEGEND**

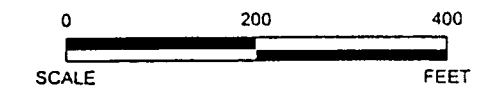
- MW-26 ● EXISTING MONITORING WELL SAMPLED USING TRADITIONAL PURGE METHOD
- ⊕ EXISTING MONITORING WELL NOT SAMPLED USING TRADITIONAL PURGE METHOD

**TCE CONCENTRATION (mg/l)  
FEBRUARY 2002**

- < 0.005
- 0.005 to 0.10
- 0.10 to 1.00
- 1.00 to 10.0
- > 10.0

**NOTE:**

1) MW-38 WAS USED AS AN INJECTION WELL FOR THE PILOT STUDY AND WAS NOT SAMPLED IN FEBRUARY 2002.

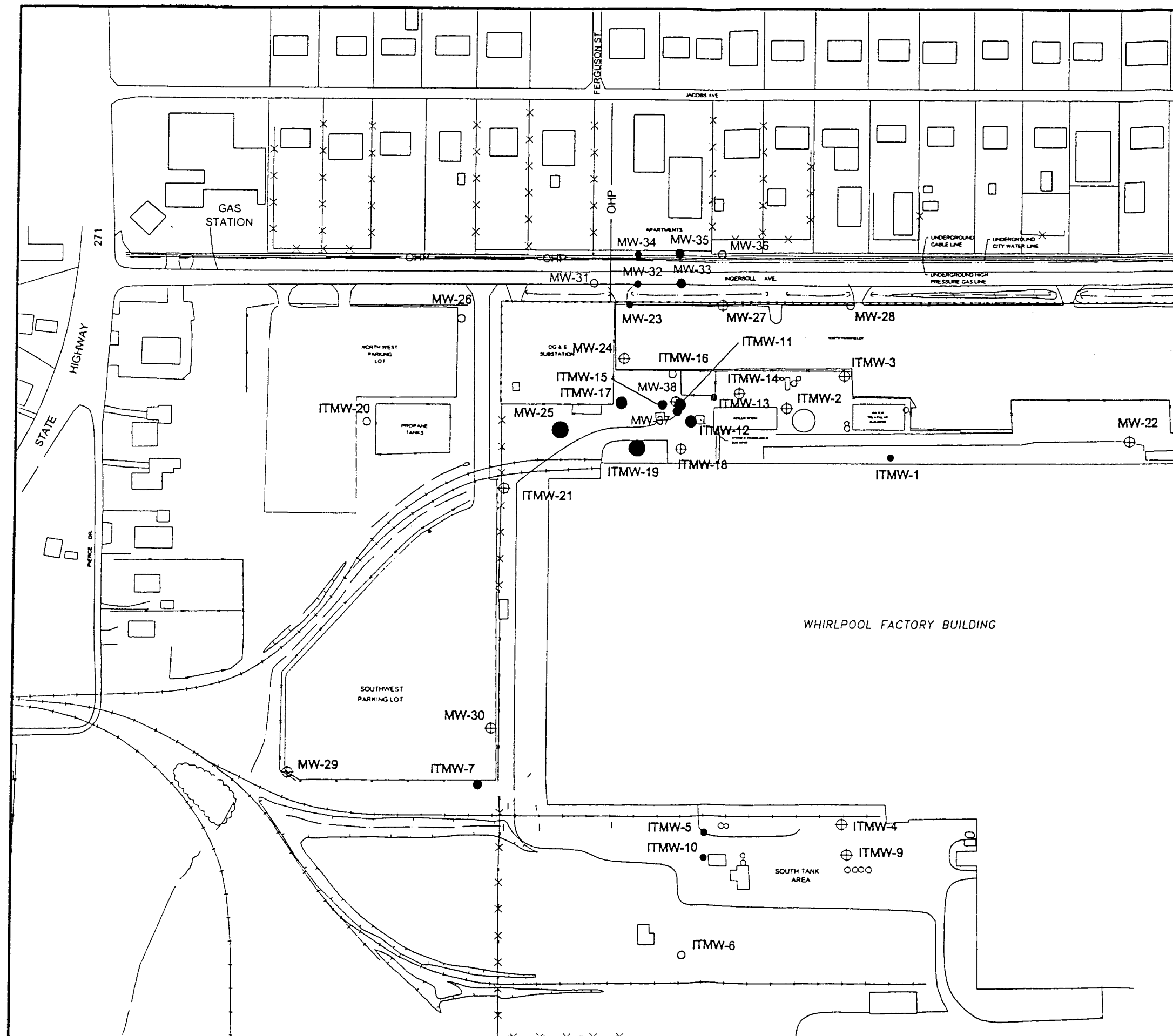


**ERM-Southwest, Inc.**  
HOUSTON • NEW ORLEANS • AUSTIN • DALLAS • BEAUMONT • BATON ROUGE

FIGURE 1  
TCE ISOCONCENTRATION MAP  
FEBRUARY 2002  
TRADITIONAL SAMPLE METHOD  
Whirlpool Corporation  
Fort Smith, Arkansas

DESIGN: JT	CHKD:	DATE: 04/10/02	REV:
DRAWN: LMC	SCALE: AS SHOWN	W.O. NO: 581009B202	D02





# LEGEND

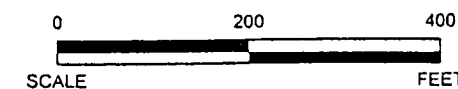
- MW-26 ● EXISTING MONITORING WELL SAMPLED USING LOW-FLOW METHOD
- ⊕ EXISTING MONITORING WELL NOT SAMPLED USING LOW-FLOW METHOD

## TCE CONCENTRATION (mg/l) FEBRUARY 2002

- < 0.005
- 0.005 to 0.10
- 0.10 to 1.00
- 1.00 to 10.0
- > 10.0

## NOTE:

- MW-38 WAS USED AS AN INJECTION WELL FOR THE PILOT STUDY AND WAS NOT SAMPLED IN FEBRUARY 2002.
- MW-31 THROUGH MW-36 ARE LOW YIELD WELLS AND PURGED DRY WHILE ATTEMPTING LOW-FLOW TECHNIQUES. CONSEQUENTLY, DATA FOR THESE WELLS ARE INDICATED ON BOTH TRADITIONAL AND LOW-FLOW TECHNIQUE MAPS.



## ERM-Southwest, Inc.

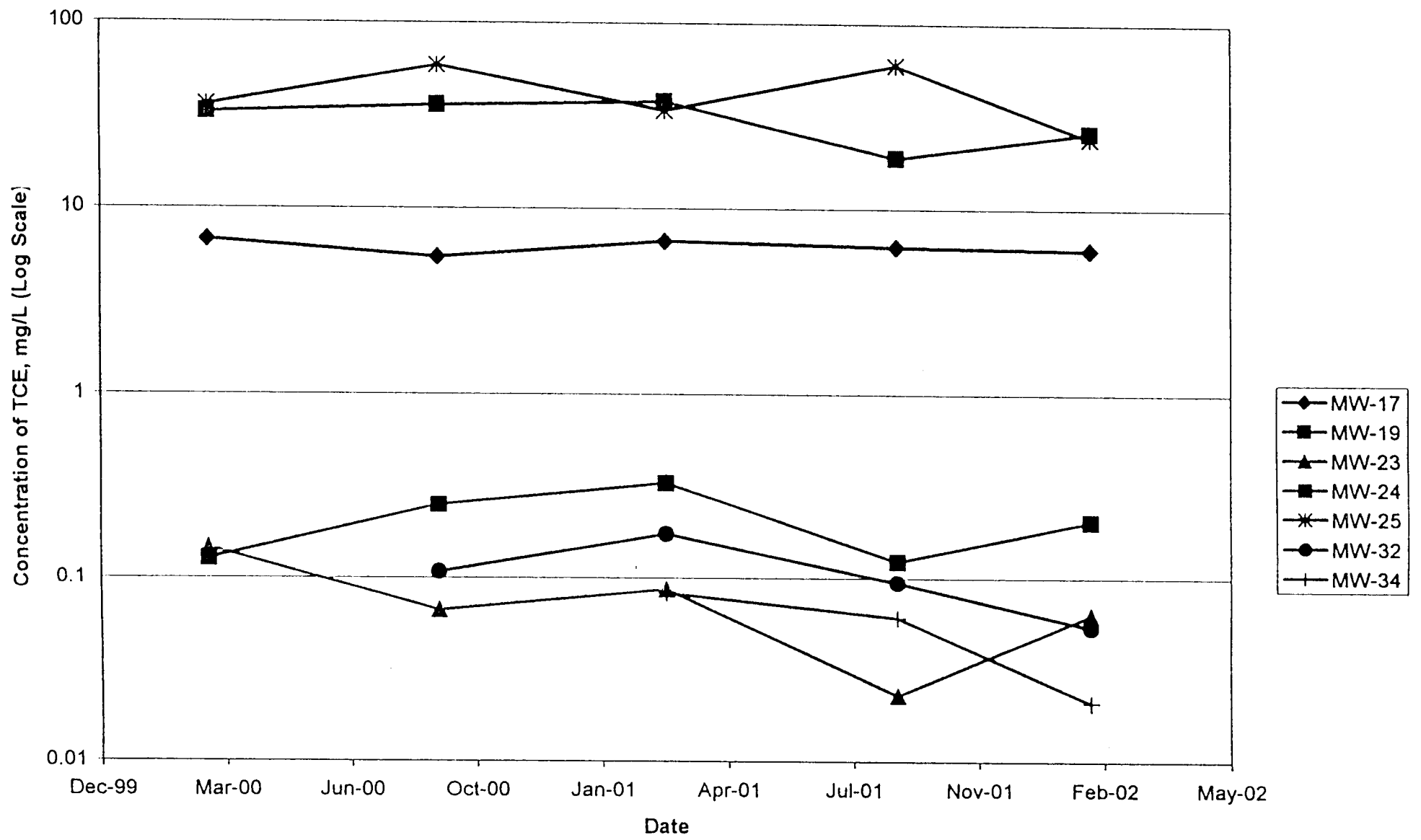
HOUSTON · NEW ORLEANS · AUSTIN · DALLAS · D'HAUMONT · BATON ROUGE

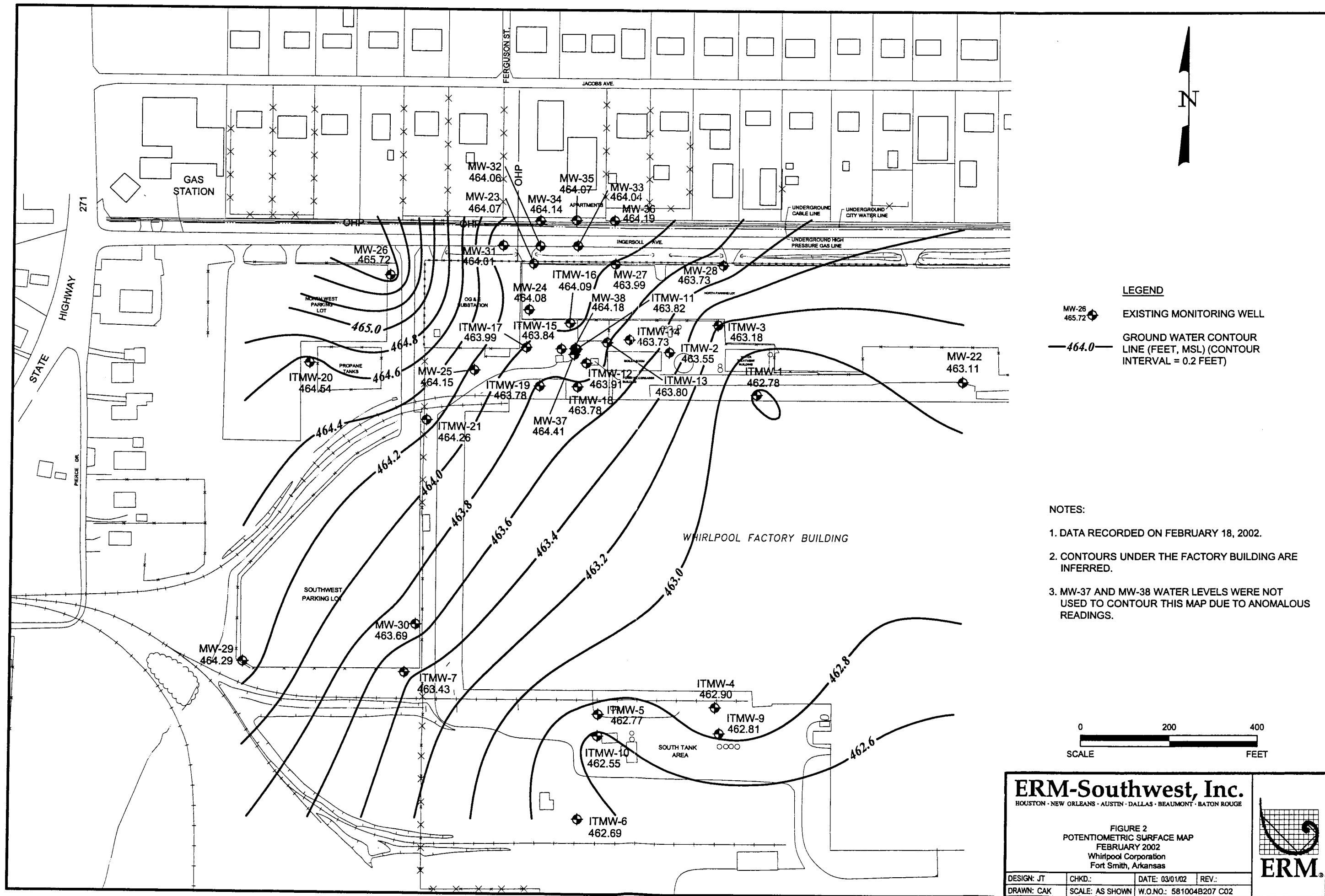
FIGURE 2  
TCE ISOCONCENTRATION MAP  
FEBRUARY 2002  
LOW-FLOW SAMPLE METHOD  
Whirlpool Corporation  
Fort Smith, Arkansas

DESIGN: JT	CHKD:	DATE: 04/10/02	REV:
DRAWN: LMc	SCALE: AS SHOWN	W/O NO: 581009B203 D02	



Figure 3  
TCE Concentrations vs. Time of MW-19 to MW-34 Transect  
Whirlpool Corporation  
Fort Smith, Arkansas

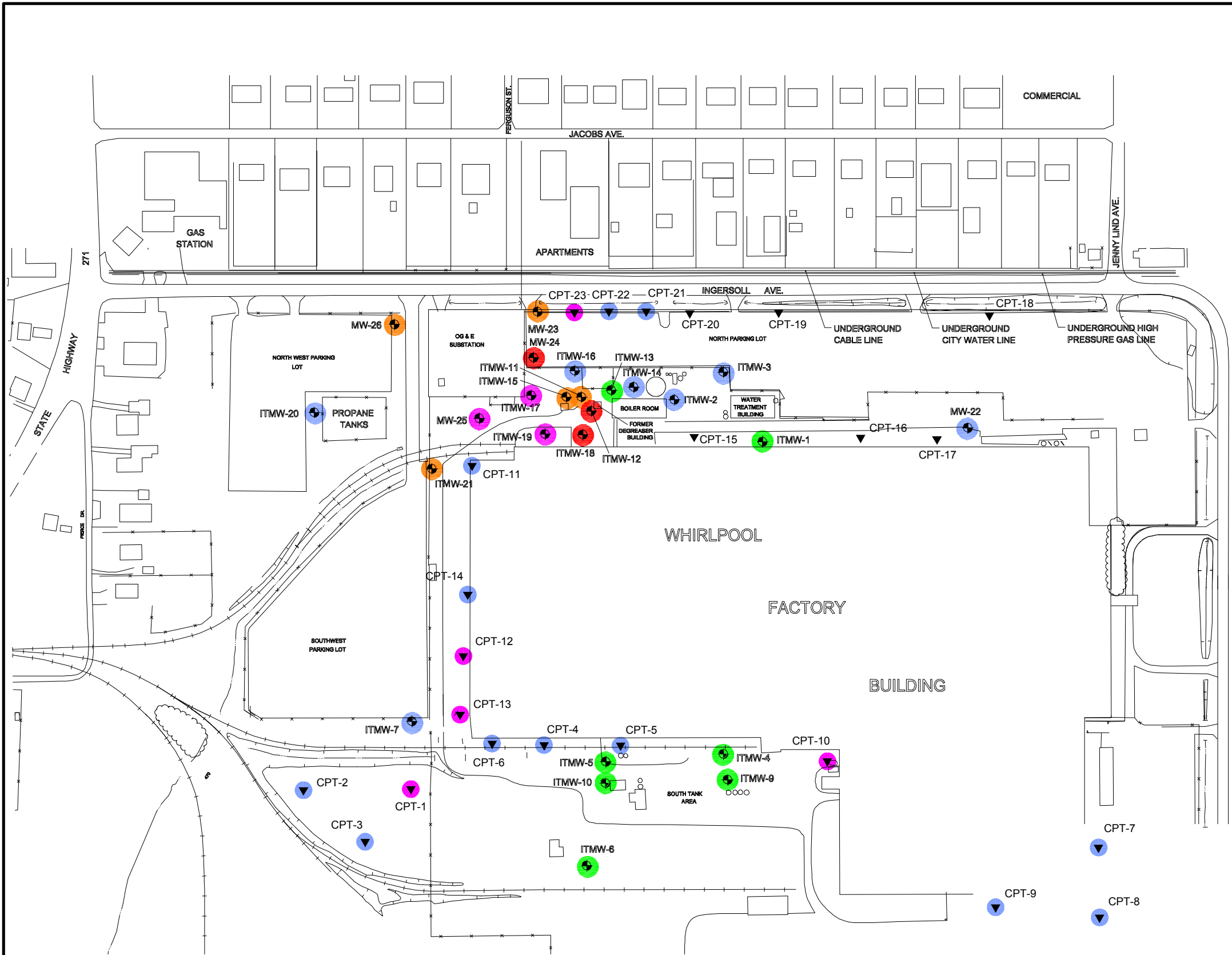




**TCE Isoconcentration Maps and Potentiometric Surface  
Maps from 1999, 2000, and 2001 Semi-Annual Ground  
Water Sampling Reports**  
*Attachment 2*

*August 30, 2002*  
*W.O. #481-007*

**Environmental Resources Management**  
16300 Katy Freeway, Suite 300  
Houston, Texas 77094-1611  
(281) 600-1000



- LEGEND**
- CPT-16 ▼ CPT LOCATIONS
  - MW-26 ⊕ EXISTING MONITOR WELL

- TCE CONCENTRATION (mg/l)  
FEBRUARY 1999**
- < 0.005
  - 0.005 to 0.10
  - 0.10 to 1.00
  - 1.00 to 10.0
  - > 10.0

NOTE: MAP REPRESENTS A COMPILATION OF DATA COLLECTED DURING 1999. MONITOR WELLS WERE SAMPLED DURING FEBRUARY 1999. CPT POINTS WERE SAMPLED DURING OCTOBER 1999.

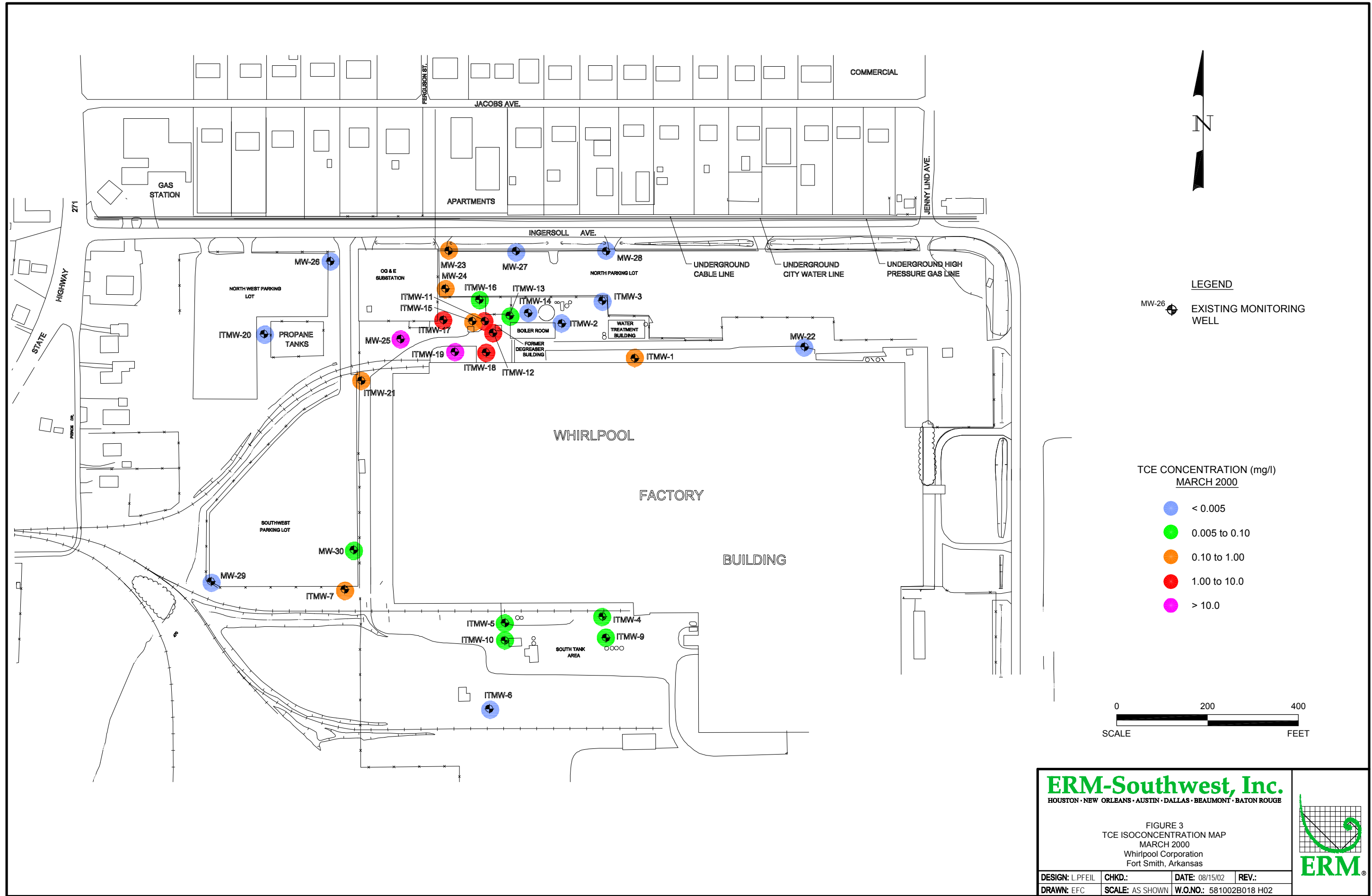


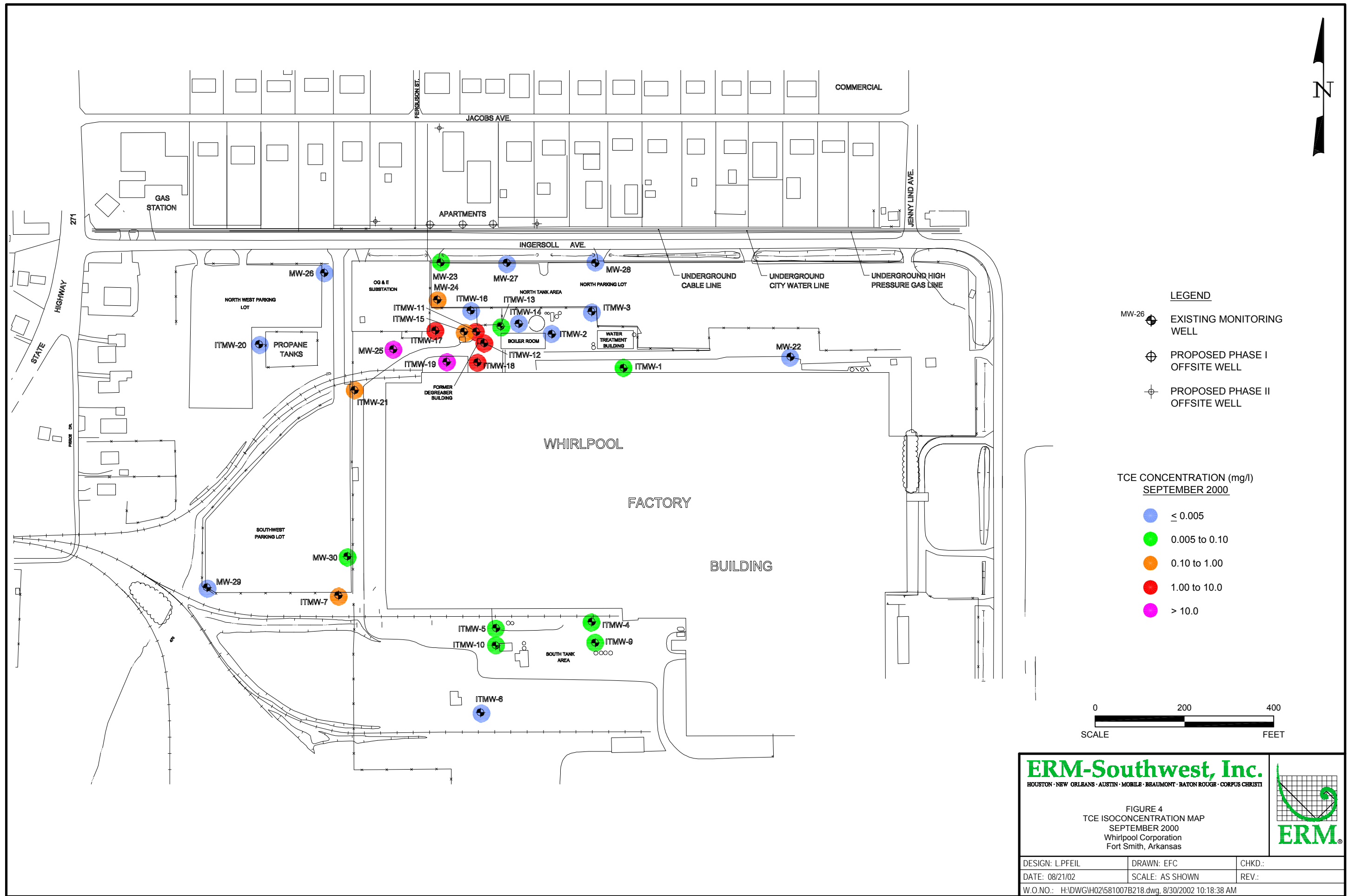
**ERM-Southwest, Inc.**  
HOUSTON · NEW ORLEANS · AUSTIN · MOBILE · BRAUMONT · BATON ROUGE · CORPUS CHRISTI

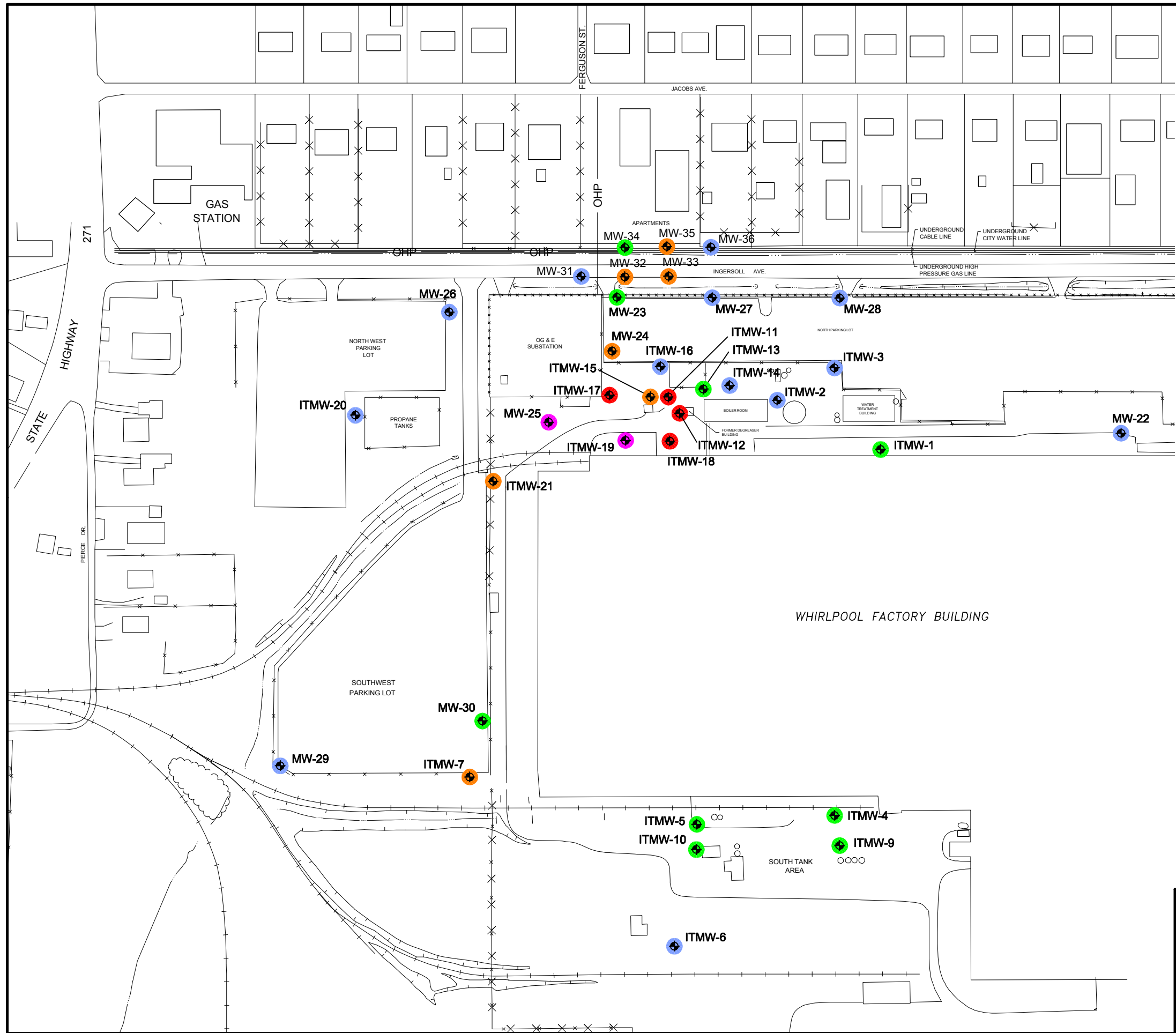
FIGURE 3  
TCE ISOCONCENTRATION MAP  
1999  
Whirlpool Corporation  
Fort Smith, Arkansas

DESIGN: L.PFEIL	DRAWN: EFC	CHKD.:
DATE: 08/23/02	SCALE: AS SHOWN	REV.:
W.O.NO.: H:\DWG\H02\581007B220.dwg, 8/30/2002 10:16:24 AM		









LEGEND

 EXISTING MONITORING WELL

TCE CONCENTRATION (mg/l)  
MARCH 2001

-  < 0.005
-  0.005 to 0.10
-  0.10 to 1.00
-  1.00 to 10.0
-  > 10.0

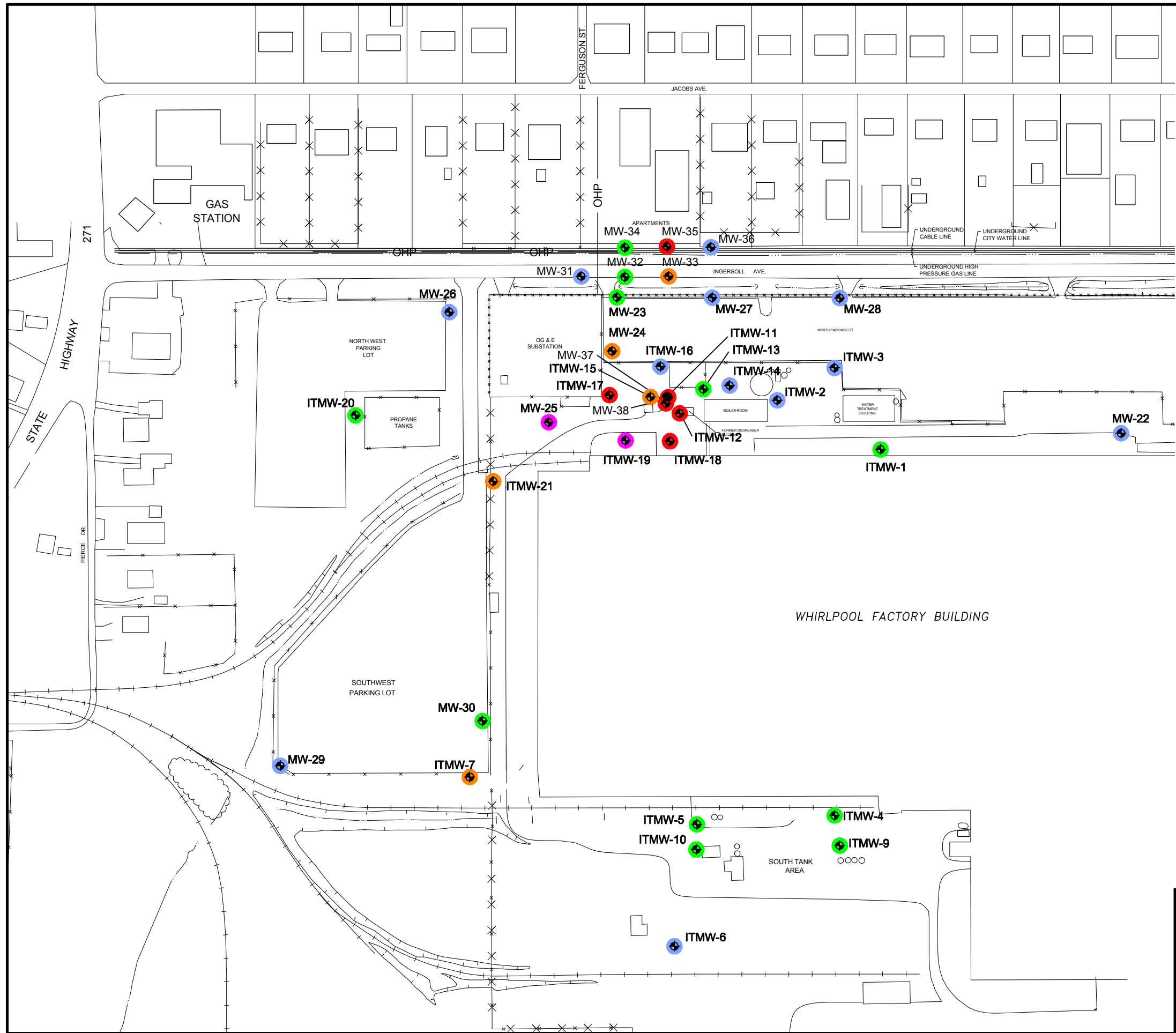


**ERM-Southwest, Inc.**  
HOUSTON • NEW ORLEANS • AUSTIN • DALLAS • BEAUMONT • BATON ROUGE

FIGURE 1  
TCE ISOCONCENTRATION MAP  
MARCH 2001  
Whirlpool Corporation  
Fort Smith, Arkansas

DESIGN: JT	CHKD.:	DATE: 08/16/02	REV.:
DRAWN: CAK/LMc	SCALE: AS SHOWN	W.O.NO.: 581007B211 H02	





**LEGEND**

MW-26 EXISTING MONITORING WELL

**TCE CONCENTRATION (mg/l)  
SEPTEMBER 2001**

- < 0.005
- 0.005 to 0.10
- 0.10 to 1.00
- 1.00 to 10.0
- > 10.0

**NOTES:**

1. LOCATIONS FOR WELLS ITMW-37 AND ITMW-38 ARE APPROXIMATE AND WILL BE UPDATED WHEN SURVEY DATA ARE RECEIVED.

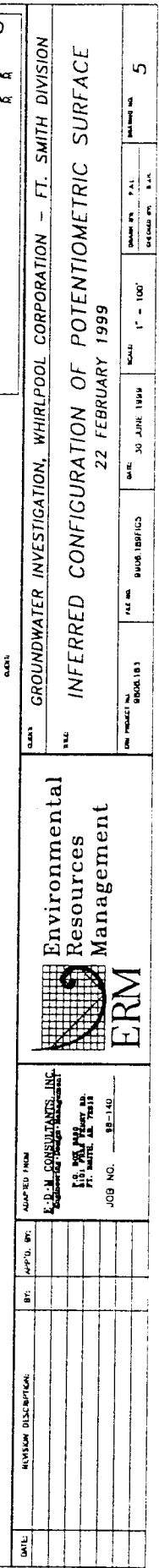


**ERM-Southwest, Inc.**  
HOUSTON • NEW ORLEANS • AUSTIN • DALLAS • BEAUMONT • BATON ROUGE

FIGURE 1  
TCE ISOCONCENTRATION MAP  
SEPTEMBER 2001  
Whirlpool Corporation  
Fort Smith, Arkansas

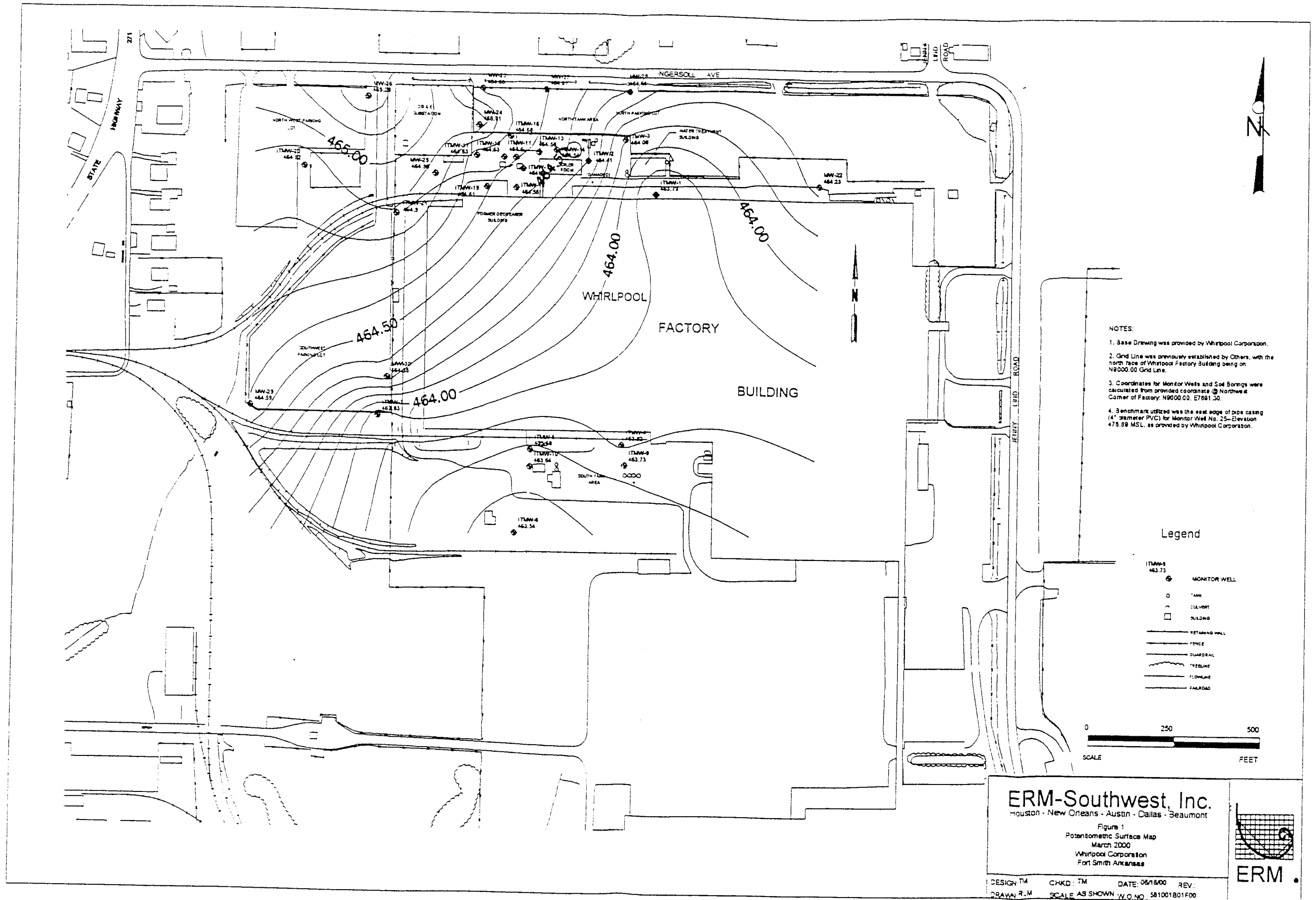
DESIGN: JT	CHKD.:	DATE: 08/21/02	REV.:
DRAWN: CAK/LMc	SCALE: AS SHOWN	W.O.NO.: 581007B212 H02	





NOTE:  
GROUNDWATER ELEVATIONS FOR MONITORING WELLS  
MW-24 THROUGH MW-26 TAKEN ON  
25 FEBRUARY 1999.

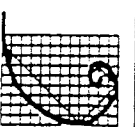




ERM-Southwest, Inc.  
Houston - New Orleans - Austin - Dallas - Beaumont

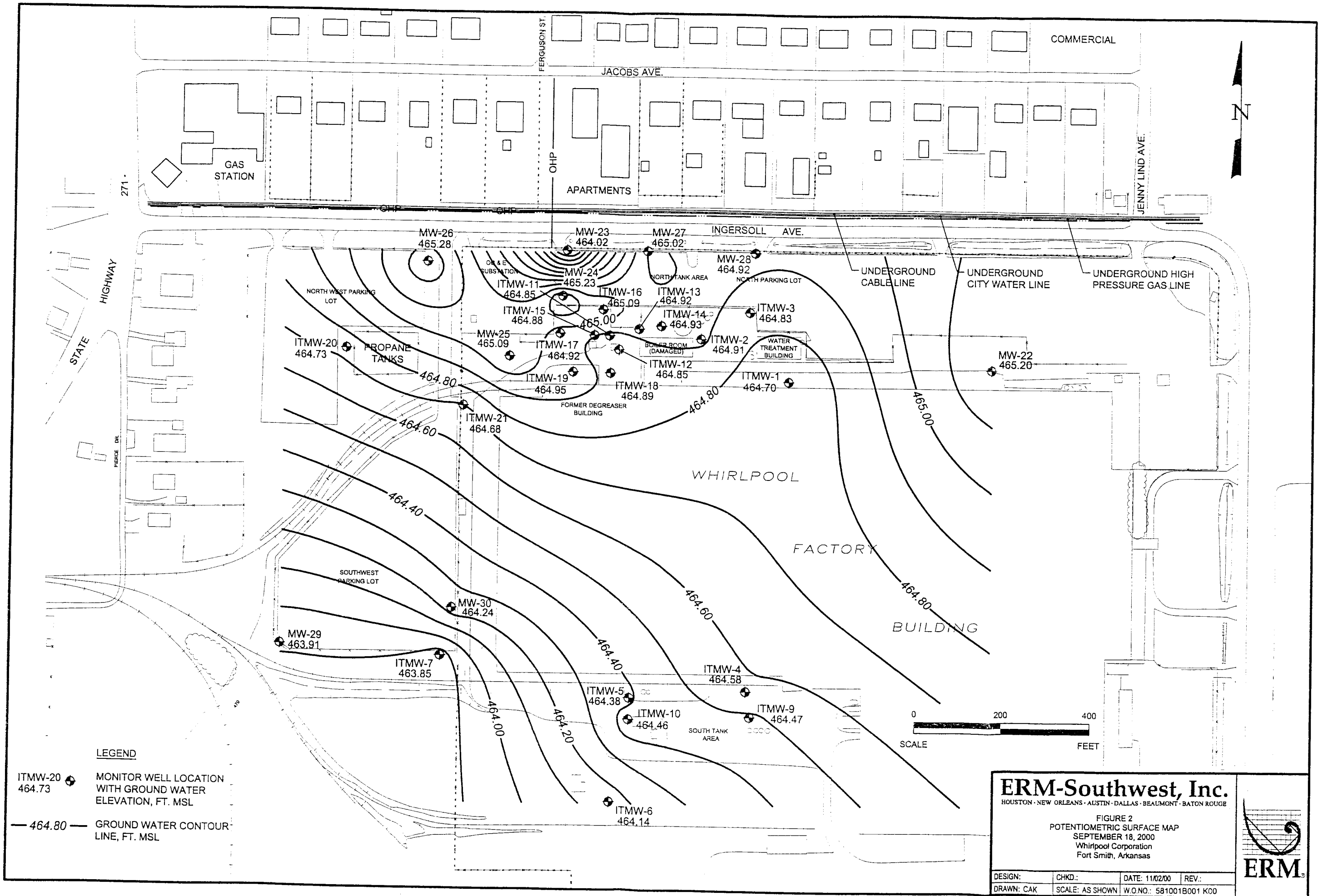
Figure 1  
Potentiometric Surface Map  
March 2000  
Whirlpool Corporation  
Fort Smith Arkansas

DESIGN: TM CHKD: TM DATE: 06/18/00 REV:  
DRAWN: R.M. SCALE: AS SHOWN W.O. NO. 581001801F00



ERM.





LEGEND

- ITMW-20 464.73 MONITOR WELL LOCATION WITH GROUND WATER ELEVATION, FT. MSL
- 464.80 — GROUND WATER CONTOUR LINE, FT. MSL

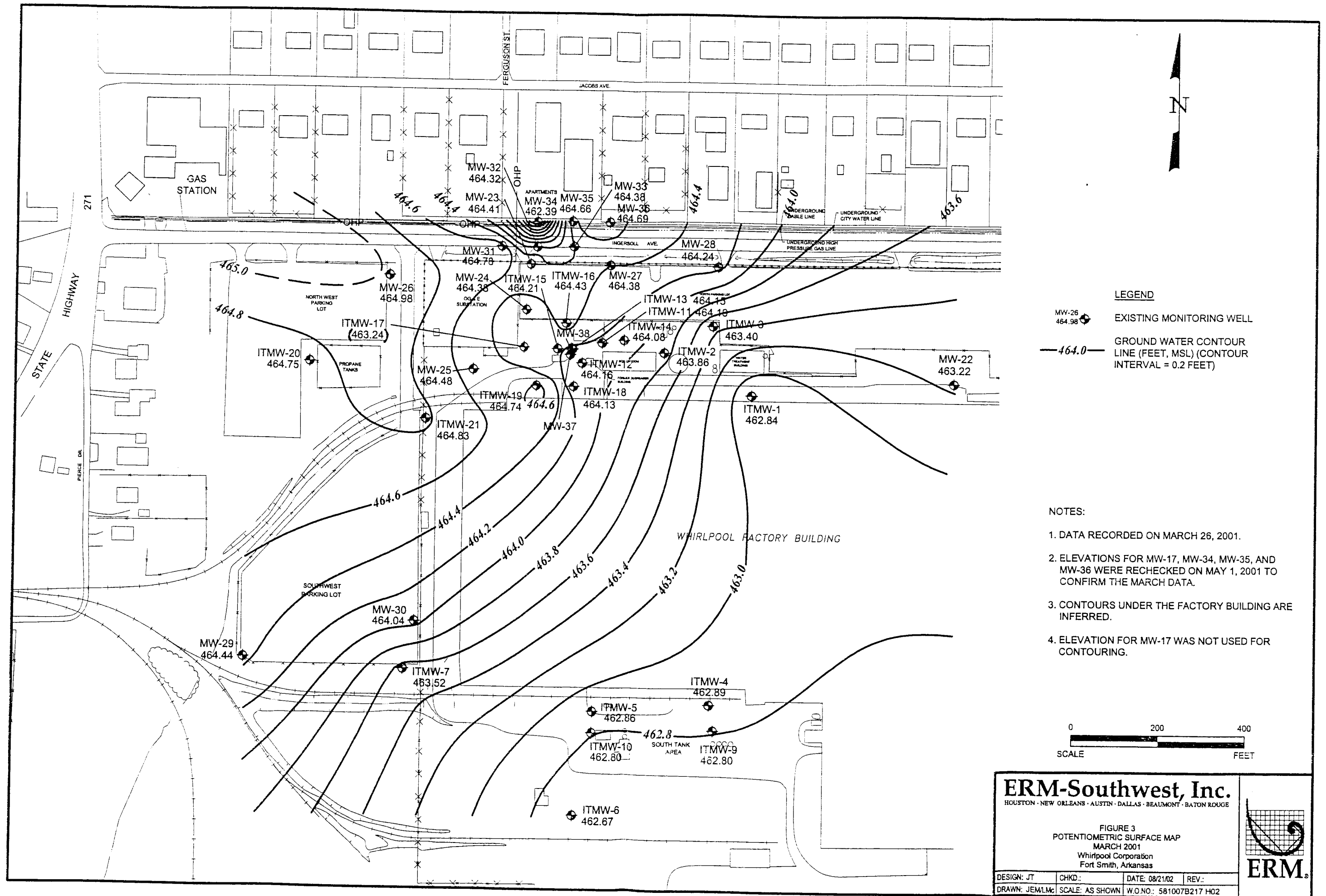
**ERM-Southwest, Inc.**  
HOUSTON • NEW ORLEANS • AUSTIN • DALLAS • BEAUMONT • BATON ROUGE

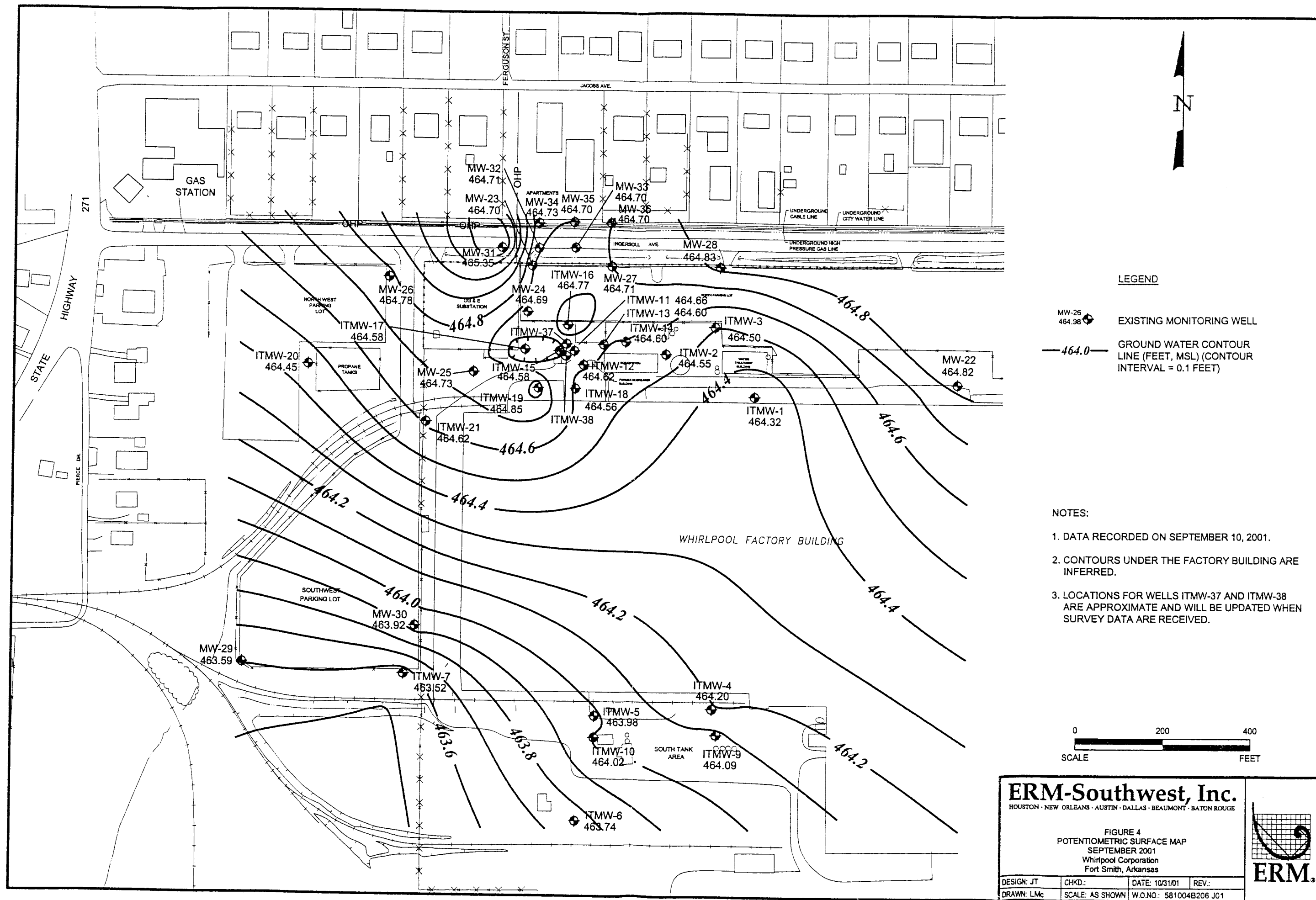
FIGURE 2  
POTENTIOMETRIC SURFACE MAP  
SEPTEMBER 18, 2000  
Whirlpool Corporation  
Fort Smith, Arkansas

DESIGN:	CHKD:	DATE: 11/02/00	REV:
DRAWN: CAK	SCALE: AS SHOWN	W.O.NO.: 581001B001 K00	









**Summary of CPT Grab Ground Water Sample Data**  
*Attachment 3*

*August 30, 2002*  
*W.O. #481-007*

**Environmental Resources Management**  
16300 Katy Freeway, Suite 300  
Houston, Texas 77094-1611  
(281) 600-1000

TABLE 4

## ANALYTICAL RESULTS, VOCs DETECTED IN GROUNDWATER SAMPLES

Parameter	LOQ	CPT-1	CPT-2	CPT-3	CPT-4	CPT-5	CPT-6	CPT-7	CPT-8	CPT-9
Tetrachloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	5	66	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,2-Dichloroethene	5	10	<5	<5	<5	<5	<5	<5	<5	<5
trans-1,2-Dichloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total 1,2-Dichloroethene	10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl Chloride	10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Parameter	LOQ	CPT-10	CPT-11	Dup-1 (Dupl. of CPT-11)	Dup-1A (Chemron CPT-11)	CPT-12	CPT-13	CPT-14	CPT-21	CPT-22
Tetrachloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	5	32	<5	<5	<5	41	5,900	<5	<5	<5
cis-1,2-Dichloroethene	5	<5	<5	<5	<5	16	<5	<5	<5	<5
trans-1,2-Dichloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total 1,2-Dichloroethene	10	<10	<10	<10	<10	20	<10	<10	<10	<10
1,1-Dichloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl Chloride	10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Parameter	LOQ	CPT-23	"FB" (Field Blank)	Travel Blank	MW-27	MW28	Duplicate (Dupl. MW-28)	Duplicate (Chemron, MW-28)	MW-29	MW-30
Tetrachloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	5	340	<5	<5	<5	<5	<5	<5	<5	115
cis-1,2-Dichloroethene	5	16	<5	<5	<5	<5	<5	<5	<5	34
trans-1,2-Dichloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total 1,2-Dichloroethene	10	20	<10	<10	<10	<10	<10	<10	<10	30
1,1-Dichloroethene	5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl Chloride	10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Analysis by US EPA Method SW-846 8260B.

Units used are mg/L.

LOQ = laboratory Limit of Quantitation

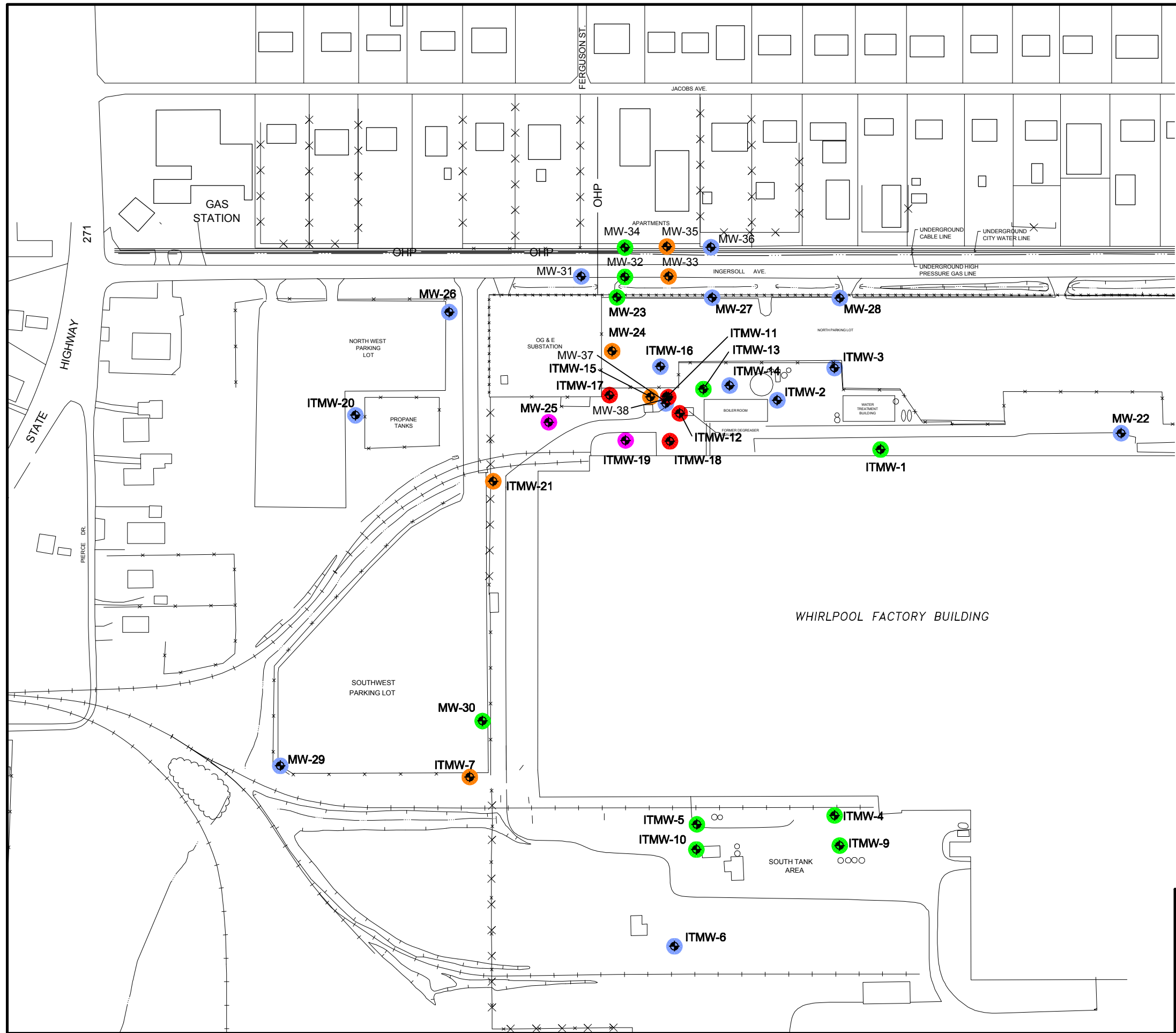
Samples from CPT wells collected 27 October 1999. Samples from MW-series wells collected 09 December 1999.

Chemron = Chemron Incorporated (secondary subcontract laboratory).

**Replacement Figure 5-1 for Conceptual Site Model**  
*Attachment 4*

*August 30, 2002*  
*W.O. #481-007*

**Environmental Resources Management**  
16300 Katy Freeway, Suite 300  
Houston, Texas 77094-1611  
(281) 600-1000



LEGEND

MW-26 EXISTING MONITORING WELL

TCE CONCENTRATION (mg/l)  
FEBRUARY 2002

- < 0.005
- 0.005 to 0.10
- 0.10 to 1.00
- 1.00 to 10.0
- > 10.0

NOTES:

1. LOCATIONS FOR WELLS ITMW-37 AND ITMW-38 ARE APPROXIMATE AND WILL BE UPDATED WHEN SURVEY DATA ARE RECEIVED.



**ERM-Southwest, Inc.**  
HOUSTON • NEW ORLEANS • AUSTIN • DALLAS • BEAUMONT • BATON ROUGE

FIGURE 5-1  
TCE ISOCONCENTRATION MAP  
FEBRUARY 2002  
Whirlpool Corporation  
Fort Smith, Arkansas

DESIGN: JT	CHKD.:	DATE: 08/27/02	REV.:
DRAWN: CAK/LMc	SCALE: AS SHOWN	W.O.NO.: 581007B215 H02	



**Boring Logs and Well Completion Details**  
*Appendix C*

*June 25, 2004*  
*Project No. 0014507*

**Environmental Resources Management**  
15810 Park Ten Place, Suite 300  
Houston, Texas 77084-5140  
(281) 600-1000



# MW-39 DRILLING LOG

W.O. NO. 58113 Boring/Well ID MW-39 Date Drilled 7/14/03  
 Project Off-site delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 29.5' Boring Diam. 3"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' MSL Datum  
 Screen: Type Stainless prepak Diam. 0.75" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 0.75" Length 19.5' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Sammy Smith  
 Drilling Method Geoprobe Log By Troy Meinen

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM HEADSPACE (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-0.5 0.5-2.8	SILTY CLAY: Grayish-brown, dry, hard, occasional rootlets, occurring 1/2" diameter pieces of black shale. SILTY SAND to SANDY SILT: pale brown, moist to dry, crumbly, stiff, abundant rootlets.
					0.0			
					0.0		2.8-4.5	SILTY SANDY CLAY: Pale brown with reddish-brown mottling, moist, slightly plastic to crumbly, occasional rootlets, occurring 1/4" diameter iron nodules.
						4-8		
-5	5				0.0		4.5-5.7	SILTY SANDY CLAY: Strong brown to orange with dark brown mottling, moist to dry, firm, abundant iron nodules and dark brown mottling large occasional pockets of pale brown, soft, silty clay.
					0.0		5.7-7.5	SILTY CLAY: Strong brown, dark brown, and orange mottled, moist, stiff to firm, occasional 1/2" diameter iron nodules, occasional 1/2" diameter to 1" diameter calcareous nodules.
					0.0		7.5-8	SILTY CLAY: Pale brown, dark brown, and orange mottled, moist, stiff to soft, occasional 1/2" to 1" diameter calcareous nodules.
					0.0	8-10	8-9	SILTY CLAY: Strong brown with pale brown and minor dark brown mottling, moist, firm to hard, crumbly to plastic.
					0.0		9-11.1	SILTY CLAY: Strong brown with minor pale gray and abundant dark brown mottling, moist, hard, crumbly, abundant 1/4" diameter calcareous nodules and iron nodules.
-10	10					10-12		
					0.0		11.1-11.6	SILTY SANDY CLAY: Strong brown with pale brown mottling and minor dark brown mottling, moist, stiff to firm, plastic.
						12-14	11.6-12.2	CLAYEY SILTY SAND: Strong brown with abundant dark brown mottling, moist, stiff, crumbly, abundant 1/4"-1/2" calcareous and iron nodules.
					0.0		12.2-15.5	SILTY SANDY CLAY: Strong brown with pale brown and minor dark brown mottling, moist, stiff, slightly plastic.
						14-16		
-15	15							





# MW-39 DRILLING LOG

W.O. NO. 58113 Boring/Well ID MW-39 Date Drilled 7/14/03  
Project Off-site delineation Owner Whirlpool Corporation  
Location Fort Smith, AR Boring T.D. 29.5' Boring Diam. 3"  
N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' MSL Datum  
Screen: Type Stainless prepak Diam. 0.75" Length 10' Slot Size 0.01"  
Casing: Type Schedule 40 PVC Diam. 0.75" Length 19.5' Sump Length 0'  
Top of Casing Elevation 0' Stickup 0'  
Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
Drilling Company TWF Drilling Driller Sammy Smith  
Drilling Method Geoprobe Log By Troy Meinen

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM HEADSPACE (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15				0.0	16-20	15.5-16 16-18.7	SILTY CLAYEY SAND: Brown to strong brown with minor dark brown mottling, moist to wet, soft to firm, slightly crumbly. SILTY CLAYEY SAND TO SILTY SANDY CLAY: strong brown to brown with occasional dark brown mottling, moist to wet, soft to firm, slightly crumbly to slightly plastic (clay content high but varies).
					0.0			
					0.0		18.7-19 19-20	SILTY CLAY: Reddish-brown with occasional dark brown mottling, moist, hard, plastic. SILTY CLAYEY SAND TO SILTY SANDY CLAY: strong brown to brown with occasional dark brown mottling, moist to wet, soft to firm, slightly crumbly to slightly plastic (clay content high but varies), with silty sand pocket with medium-grained sand at base, bro
-20	20				0.0	20-24	20-24	SILTY SANDY CLAY: Strong brown, moist, stiff to firm, plastic.
					0.0			
					0.0	24-25.5	24-24.5 24.5-25.5	CLAYEY SILTY SAND: Strong brown with dark brown mottling, moist to wet, stiff, occasional 1/4" quartzite gravel, sand grain size increases with depth to medium-grained at 24.5'.
-25	25				0.0	25.5-27	25.5-26 26-27.5	GRAVELLY SANDY CLAY to CLAYEY SAND: strong brown with pale gray mottling, moist, hard, crumbly 1/4" to 1/2" diameter quartzite gravel. SILTY GRAVELLY CLAYEY SAND: brown, water-saturated, 1/4" to 1/2" diameter quartzite gravel.
					0.0	27-28		GRAVELLY SANDY CLAY to CLAYEY SAND: strong brown with pale gray mottling, wet to water-saturated, hard, crumbly 1/4" to 1/2" diameter quartzite gravel.
					0.0	28-29.5	27.5-28 28-29	GRAVELLY SAND: Strong brown, water-saturated, dense, medium to coarse-grained with 1/2" to 1" diameter quartzite gravel.
					0.0		29-29.5	SILTY CLAY: Brown to brownish-gray, moist to wet, stiff to hard, plastic, grades to fissil gray shale at base.
-30	30							SHALE: Gray with occasional brown mottling along fractures, fissil, weathered.



# MW-39 DRILLING LOG

W.O. NO. 58113 Boring/Well ID MW-39 Date Drilled 7/14/03  
Project Off-site delineation Owner Whirlpool Corporation  
Location Fort Smith, AR Boring T.D. 29.5' Boring Diam. 3"  
N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' MSL Datum  
Screen: Type Stainless prepak Diam. 0.75" Length 10' Slot Size 0.01"  
Casing: Type Schedule 40 PVC Diam. 0.75" Length 19.5' Sump Length 0'  
Top of Casing Elevation 0' Stickup 0'  
Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
Drilling Company TWF Drilling Driller Sammy Smith  
Drilling Method Geoprobe Log By Troy Meinen

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM HEADSPACE (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30							T.D. = 29.5'
-35	35							
-40	40							
-45	45							



# MW-40 DRILLING LOG

W.O. NO. 58113 Boring/Well ID MW-40 Date Drilled 7/14/03

Project Off-site delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 28.5' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' MSL Datum

Screen: Type Stainless prepak Diam. 0.75" Length 10' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 0.75" Length 17.8' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Sammy Smith

Drilling Method Geoprobe Log By Troy Meinen

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-4	0-0.3 0.3-0.8 0.8-2 2-3.5 3.5-4 4-6.2	SILTY SANDY CLAY: Gray, dry to damp, soft, crumbly, abundant rootlets. WEATHERED SHALE MIXED WITH SILT: black to dark gray, soft, crumbly, fissil (fill material). SILTY SANDY CLAY: Strong brown, black, and gray mottled, moist to wet, firm, plastic, abundant rootlets. SANDY SILT: Brown with occasional dark brown mottling, water-saturated, soft, crumbly. (Boring is at edge of a 2 ft deep wet drainage ditch). SILTY CLAY: Brown with occasional dark brown mottling, water-saturated, soft, crumbly. SANDY CLAYEY SILT: Brown and strong brown with occasional dark brown mottling, wet to water-saturated, soft.
-5	5				0.0	4-8	6.2-8.5	SILTY SANDY CLAY: Strong brown with gray mottling, moist, stiff to hard, plastic.
-10	10				0.0	8-10	8.5-9.5 9.5-10.8	SILTY SANDY CLAY: Strong brown with occasional pale gray mottling, moist, stiff to hard. SILTY SANDY CLAY: Strong brown with gray mottling, moist, stiff to hard, plastic.
-15	15				0.0	10-12	10.8-11 11-11.5 11.5-14	SILTY CLAY: Pale brown, wet, soft, fine-grained. SILTY CLAY: Gray with occasional strong brown mottling, moist, stiff, plastic. SILTY CLAY: Strong brown with occasional gray to pale gray mottling, moist, stiff, plastic. At 12.5ft dark brown to very dark gray mottling
					0.0	12-14	14-14.5 14.5-15.5	SILTY SANDY CLAY: Strong brown with occasional dark brown mottling, moist, firm, plastic. CLAYEY SANDY SILT: Strong brown, wet to water-saturated, soft, loose, with coarse-grained sand to small gravel.
						14-16		



# MW-40 DRILLING LOG

W.O. NO. 58113 Boring/Well ID MW-40 Date Drilled 7/14/03  
Project Off-site delineation Owner Whirlpool Corporation  
Location Fort Smith, AR Boring T.D. 28.5' Boring Diam. 3"  
N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' MSL Datum  
Screen: Type Stainless prepak Diam. 0.75" Length 10' Slot Size 0.01"  
Casing: Type Schedule 40 PVC Diam. 0.75" Length 17.8' Sump Length 0'  
Top of Casing Elevation 0' Stickup 0'  
Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
Drilling Company TWF Drilling Driller Sammy Smith  
Drilling Method Geoprobe Log By Troy Meinen

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15				0.0	16-18	15.5-16 16-18	SILTY CLAY: Strong brown and pale gray, stiff to hard. SILTY SANDY CLAY: Strong brown with occasional pale gray mottling, moist, stiff, slightly crumbly to plastic. At 15.6ft occasional 1/2" diameter iron nodules.
					0.0	18-20	18-19.2 19.2-20	SILTY SANDY CLAY: Strong brown with occasional pale gray mottling, moist, stiff, slightly crumbly to plastic, with occasional dark brown 1/4" to 1/2" diameter nodules, grades to sand at base. SILTY CLAYEY SAND WITH GRAVEL: strong brown to brown, wet to water-saturated, dense, gravel is 1/8" to 1/4" diameter quartzite.
-20	20				0.0	20-24	20-21.5	SILTY SANDY CLAY: Strong brown with gray mottling, wet, stiff, plastic.
					0.0	21.5-23.3	21.5-23.3	SILTY SANDY GRAVEL: water-saturated, loose to flowing, 1/8"-1/4" diameter quartzite gravel, grades to clayey gravel.
					0.0	23.3-23.9	23.3-23.9	CLAYEY GRAVEL: wet to water-saturated, stiff, crumbly.
					0.0	24-26	23.9-24 24-25	GRAVELLY CLAY: Strong brown, wet to moist, hard, plastic, gravel is 1/4" to 1/2" diameter quartzite.
-25	25				0.0	25-25.8	25-25.8	SILTY SANDY GRAVEL: strong brown to brown, water-saturated, dense, 1/8" to 1/4" quartzite gravel.
					0.0	26-28.5	25.8-26.2 26.2-26.3 26.3-26.7 26.7-28	GRAVELLY SILTY SAND: strong brown, water-saturated, dense, crumbly, 1/4" to 1/2" diameter quartzite gravel. SANDY CLAY: Strong brown with very pale grey mottling, moist to wet, hard, crumbly, occasional quartzite gravel (1/2" to 1" diameter). SANDY GRAVEL: brown to strong brown, wet, hard, dense, gravel is 1/2" diameter quartzite.
					0.0	28-28.5	28-28.5	SANDY SILTY CLAY: Pale gray with strong brown mottling, moist, stiff to hard, plastic. SILTY CLAY: Strong brown to orange with occasional gray mottling, fissil to slightly blocky texture, (weathered shale). SHALE: Gray, moist, hard, slightly crumbly, fissil.
-30	30							



# MW-40 DRILLING LOG

W.O. NO. 58113 Boring/Well ID MW-40 Date Drilled 7/14/03  
Project Off-site delineation Owner Whirlpool Corporation  
Location Fort Smith, AR Boring T.D. 28.5' Boring Diam. 3"  
N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' MSL Datum  
Screen: Type Stainless prepak Diam. 0.75" Length 10' Slot Size 0.01"  
Casing: Type Schedule 40 PVC Diam. 0.75" Length 17.8' Sump Length 0'  
Top of Casing Elevation 0' Stickup 0'  
Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
Drilling Company TWF Drilling Driller Sammy Smith  
Drilling Method Geoprobe Log By Troy Meinen

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30							T.D. = 28.5'
-35	35							
-40	40							
-45	45							



# MW-41 DRILLING LOG

W.O. NO. 58113 Boring/Well ID MW-41 Date Drilled 7/15/03

Project Off-site delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 29' Boring Diam. 8"

N. Coord.  E. Coord.  Surface Elevation 0' MSL Datum

Screen: Type Stainless prepak Diam. 0.75" Length 10' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 0.75" Length 18.7' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft.  (  ) 2. Ft.  (  )

Drilling Company TWF Drilling Driller Sammy Smith

Drilling Method Geoprobe Log By Troy Meinen

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM HEADSPACE (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-0.5 0.5-3	SILTY CLAY: Gray, moist, firm, plastic to slightly crumbly, abundant rootlets, occasional iron nodules. SILTY CLAY: Gray with orange mottling, moist, firm to stiff, plastic, abundant rootlets, occasional iron nodules to 1/4" diameter. At 2.6' to 3' no orange mottling.
					0.0		3-4.3	SILTY SANDY CLAY: Brown with gray mottling, moist, slightly plastic to slightly crumbly.
					0.0	4-8	4.3-5.5	SILTY CLAY: Brown to pale brown with minor dark brown and orange mottling, moist, hard, crumbly, blocky, abundant 1/4" to 1/2" calcareous nodules and occasional 1/4" diameter iron nodules.
-5	5				0.0		5.5-6.5	SILTY CLAY: Strong brown and pale gray mottled, moist, stiff to hard, plastic, occasional calcareous nodules to 1" diameter, occasional iron nodules to 1/2" diameter.
					0.0		6.5-8.2	SILTY CLAY: Pale brown with minor strong brown and gray mottling, moist, hard, plastic. At 7" sandy and softer.
					0.0	8-12	8.2-9	SILTY CLAY: Gray and strong brown mottled, wet, soft, plastic.
					0.0		9-9.2 9.2-12	SILTY SAND: Brown, water-saturated, loose to flowing, medium-grained, abundant dark gray grains. SILTY SANDY CLAY: Strong brown to orange with pale gray mottling and minor dark brown mottling, moist, hard, plastic, occasional iron nodules to 1/2" diameter.
-10	10				0.0		12-16	SILTY CLAY: Pale gray with occasional orange to strong brown mottling, moist, hard, plastic. At 16' to 18' orange to strong brown with occasional iron nodules to 1/8" diameter. At 18' to 19' pale gray and sandy.
-15	15				0.0			



# MW-41 DRILLING LOG

W.O. NO. 58113 Boring/Well ID MW-41 Date Drilled 7/15/03  
 Project Off-site delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 29' Boring Diam. 8"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' MSL Datum  
 Screen: Type Stainless prepak Diam. 0.75" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 0.75" Length 18.7' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Sammy Smith  
 Drilling Method Geoprobe Log By Troy Meinen

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM HEADSPACE (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15				0.0	16-20		
					0.0			
					0.0		19-19.5	SAND TO SILTY SAND: strong brown with minor pale brown mottling, water-saturated, dense, medium-grained quartz.
-20	20				0.0	20-24	19.5-20	GRAVELY SILTY SANDY CLAY: strong brown, moist to wet, hard, crumbly, 1/2"-1" diameter quartzite gravel.
					0.0		20-21	SILTY SANDY CLAYEY GRAVEL: strong brown, water-saturated, dense, crumbly, 1/2"-1" diameter quartzite gravel, 1/8" gravel and medium and coarse-grained sand.
					0.0		21-22	SILTY SANDY GRAVEL, strong brown, water-saturated, dense, crumbly, 1/2"-1" diameter quartzite gravel, 1/8" diameter quartzite gravel and medium and coarse-grained quartz sand.
					0.0		22-26.5	SILTY SANDY GRAVEL: strong brown, water-saturated, dense, 1/4"-1/8" diameter quartzite gravel.
-25	25					24-29		
							26.5-29	SILTY CLAY AND SHALE: strong brown to orange grading to dark gray to black, moist, fissil (zone describes cuttings).
-30	30							T.D. = 29'



# MW-42B DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-42B Date Drilled 11/10/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 27' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 0.75" Length 22' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-0.7	FILL: Clayey Asphalt, dark gray and black mottled, dry, coarse-grained, gravel (up to 1/2"-diameter), brittle.
							0.7-1.55	CLAYEY SILT: Medium brown, dry, nonplastic, very loose, very fine-grained, trace of rootlets.
							1.55-1.7	CLAYEY SILT: Reddish-yellow, dry, nonplastic, medium dense, very fine-grained, crumbly, pockets of silty clay, dark brown.
-2	2				0.0		1.7-3.6	SILTY CLAY: Yellowish-red with some red, wet, slightly plastic, soft, with trace of up to 1/16"-diameter hard black nodules, trace of black burrowing.
							3.6-4	CLAYEY SILT: Red and yellowish-red mottled, dry to moist, nonplastic, medium dense, crumbly, with some black nodules.
-4	4					4-8	4-6.8	SILTY CLAY: Yellowish-red and red mottled, dry, nonplastic, soft, very fine-grained, pockets of clayey silt, dark brown and gray mottled, very fine-grained, loose to medium dense, crumbly.
								From 4.3'-4.6' trace of black silty clay material, hard, with slight luster.
								From 4.6'-5.4' slightly plastic, stiff, slightly crumbly, layer of yellowish-red throughout.
-6	6				0.0			From 5.4'-6.8' becomes hard, crumbly, with clay seam, gray, hard, traces of black nodules.
							6.8-8.9	GRAVELLY CLAY INTERMIXED WITH SANDY CLAY, reddish-brown, with trace of red, light gray, black mottled, dry, plastic, hard coarse-grained, intermixed with silty sand with black calcareous nodules.
-8	8					8-12		CLAY: Yellowish-brown and light gray mottled, moist, hard, plastic, trace of black burrowing at 8.9'-9.1', 11.3'-11.4', and 9.8'-10.4'.
								From 12'-12.7' trace of dark brown mottled
								From 12'-12.5' trace of light gray
							8.9-14.8	From 12.5'-12.7', moist, stiff.
								From 12.7'-12.9' layer of silty clay, yellowish-brown and dark gray, moist, nonplastic, soft, loose, with trace of hard nodules (1/16"-1/8" diameter).
-10	10							From 12.9'-14.8' yellowish-brown with some light gray and black burrowing throughout, moist, very stiff, plastic.





# MW-42B DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-42B Date Drilled 11/10/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 27' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 0.75" Length 22' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-10	10				0.0	12-16		
-12	12							
-14	14				0.0		14.8-16	CLAY WITH SILT, yellowish-brown with some light gray, moist, plastic, very stiff, black burrowing throughout.
-16	16					16-20	16-18	NO RECOVERY: Cuttings indicate sandy clay.
-18	18				0.0		18-20	NO RECOVERY: Cuttings incated clayey sand.
-20	20							



# MW-42B DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-42B Date Drilled 11/10/2003  
 Project Off-Site Delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 27' Boring Diam. 3"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 0.75" Length 22' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Ed Wilson  
 Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-20	20				0.0	20-22	20-20.4 20.4-20.8 20.8-21 21-22	CLAYEY SAND: Pale brown with some light gray mottled, very wet, very loose to loose, medium-grained, with seam of sandy clay throughout, slightly plastic, firm to very soft. SANDY CLAY: Yellowish-brown and reddish-brown, wet to moist, slightly plastic, stiff, laminations of clayey sand, loose, fine-grained.
-22	22				0.0	22-24	22-23.3 23.3-24	SANDY CLAY: Gray with some yellowish-brown, moist to damp, very stiff, trace of greenish-gray calcareous nodules (up to 1/4"-diameter). GRAVELLY CLAY: Reddish-brown with a trace of dark brown and red., dry, nonplastic, coarse-grained, very crumbly, gravel (up to 1/2"-diameter) increases towards base.
-24	24				0.0	24-26	24-25.5 25.5-26	GRAVEL: CLAYEY GRAVEL, yellow, brown, and reddish-brown mottled, water-saturated, gravel nodules (up to 1/8"-diameter), very coarse-grained. GRAVELLY CLAY: Yellowish-brown and reddish-brown mottled, very wet, slightly plastic, hard, abundant gravel nodules.
-26	26				0.0	26-27	26-27	CLAYEY SAND: dark brown and dark gray mottled with some loose gravel, water-saturated, gravel nodules (up to 1/8"-diameter), very coarse-grained. GRAVELLY SANDY CLAY: dark brown and yellowish-brown mottled, wet to moist, slightly plastic, soft, loose, coarse-grained.
-28	28							CLAY: Dark brownish-gray, damp, plastic, hard, blocky towards base with layers of light gray with fractures throughout.
-30	30							T.D. = 27'



# MW-43 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-43 Date Drilled 11/11/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 26.2' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 0.75" Length 21' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-1.5	NO RECOVERY, sediment too soft.
							1.5-2.1	CONCRETE
-2	2				0.0		2.1-3.2	CLAYEY SANDY SILT: Medium brown with a trace of yellowish-red, and dark gray, damp, nonplastic, medium dense, fine-grained with occasional black asphalt nodules (1/8"-diameter). From 3.0'-3.2' pocket of asphalt, black, luster, hard coarse-grained nodules (up to 1/2"-diameter), intermixed with coarse-grained sand, loose.
							3.2-3.8	SILTY CLAY: Medium brown with some dark gray mottled, wet, slightly plastic, soft, with occasional calcareous nodules (up to 1/8"-diameter). At 3.5' trace of reddish-yellow.
-4	4					4-8	3.8-4.5	SILTY CLAY AND CLAYEY SILT INTERMIXED, medium brown and yellowish-red mottled, damp, nonplastic, stiff to firm.
							4.5-5.3	SILTY CLAY: Medium brown with some yellowish-brown and gray mottled, moist, firm, slightly plastic.
							5.3-6.1	From 4.5'-4.7' trace of black and brownish-gray mottled, wet, very soft. From 4.85'-5.10' clayey silt parting, gray.
-6	6				0.0		6.1-7.4	SANDY CLAYEY SILT: Yellowish-brown with some reddish-yellow mottled, dry, medium dense to loose, very crumbly, fine-grained, well-sorted, with occasional black calcareous nodules (up to 1/4" diameter), very crumbly.
							7.4-8	CLAYEY SILT: Yellowish-brown and reddish-yellow mottled, dry, medium dense to loose, fine-grained, crumbly, with occasional dark gray and black burrowing.
-8	8					8-12	8-9	SILTY CLAY: Yellowish-brown with trace of gray and red, damp, slightly plastic, stiff to very stiff, with trace of black nodules (up to 1/16"-diameter), caliche.
							9-11.3	NO RECOVERY SILTY SANDY CLAY: Yellowish-brown and gray with occasional reddish-yellow mottling, dry, plastic, hard, slightly crumbly.
-10	10							



# MW-43 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-43 Date Drilled 11/11/2003  
 Project Off-Site Delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 26.2' Boring Diam. 3"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 0.75" Length 21' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Ed Wilson  
 Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-10	10				0.0			
-12	12				0.0	12-14	11.3-12 12-12.8 12.8-13.1 13.1-14	CLAYEY SILT: Gray with some yellowish-brown mottled, dry, medium dense to dense, very fine-grained, well-sorted. SILTY CLAY: Yellowish-brown and medium brown mottled with some gray, very wet, nonplastic to slightly plastic, very soft, slightly flowing, with parting of clayey silt, gray. CLAYEY SILTY SAND: Gray, dry, hard, nonplastic, fine-grained, black burrowing. SILTY SAND: Yellowish-brown, dark gray, and black mottled, moist, loose, with occasional black calcareous nodules. At 13.6' dense.
-14	14				0.0	14-16	14-14.4 14.4-17	SILTY CLAY: Yellowish-brown and gray mottled, wet, very soft, nonplastic, very fine-grained, well-sorted. From 14.3'-14.4' pocket of black, brownish-gray, and yellowish-brown mottling. SILTY SAND: Yellowish-brown, wet, medium-grained, moderately sorted, quartz grains visible of various colors, loose to medium dense. From 15.6'-16' fining downward.
-16	16				0.0	16-18		SILTY CLAY: Gray with trace of yellowish-brown, moist to damp, slightly plastic, stiff. SILTY CLAYEY SAND: Reddish-brown, moist, medium to fine-grained, loose to medium dense, well-sorted.
-18	18				0.0	18-20	17-17.5 17.5-18 18-18.5 18.5-19.5 19.5-19.8 19.8-20	GRAVELLY CLAYEY SAND: reddish-brown, very wet, loose, medium to coarse-grained, poorly sorted, abundant gravel (up to 3/4"-diameter). CLAYEY SILTY SAND: Reddish-brown, moist to wet, medium dense, medium-grained, poorly sorted, with occasional gravel (up to 1/4"-diameter). SILTY CLAY: Bluish-gray with trace of yellowish-brown mottling, damp to dry, slightly plastic, hard. CLAYEY SILTY SAND: Pale brown, yellowish-red, and gray mottled, damp to dry, medium dense, very fine-grained, well sorted to medium sorted, with trace of iron staining throughout.
-20	20				0.0			



# MW-43 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-43 Date Drilled 11/11/2003  
 Project Off-Site Delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 26.2' Boring Diam. 3"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 0.75" Length 21' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Ed Wilson  
 Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-20	20				0.0	20-22	20-20.1 20.1-22	SILTY CLAYEY GRAVEL, reddish and reddish-brown mottling, wet, poorly graded, abundant gravels (up to 3/4"-diameter), semi-angular, coarse, sand and clay mixtures, hard, nonplastic, stiff. From 20.6'-20.10' some pink mottling.
-22	22				0.0	22-24	22-23.3	CLAYEY SILTY SANDY GRAVEL: abundant gravels (up to 1"-diameter), wet, hard, nonplastic, semi-rounded, coarse-grained, with clayey silty sandy mixtures that are dark gray and black mottled.
-24	24				0.0	24-26.2	23.3-23.9 23.9-24 24-24.11 24.11-24.7 24.7-25.11 25.11-26.2	CLAYEY SANDY GRAVEL: water, saturated, well graded, gravel makes up 95% of matrix (up to 1"-diameter), with traces of gravel-clayey and mixtures. CLAYEY GRAVELLY SAND, yellowish-brown, dry to damp, nonplastic, fine-grained, occasional gravels (up to 1/4"-diameter) semi-rounded. SANDY GRAVELLY CLAY, medium brown, brownish-gray, and yellowish-brown mottled, dry, occasional gravel (up to 1"-diameter). SILTY SAND WITH GRAVEL: light brown, pale brown, dark gray, and black mottled, dry to moist, medium dense, fine-grained, angular gravel nodules (up to 1/2"-diameter). CLAYEY SILTY GRAVEL, wet, well graded, (up to 1/2"-diameter), angular, yellowish-brown clayey silt, nonplastic, fine-grained.
-26	26							CLAY: Brownish with some black, dark gray and gray mottling, moist, hard, plastic, becoming dominantly dark gray and brownish-gray mottling at 25.6', grades to a fissile shale. SHALE: Dark gray, hard, weathered, fissiles, occasional brown mottling along fractures. T.D. = 26.2'
-28	28							
-30	30							



# SB-45 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID SB-45 Date Drilled 11/12/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 24' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 2" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-3.5	SANDY CLAY: Dark brown and brown mottled, damp, slightly plastic, soft, trace of asphalt nodules (1/8"-diameter). From 0.8'-3.5' becomes medium and pale brown mottled, damp to dry, higher sand content.
-2	2				0.0		3.5-4	SILTY CLAY: Yellowish-brown and brown mottled, damp, slightly plastic, firm, pockets of gray clayey silt, very fine-grained, nonplastic, medium dense to dense.
-4	4					4-6	4-4.3	SANDY CLAY: Reddish-yellow with traces of brown, pale brown and light gray, slightly plastic, damp, firm to soft.
					0.0		4.3-6	SILTY CLAY: Brown and yellowish-brown mottled, damp, slightly plastic, firm, trace of rootlets at 4.11', seam of sandy clay, gray, nonplastic, loose to medium dense, fine-grained. From 5.2'-5.6' silty clay becomes reddish-yellow with pockets of clayey silt, loose to medium dense, crumbly.
-6	6					6-8	6-7.1	SILTY CLAY: Brown, yellowish-brown, and gray mottled, moist, slightly plastic, firm to stiff, pockets of sandy clay, reddish-yellow, slightly plastic.
					0.0		7.1-8.1	SILTY CLAY: Gray and brown mottled with some reddish-yellow that are pockets of sandy clay, damp, slightly plastic. From 7.7'-8' seam of reddish-yellow silty clay, stiff.
-8	8					8-12	8.1-9.8	CLAY WITH SILT, gray with trace of reddish-yellow, dry, hard, plastic. From 9.0'-9.8' becomes gray and reddish-yellow mottled, no silt.
							9.8-14	SILTY CLAY: Reddish-yellow with some gray mottled, dry, plastic, hard, trace of black burrowing throughout and iron staining, becoming harder towards base. From 10.9'-12.10' becomes brown with trace of gray and yellowish-brown mottling, damp to moist, plastic to slightly plastic, soft. From 12.10'-14' becomes firm intermixed with plastic and slightly plastic. From 13.6'-14' pockets of silty clay, gray and sandy clay, red, slightly plastic to nonplastic, medium dense, very fine-grained.
-10	10							



# SB-45 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID SB-45 Date Drilled 11/12/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 24' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 2" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-10	10				0.0			SANDY CLAY: Red with trace of gray, damp to dry, soft, crumbly, equal amounts of sand and clay.
-12	12					12-14		At 14.2' and 14.5' pocket of silty clay, gray, loose to medium dense, very soft.
					0.0			CLAY: Light greenish-gray with trace of red mottled, damp to dry, plastic, hard.
								CLAYEY SILT: Gray, damp, soft, loose, nonplastic, very fine-grained.
								CLAYEY SAND: Yellowish-red and red mottled, wet, well sorted, rounded, fine-grained, pockets of clayey silt, pale brown, throughout.
-14	14					14-16	14.0-14.7	From 14.10'-15' black burrowing.
					0.0		14.7-14.9	SILTY SAND: Red, wet to very wet, medium dense, fine-grained, abundant iron staining, black burrowing.
							14.9-14.10	SILTY GRAVELLY SAND: red and yellowish-red mottled, very wet, poorly to medium sorted, gravel (up to 1/8"-diameter), semi-rounded, increase gravel towards base.
							14.10-15.8	At 16' water-saturated.
-16	16					16-18	15.8-15.10	At 16.7' pocket of silty sand, greenish-gray and bluish-gray, very wet, loose, with some calcareous nodules (up to 1/16"-diameter).
					0.0		15.10-17	From 16.9'-17' trace of clay content in mixture so clayey silty sand.
								Decrease in gravel content to trace.
								CLAYEY GRAVELLY SAND: red and reddish-brown mottled, water-saturated, abundant gravel (up to 3/4"-diameter), semi-rounded, fine-grained to medium-grained, loose to very loose.
					0.0		17-18	SILTY GRAVEL: water-saturated, abundant gravels (up to 3/4"-diameter), rounded to semi-angular, medium-graded to well graded, with silt and sand mixtures, yellowish-red and yellowish-brown mottled.
-18	18					18-20	18-18.9	GRAVELLY SILTY SAND: moist, medium-grained, very loose, trace of gravel (up to 1/16"-diameter), abundant iron staining.
					0.0		18.9-19.9	SILTY GRAVELLY SAND: wet to moist, medium-grained, poorly sorted, very loose, abundant gravel (up to 1/8"-diameter).
							19.9-19.11	
-20	20						19.11-20	SILTY CLAYEY SAND: Yellowish-brown, damp, fine-grained, medium dense to dense, slightly plastic to nonplastic.



# SB-45 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID SB-45 Date Drilled 11/12/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 24' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 2" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-20	20				0.0	20-22	20-21.6	CLAYEY GRAVELLY SAND: yellowish-brown, very wet, rounded gravel (up to 1/16"-diameter), clayey sand mixture, increases clay content towards base. From 20.9'-21.6' abundant gravel.
-22	22				0.0	22-24	21.6-22 22-23.9	CLAYEY SAND: Dark brown and yellowish-brown mottled, moist, nonplastic, fine-grained, medium dense, with some gravel (up to 3/4"-diameter), becoming dense towards base. SILTY SAND: Yellowish-brown and medium brown mottled with some black and dark gray mottling, damp, very loose.
-24	24				0.0		23.9-24	CLAY: Dark brown with some black, dark gray, and red mottling, damp, plastic, hard, weathered, fissles towards base with iron staining along fractures. T.D. = 24'
-26	26							
-28	28							
-30	30							





# MW-46 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-46 Date Drilled 11/13/2003  
 Project Off-Site Delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 22' Boring Diam. 3"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 0.75" Length 21' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Ed Wilson  
 Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVH Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-2	0-4	SILTY CLAY: Gray and dark gray mottled, moist, nonplastic, soft, with some iron nodules (1/8"-diameter). From 0.8'-1.1' with some black hard clay nodules (1/8"-diameter). From 1.1'-1.10' slightly plastic, with pockets of sandy silty clay, brown. At 0.7'-1.1' firm, plastic. From 1.10'-2' brownish-gray, plastic to slightly plastic, with seam of clayey sand, reddish-yellow, medium dense, very fine-grained. From 2'-2.3' gray and dark gray with trace of brown mottled, moist, soft, slightly plastic. At 2.2' pocket of black silty clay, plastic. From 2.3'-2.11' brown with gray mottled, damp to dry, stiff, plastic. From 2.11'-3.4' moist, soft, slightly plastic. From 3.4'-3.7' red, yellowish-brown, gray, and light gray mottled, moist, very stiff, plastic. From 3.7'-4' Gray with some yellowish-red mottled, damp, plastic, very stiff to stiff, with iron concretions mottled (1/8"-diameter).
-2	2				0.0	2-4	4-8	CLAYEY SILT: Gray, damp, nonplastic, loose to medium dense, very fine-grained. SILTY CLAY: Brownish-gray with trace of pale yellow mottled, damp, plastic, soft. From 5.4'-5.5' pocket of sandy clayey silt mottling, brownish-gray with some dark gray, loose to medium dense, nonplastic. From 5.6'-5.7' pocket of reddish-yellow clayey sand, loose to medium dense, very fine-grained.
-4	4				0.0	4-8	8-12	SANDY SILTY CLAY: Brown with some yellowish-red mottled, dry to damp, slightly plastic, stiff, very fine-grained. SILTY SANDY CLAY: Pale brown and medium brown mottled, dry to damp, nonplastic, soft. At 6.8' pocket of very fine silty clay, gray, plastic, very soft. From 7.6'-8' gray and pale brown with some yellowish-red and black mottling, nonplastic, firm. SILTY CLAY: Gray and medium brown mottled, moist, plastic, soft to firm, becomes softer towards base. At 8.5' pocket of clay, gray, with trace of silt, stiff, plastic.
-6	6				0.0	6-8	8-12	SILTY CLAY: Gray, damp to dry, firm to stiff, slightly plastic. From 8.10'-8.11' red burrowing, rootlets, seam of sandy silty clay, yellowish-red, nonplastic, firm. From 10'-10.1' and 10.4' pocket of red and black iron residue and concretions, clayey silt, loose. At 10.6'-10.8' caliche.
-8	8				0.0	8-12	8-12	
-10	10				0.0	10-12		



# MW-46 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-46 Date Drilled 11/13/2003  
 Project Off-Site Delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 22' Boring Diam. 3"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 0.75" Length 21' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Ed Wilson  
 Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-10	10				0.0		10.11-12	SANDY CLAY: Yellowish-red, damp to dry, hard, slightly plastic. From 10.11'-11' trace of black burrowing, rootlets. From 11.5'-12' seam of clay, gray, plastic, hard.
-12	12				0.0	12-14	12-12.11 12.11-13.8	SILTY CLAY: Gray and light gray, damp to dry, slightly plastic, very stiff, high clay content, with some black burrowing throughout, with sandy silty clay parting, yellowish-red, slightly plastic, stiff. From 12.8'-12.11' increase in black clayey silt.
-14	14				0.0	14-16	13.8-14.8	CLAYEY SILTY SAND: Yellowish-red, damp, loose, very fine-grained, with black mottling. From 13.5'-13.8, black iron-stained concretions abundant. SILTY CLAYEY SAND: Yellowish-red, dense, abundant black nodules, silty clay pocket, gray, trace of gravel towards base.
-16	16				0.0	16-18	14.8-15 15-15.8 15.8-16 16-20	GRAVELLY SAND: CLAYEY GRAVELLY SAND, brown and yellowish-red mottled, wet to moist, nonplastic, dense, medium sorted, rounded grains, abundant gravel (up to 1/8"-diameter) increase towards base. CLAYEY SILTY SAND: Yellowish-red with trace of brown and pale brown mottled, moist, medium dense, fine-grained, pocket of clayey silty sand, gray, loose at 15.3'. CLAYEY SAND: GRAVELLY CLAYEY SAND, yellowish-red, dry, dense, abundant gravel towards base (up to 1/16"-diameter), semi-rounded, fine-grained, with trace of black concretions towards base. CLAYEY SILTY SAND: CLAYEY SILTY GRAVELLY SAND, yellowish-red, water-saturated, loose, with abundant gravel (up to 3/4"-diameter), poorly sorted, angular grains, medium to fine-grained clayey silty sand matrix with gravels that are well graded. At 18' changes to clayey gravelly silty sand, medium to coarse grained matrix silty sandy material.
-18	18				0.0	18-20		
-20	20				0.0			



# MW-46 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-46 Date Drilled 11/13/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 22' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 5' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 0.75" Length 21' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-20	20				0.0	20-22	20-20.7	SILTY SANDY CLAY: Yellowish-red, very wet, slightly plastic, firm.
							20.7-21.10	SANDY SILTY CLAY: Yellowish-brown, damp, slightly plastic, with some black burrowing.
							21.10-22	At 21.6' plasticity and hardness increase towards base. CLAY: Brown with some gray layers, plastic, hard, fissiles towards base to shale.
-22	22							T.D. = 22'
-24	24							
-26	26							
-28	28							
-30	30							



# SB-49 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID SB-49 Date Drilled 11/13/2003  
Project Off-Site Delineation Owner Whirlpool Corporation  
Location Fort Smith, AR Boring T.D. 20.6' Boring Diam. 3"  
N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
Top of Casing Elevation 0' Stickup 0'  
Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
Drilling Company TWF Drilling Driller Ed Wilson  
Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-0.10	FILL: CLAYEY SILT with trace of gravel, dark brown, dry, very fine-grained, very loose, rootlets.
							0.10-1.5	CLAYEY SILT: Medium brown, dry to damp, very fine-grained, loose, trace of rootlets.
							1.5-2.1	SILTY CLAY: Pale brown, dry, nonplastic, loose to medium dense, firm to soft, crumbly, with occasional gravel pieces, angular (up to 1/2"-diameter), with trace of yellowish-red iron concretions.
-2	2				0.0		2.1-2.8	CLAYEY SILT: Pale brown and light brown, dry, crumbly, very loose, very fine-grained, blocky with trace of yellowish-red clayey sand.
							2.8-3.5	SILTY SANDY CLAY: Yellowish-red and pale brown mottled, dry, nonplastic, loose to medium dense, very fine-grained. With a parting of silty clay, gray, slightly plastic, soft.
							3.5-4	INTERMIXED SANDY CLAYEY SILT AND SILTY CLAY, yellowish-red, dry, loose to medium dense, fine-grained, silty clay is brown and reddish-brown mottled, stiff, slightly plastic, with some black clayey silt pockets throughout, nonplastic, stiff, increasing towards base.
-4	4					4-8	4.4-8	SILTY SANDY CLAY: Medium brown, pale brown, and gray mottled with some yellowish-brown, dry, slightly plastic, very loose, crumbly, trace of rootlets, trace of black clayey silt layering.
							4.8-5.2	From 4.6'-4.8' pocket of black layering and yellowish-red clayey silt, medium dense.
							5.2-6.3	SILTY CLAY: Brown, moist, slightly plastic to plastic, very soft.
							6.3-7.4	CLAY: Gray and yellowish-red mottled, damp, plastic, very stiff, with a parting of silty clay, yellowish-red, plastic, very stiff.
-6	6				0.0		7.4-8	From 6.9'-6.12' some black and iron staining pockets, loose, nodules (up to 1/16"-diameter).
							8-8.11	SILTY CLAY: Yellowish-red, dry, slightly plastic, very stiff, with black nodules and staining at 6.9'.
							8.11-9.5	CLAYEY SILT: Yellowish-red, dry, nonplastic, medium dense to loose, nonplastic, with trace of black and red (iron) nodules and stain at 7.10'.
-8	8					8-12	9.5-9.10	SILTY CLAY: Yellowish-brown and dark brown mottled, moist, plastic to slightly plastic, very soft.
							9.10-10.4	From 8.7'-8.11' becomes yellowish-brown, dry to damp, very stiff, with seam of clayey silt, deep brown, loose to medium dense, rootlets, with some black and iron staining.
								SANDY SILTY CLAY: Gray, brown, and yellowish-red mottled, dry to damp, slightly plastic to nonplastic, very stiff, slightly crumbly.
-10	10							SANDY CLAYEY SILT: Yellow and gray mottled, dry to damp, very loose to loose, very fine-grained.
								From 9.9'-9.10' pocket of clay, brown, plastic, soft to firm.
								SANDY SILT: Yellowish-red, dry, nonplastic, soft, very loose, very fine-grained.



# SB-49 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID SB-49 Date Drilled 11/13/2003  
 Project Off-Site Delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 20.6' Boring Diam. 3"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Ed Wilson  
 Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-10	10			0.0		10.4-11.5	SANDY SILTY CLAY: Yellowish-red with some pale brown and gray, dry to damp, nonplastic, soft to firm, very fine-grained. From 11'-11.2' pockets of clay, gray and yellowish-red mottled, plastic, firm to soft.
-12	12			0.0	12-14	11.5-12	From 11.2'-11.5' yellowish-red silty clay with loose sandy silt, slightly plastic, firm.
						12-12.3	SILTY CLAY: Gray and yellowish-red and red, dry to damp, slightly plastic, stiff, with black burrowing and iron staining.
						12.3-12.8	SILTY SANDY CLAY: Yellowish-brown, brown, and gray mottled, dry, slightly plastic, stiff, with dark gray laminations, slightly loose sediment.
						12.8-13.10	SILTY CLAY: Brown with some yellowish-red, moist, slightly plastic, soft.
						13.10-14.5	SANDY CLAYEY SILT: Yellowish-brown and pale brown mottled, dry, nonplastic, loose, blocky, crumbly.
-14	14				14-16	14.5-14.11	CLAYEY SILT: Gray with some yellowish-red, dry, dense to loose, very fine-grained.
						14.5-16	SILTY SAND: Red and yellowish-red mottled, dry, loose, fine-grained, with some hard iron nodules (up to 1/4"-diameter).
							CLAYEY SILTY SAND INTERLAYERED WITH CLAYEY SILT, clayey silty sand is red and yellowish-red, damp, loose to medium dense, fine-grained, clayey silt is gray, medium dense to loose, very fine-grained.
-16	16				16-20	16-17.3	SILTY CLAY AND CLAYEY SILT, medium brown, damp to dry, very loose to medium dense, very crumbly, fine-grained, blocky.
						17.3-19.8	SILTY CLAY TO CLAYEY SILT, brown and dark brown mottled, dry, medium dense to loose, blocky, very fine-grained, nonplastic, very crumbly.
-18	18			0.0			
							CLAY: Brown and gray mottled, dry, plastic, very stiff, crumbly.
							From 19.10'-20.6' hard, turns dark gray, fissiles down to weathered shale.
-20	20					19.8-20.6	T.D. = 20.6'



# MW-50 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-50 Date Drilled 11/13/2003  
 Project Off-Site Delineation Owner Whirlpool Corporation  
 Location Fort Smith, AR Boring T.D. 18.6' Boring Diam. 3"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 0.75" Length 8' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company TWF Drilling Driller Ed Wilson  
 Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-1.8	NO RECOVERY: Sediment too soft.
-2	2				0.0		1.8-2.4	CLAYEY SILT: Dark brown, damp, nonplastic, very fine-grained, abundant rootlets, trace of gravel (up to 1/4"-diameter).
							2.4-4.5	SILTY CLAY: Brown, red, and pale brown mottled with some yellowish-red, damp, stiff, slightly plastic, rootlets. From 4'-4.3' becomes brown with trace of gray and dark brown mottling, moist, plastic to slightly plastic, soft. From 4.3'-4.5' damp, plastic, firm.
-4	4					4-6		
					0.0		4.5-4.9	SANDY SILTY CLAY INTERMIXED WITH CLAYEY SAND, dark brown with some pale brown and yellowish-red mottled, damp, slightly plastic, stiff, with a parting of silty clay, gray, slightly plastic, soft, with some loose silt.
							4.9-6.8	SILTY CLAY: Brown and pale brown mottled, dry to damp, plastic, soft to firm, with a parting of clayey silt, yellowish-red, loose.
-6	6					6-8	6.8-6.10	From 5.8'-6' becomes slightly plastic to nonplastic, firm, moist. From 6'-6.8' becomes pale brown, damp, slightly plastic, stiff, with a seam of clayey silt, gray, nonplastic, medium dense, with trace of yellowish-red mottled.
					0.0		6.8-8	CLAY: Light gray with trace of yellowish-red mottled, damp, plastic, soft to firm, with trace of silt.
-8	8					8-12	8-8.11	SANDY CLAYEY SILT: Yellowish-red with some gray mottling, dry, dense to medium dense, nonplastic, crumbly, very fine-grained, black clayey burrowing, luster, nodules (up to 1/4"-diameter), becomes looser towards base.
							8.11-9.1	
							9.1-11.2	SILTY CLAY: Brown with trace of yellowish-red mottled, wet, plastic. CLAY: Reddish-brown, damp, stiff, plastic.
-10	10							SILTY CLAY: Gray, damp, slightly plastic, stiff to firm, with lamination of silty clayey sand, yellowish-red, nonplastic, trace of iron concretions.



# MW-50 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID MW-50 Date Drilled 11/13/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 18.6' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type 65 Mesh stainless steel Diam. 0.75" Length 10' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 0.75" Length 8' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-10	10				0.0			
-12	12				0.0	12-14	11.2-11.8 11.8-12 12-14	CLAY: Yellowish-red, damp to moist, plastic, very stiff, becoming hard towards base, decreasing moisture towards base. GRAVELLY CLAY: Red and dark brown mottled, damp to moist, with abundant gravel (up to 1/2"-diameter), very dense, hard, with abundant iron and black staining. SANDY CLAY: GRAVELLY SANDY CLAY, red and yellowish-brown mottled, wet, abundant gravel (poorly sorted, up to 1"-diameter), in a sandy clayey matrix, dense, nonplastic, hard. Increasing gravelly clayey sand towards base.
-14	14				0.0	14-16	14-15.3	CLAYEY SILTY SAND: GRAVELLY CLAYEY SILTY SAND, wet, abundant gravels (up to 1"-diameter), dense to loose, semirounded and angular.
-16	16				0.0	16-18.6	15.3-17.6	CLAYEY SILTY SAND: Gray and yellowish-brown, wet, medium dense to very loose, fine-grained.
-18	18				0.0		17.6-18.6	CLAY: Dark gray, plastic, hard, weathered, fissile to shale at 17.8'.  T.D. = 18.6'
-20	20							



# SB-51 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID SB-51 Date Drilled 11/14/2003  
Project Off-Site Delineation Owner Whirlpool Corporation  
Location Fort Smith, AR Boring T.D. 16' Boring Diam. 3"  
N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
Top of Casing Elevation 0' Stickup 0'  
Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
Drilling Company TWF Drilling Driller Ed Wilson  
Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-0.8	NO RECOVERY: Sediment too soft.
							0.8-1.5	FILL: CLAYEY SILT, dark brown and brown, damp, very loose, nonplastic, abundant rootlets. From 1.2'-1.5' becomes dark brown and gray mottling, slightly plastic, soft, loose, with large pieces of bark.
							1.5-2.1	SILTY CLAY: Medium brown, moist, slightly plastic to plastic, with trace of yellowish-red nodules, trace of rootlets, coarsening down to a silty clay with equal silt and clay amounts at 1.9'.
-2	2				0.0		2.1-2.8	SANDY CLAYEY SILT: Reddish-yellow, brown, and pale brown mottled, dry, nonplastic, very loose, crumbly, with occasional gravel (up to 1/8"-diameter), trace of dark brown and black mottled towards base.
							2.8-2.11	SANDY SILTY CLAY: Gray, light gray, reddish-yellow, brown, and pale brown mottled, dry, slightly plastic, stiff, with some black burrowing towards base.
							2.11-3.5	SILTY SANDY CLAY: Yellowish-red and black with trace of light gray mottled, dry, very stiff, very crumbly, loose to dense, with abundant black mottling throughout.
-4	4					4-8	3.5-3.7	SANDY CLAYEY SILT: Gray, yellowish-red, and black mottled, dry, nonplastic, loose to very loose, very fine-grained.
							3.7-4.3	SILTY SANDY CLAY: Deep yellowish-red and some black mottled, dry, hard, nonplastic, with some pockets of iron staining with some gravel (up to 1/4"-diameter).
							4.3-4.8	GRAVEL: with clayey sandy silt mixture, dry, gravels up to 1/4"-diameter, loose, poorly sorted, well graded, angular, clayey sand crumbles easily.
							4.10-7.2	GRAVELLY SILTY SAND, with clay parting, silty clay parting is gray, hard, plastic, gravelly silty sand is red and deep orange yellowish-red and black mottled, silty sand is matrix with abundant gravel (up to 1/8"-diameter), nonplastic, loose, angular to semi-rounded.
-6	6				0.0		7.2-8.11	SANDY CLAYEY GRAVELS INTERMIXES WITH CLAYEY SANDY GRAVELS, abundant gravels (up to 3/4"-diameter), angular to semi-angular, dry, well graded gravels, with a sandy clay matrix, dense, dry.
							8.11-9.8	GRAVELLY SILTY CLAY, yellowish-red, dry, with gravels (up to 3/4"-diameter), very hard, plastic, with trace of iron staining and black mottling.
-8	8					8-10		CLAY: Yellowish-red, moist, plastic, stiff, with seam of silty clay, slightly plastic, yellowish-red. From 9.3'-9.5' pocket of silty sand intermixed with gravelly clay, very loose, nonplastic, gravel and nodules up to 1/4"-diameter, poorly sorted. From 9.5'-9.8' clay becomes gray, hard, plastic.
-10	10				0.0		9.8-11.5	SEE PAGE 2





# SB-51 DRILLING LOG

W.O. NO. 581-013 Boring/Well ID SB-51 Date Drilled 11/14/2003

Project Off-Site Delineation Owner Whirlpool Corporation

Location Fort Smith, AR Boring T.D. 16' Boring Diam. 3"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company TWF Drilling Driller Ed Wilson

Drilling Method Geoprobe/Hollow Stem Auger Log By Karin Shultz

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM Headspace (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-10	10				0.0	10-12	9.8-11.5	SILTY GRAVELLY SAND, dry, red and yellowish-red mottled, nonplastic, fine-grained, poorly sorted, gravel is up to 3/4"-diameter) in a silty sand matrix. From 10'-11.5' matrix changes to a silty sandy clay, dense, slightly plastic, with some loose silty sand throughout, deeper red and yellowish-red mottled, gravel up to 1"-diameter.
-12	12				0.0	12-14	11.5-12 12-12.11 12.11-12.3 12.3-12.45 12.45-13.4	CLAYEY GRAVEL, abundant gravel (gray and light gray, angular, well sorted gravel) in a clay matrix (yellowish-red, slightly plastic, hard). SILTY SANDY CLAY: Yellowish-red and gray mottled, damp, slightly plastic, soft.
-14	14				0.0	14-16	13.4-14 14-15.7	CLAYEY SILT: Yellowish-red, loose, very fine-grained, with some occasional gravel up to 1/2"-diameter, angular. GRAVELLY CLAY: Dark brown, fractures, breaks easily, weathered, gravel up to 1/4"-diameter with some loose silt.
-16	16				0.0		15.7-16	GRAVELLY CLAYEY SAND, yellowish-red, moist, abundant gravel from 12.10'-13.2' up to 1"-diameter, with clayey sand mixture, medium-grained, nonplastic. SAND: Yellowish-red, moist, medium-grained, loose with occasional gravel (up to 1/4"-diameter). CLAY: Yellowish-red, damp to dry, very stiff to stiff, plastic, with occasional pockets of sandy clay throughout, hardening towards base.
-18	18							CLAY: Dark gray, weathered into shale, very hard, plastic, fractures throughout. T.D. = 16'
-20	20							

# **Well Development Records**

## *Appendix D*

*June 25, 2004*

*Project No. 0014507*

### **Environmental Resources Management**

15810 Park Ten Place, Suite 300

Houston, Texas 77084-5140

(281) 600-1000

**Environmental Resources Management**  
**MONITOR WELL DEVELOPMENT RECORD**

Area: Whirlpool  
 Well No.: MW-39

Client: Whirlpool  
 Location: Fort Smith  
 W.O. # 581-013  
 Developer(s): Lance Harbinson

Date: 7/14/2003  
 Well Casing Diameter ( $d_{wc}$ ): 0.75 in.  
 Borehole Diameter ( $d_b$ ): 3 in.  
 Measuring Point: GND  
 Measuring Point Elevation: ft.

Total Well Depth **TD**: 29.5 ft. Well Volume  $V_w = 3.14 \times (d_{wc}/24)^2 \times h_{wc} \times 7.5 \text{ gal/ft}^3$   
 Depth to Water **DTW**: 10.9 ft.  $V_w =$  0.42 gal.  
 Height of Water Column  $h_{wc} = \text{TD} - \text{DTW}$  18.6 ft.  
 Depth to Product, if present, **DTP** --- ft. Use DTP=DTW to calculate  $h_{wc}$ , if product is present.  
 Height of Filter Sand Above Sump  $h_s$  14.5 ft.  
 Volume of Water in Filter Sand  $V_{fs} = 3.14 \times ((d_b/24)^2 - (d_{wc}/24)^2) \times 0.3 \times h_s \times 7.5 \text{ gal/ft}^3 =$  1.54 gal.  
 Assumed 30% porosity for filter sand.  
 Borehole Volume  $V_b = V_{wc} + V_{fs} =$  1.96 gal.

**Minimum** volume to be purged for well development:  
 Eight borehole volumes  $8 \times V_b =$  15.68 gal.  
 Volume of water added during well installation  $+$  0 gal.  
 Minimum volume to be removed 16 gal.  
**Maximum** volume not to exceed if water parameters do not stabilize. Check with **ERM** project manager.  
 Ten borehole volume:  $10 \times V_b =$  19.6 gal.  
 Volume of water added during well installation  $+$  0 gal.  
 Maximum volume to be removed 20 gal.

MONITOR WELL DEVELOPMENT RECORD

Date: 7/15/2003

Page 1 of 1

Method: watera pump/peristaltic  
 Field Instruments:

Area: Whirlpool  
 Well No.: MW-41

Time	Volume		pH (std units)	temp. (°C)	SC (µS/cm)	turbidity (NTU / FTU)	Color	Comments	Date	
	Depth (ft)	Removed (gal)								
1641	10.9					Turbid/silty	Brown	Watera	7/14/03	
1810		5	5			Turbid/silty	Brown	Watera	7/14/03	
825	10.9					Turbid/silty	Brown	Peristaltic	7/15/03	
845						Turbid/silty	Brown	Watera	7/15/03	
905						Turbid/silty	Brown	Watera	7/15/03	
922		6	6			Turbid/silty	Brown	Watera	7/15/03	
1008	10.88	5	11	5.95	23.06	0.995	Turbid/silty	Brown	Watera	7/16/03
1058				7.10	28.86	0.008	Turbid/silty	Brown	Peristaltic	7/16/03
1103				7.10	28.86	0.008	Milky/silty	Clear	Peristaltic	7/16/03
1108				7.10	28.86	0.008	Milky/silty	Clear	Peristaltic	7/16/03
1120				7.10	28.86	0.008	---	Clear	Peristaltic	7/16/03
1130				7.10	28.86	0.008	---	Clear	Peristaltic	7/16/03
1140				7.10	28.86	0.008	---	Clear	Peristaltic	7/16/03
1150		5	16	7.10	28.86	0.008	---	Clear	Peristaltic	7/16/03

**Environmental Resources Management**  
MONITOR WELL DEVELOPMENT RECORD

Area: Whirlpool  
Well No.: MW-40

Client: Whirlpool	Date: 7/15/2003
Location: Fort Smith	Well Casing Diameter ( $d_{wc}$ ): 0.75 in.
W.O. # 581-013	Borehole Diameter ( $d_b$ ): 3 in.
	Measuring Point: GND
Developer(s): Lance Harbinson	Measuring Point Elevation: ft.

Total Well Depth <b>TD</b> : 27.8 ft.	Well Volume $V_w = 3.14 \times (d_{wc}/24)^2 \times h_{wc} \times 7.5 \text{ gal/ft}^3$
Depth to Water <b>DTW</b> : 9.11 ft.	$V_w = 0.43$ gal.
Height of Water Column $h_{wc} = \text{TD} - \text{DTW}$	18.6 ft.
Depth to Product, if present, <b>DTP</b>	--- ft. Use DTP=DTW to calculate $h_{wc}$ , if product is present.
Height of Filter Sand Above Sump $h_s$	14.5 ft.
Volume of Water in Filter Sand $V_{fs} = 3.14 \times ((d_b/24)^2 - (d_{wc}/24)^2) \times 0.3 \times h_s \times 7.5 \text{ gal/ft}^3 =$	1.56 gal.
Assumed 30% porosity for filter sand.	
Borehole Volume $V_b = V_{wc} + V_{fs} =$ 2 gal.	

**Minimum** volume to be purged for well development:

Eight borehole volumes	$8 \times V_b =$	16 gal.
Volume of water added during well installation	+	0 gal.
Minimum volume to be removed		16 gal.

**Maximum** volume not to exceed if water parameters do not stabilize. Check with **ERM** project manager.

Ten borehole volume: $10 \times V_b =$	20 gal.	
Volume of water added during well installation	+	0 gal.
Maximum volume to be removed	20 gal.	

MONITOR WELL DEVELOPMENT RECORD

Date: 7/15/2003 Page 1 of 1

Method: Watera/peristaltic pump  
Field Instruments:

Area: Whirlpool  
Well No.: MW-40

Time	Volume		pH (std units)	temp. (°C)	SC (µS/cm)	turbidity (NTU / FTU)	Color	Comments	Date
	Depth (ft)	Removed (gal)							
1000	9.11					Turbid/silty	Brown	Watera	7/15/03
1015						Turbid/silty	Brown	Watera	7/15/03
1045						Turbid/silty	Brown	Watera	7/15/03
1115		2.5	2.5	5.55	24	0.621	Turbid/silty	Light brown	Peristaltic
1305	9.81						Turbid/silty	Brown	Watera
1450		5	7.5				Turbid/silty	Brown	Peristaltic
1505				5.15	24.19	0.632	---	Clear	Peristaltic
1515				5.35	24.70	0.631	---	Clear	Peristaltic
1525				5.40	24.41	0.631	---	Clear	Peristaltic
1535				5.44	24.42	0.63	---	Clear	Peristaltic
1545				5.43	29.39	0.629	---	Clear	Peristaltic
1555				5.41	24.20	0.629	---	Clear	Peristaltic
1605				5.40	24.10	0.629	---	Clear	Peristaltic
1615				5.39	24.21	0.629	---	Clear	Peristaltic
1625				5.35	24.10	0.629	---	Clear	Peristaltic
1635				5.33	23.99	0.629	---	Clear	Peristaltic
1645				5.30	23.94	0.628	---	Clear	Peristaltic
1655		10	17.5	5.28	23.92	0.629	---	Clear	Peristaltic

**Environmental Resources Management**  
MONITOR WELL DEVELOPMENT RECORD

Area: Whirlpool  
Well No.: MW-41

Client: Whirlpool	Date: <u>7/15/2003</u>
Location: Fort Smith	Well Casing Diameter ( $d_{wc}$ ): <u>0.75 in.</u>
W.O. # 581-013	Borehole Diameter ( $d_b$ ): <u>8 in.</u>
	Measuring Point: <u>GND</u>
Developer(s): Troy Meinen and Lance Harbinson	Measuring Point Elevation: <u>ft.</u>

Total Well Depth TD: <u>28.7 ft.</u>	Well Volume $V_w = 3.14 \times (d_{wc}/24)^2 \times h_{wc} \times 7.5 \text{ gal/ft}^3$
Depth to Water DTW: <u>7.95 ft.</u>	$V_w = \underline{0.47} \text{ gal.}$
Height of Water Column $h_{wc} = \text{TD} - \text{DTW}$	<u>20.75 ft.</u>
Depth to Product, if present, DTP	<u>---</u> ft. Use DTP=DTW to calculate $h_{wc}$ , if product is present.
Height of Filter Sand Above Sump $h_s$	<u>12.7 ft.</u>
Volume of Water in Filter Sand $V_{fs} = 3.14 \times ((d_b/24)^2 - (d_{wc}/24)^2) \times 0.3 \times h_s \times 7.5 \text{ gal/ft}^3 =$	<u>9.78 gal.</u>
Assumed 30% porosity for filter sand.	
Borehole Volume $V_b = V_{wc} + V_{fs} =$	<u>10.25 gal.</u>

**Minimum** volume to be purged for well development:

Eight borehole volumes	$8 \times V_b =$	<u>82 gal.</u>
Volume of water added during well installatio	$+$	<u>0 gal.</u>
Minimum volume to be removed		<u>82 gal.</u>

**Maximum** volume not to exceed if water parameters do not stabilize. Check with **ERM** project manager.

Ten borehole volume: $10 \times V_b =$	<u>102 gal.</u>	
Volume of water added during well installatio	$+$	<u>0 gal.</u>
Maximum volume to be removed	<u>102 gal.</u>	

MONITOR WELL DEVELOPMENT RECORD

Date: 7/15/2003

Page 1 of 2

Method: Watera/peristaltic pump  
Field Instruments:

Area: Whirlpool  
Well No.: MW-41

Time	Volume		pH (std units)	temp. (°C)	SC (µS/cm)	turbidity (NTU / FTU)	Color	Comments	Date	
	Depth (ft)	Removed (gal)								
815	7.5	2.5				Turbid	Brown	Watera	7/15/03	
845	7.5		5			Turbid	Brown	Watera	7/16/03	
845	28	2.5	5			Turbid	Brown	Watera	7/16/03	
855	8.5					Turbid	Brown	Watera	7/16/03	
905	22	1.5				Turbid	Brown	Watera	7/16/03	
920	22	3	8	6.66	24.92	522	Turbid	Brown	Watera	7/16/03
945	22	2	10				Turbid	Brown	Watera	7/16/03
1715	7.65						Turbid	Brown	Watera	7/16/03
1755		5	15	5.55	26.23	0.757	Turbid	Brown	Watera	7/16/03
1810		5	20	5.21	22.61	0.749	Turbid	Brown	Watera	7/16/03
1822		5	25	5.07	20.69	0.741	Turbid	Brown	Watera	7/16/03
1253	7.62	5	30	4.89	19.67	0.717	---	Clear	Peristaltic	7/17/03
1300				4.96	19.74	0.705	---	Clear	Peristaltic	7/17/03
1310		5	35	4.99	19.80	0.698	---	Clear	Peristaltic	7/17/03
1320				4.91	19.80	0.691	---	Clear	Peristaltic	7/17/03
1330		5	40	4.92	20.04	0.690	---	Clear	Peristaltic	7/17/03
1400		5	45	4.8	19.25	0.685	---	Clear	Peristaltic	7/17/03
1410				4.76	19.57	0.682	---	Clear	Peristaltic	7/17/03
1420		5	50	4.79	19.26	0.682	---	Clear	Peristaltic	7/17/03

Page 2 of 2

Area: Whirlpool  
Well No.: MW-41

[illegible]

**Environmental Resources Management**  
MONITOR WELL DEVELOPMENT RECORD

Area: Whirlpool- Fort Smith, AK  
Well No.: MW-42B

Client: Whirlpool	Date: 11/13/2004, 11/14/2004, 11/15/2004
Location: Fort Smith, AK	Well Casing Diameter ( $d_{wc}$ ): 3/4 in.
W.O. #581-013/ 0014507	Borehole Diameter ( $d_b$ ): 3 in.
	Measuring Point: Ground Surface
Developer(s):	Measuring Point Elevation: ft.

Total Well Depth <b>TD</b> : 27 ft.	Well Volume $V_w = 3.14 \times (d_{wc}/24)^2 \times h_{wc} \times 7.5 \text{ gal/ft}^3$
Depth to Water <b>DTW</b> : 7.2 ft.	$V_w = 0.5$ gal.
Height of Water Column $h_{wc} = \text{TD} - \text{DTW}$	19.8 ft.
Depth to Product, if present, <b>DTP</b>	ft. Use DTP=DTW to calculate $h_{wc}$ , if product is present.
Height of Filter Sand Above Sump $h_{fs}$	4 ft.
Volume of Water in Filter Sand $V_{fs} = 3.14 \times ((d_b/24)^2 - (d_{wc}/24)^2) \times 0.3 \times h_{fs} \times 7.5 \text{ gal/ft}^3 =$	0.4 gal.
Assumed 30% porosity for filter sand.	
Borehole Volume $V_b = V_{wc} + V_{fs} =$ 0.9 gal.	

**Minimum** volume to be purged for well development:

Five borehole volume:  $5 \times V_b =$  4 gal.

Volume of water added during well installatio + gal.

Minimum volume to be removed 4 gal.

**Maximum** volume not to exceed if water parameters do not stabilize. Check with **ERM** project manager.

Ten borehole volume:  $10 \times V_b =$  9 gal.

Volume of water added during well installatio + gal.

Maximum volume to be removed 9 gal.

MONITOR WELL DEVELOPMENT RECORD

Page 1 of 1

Method:	Area: Whirlpool- Fort Smith, AK
Field Instruments: peristaltic pump, YSI	Well No.: MW-42B

Volume									
Time	Depth (ft)	Removed (gal)	Cumulative (gal)	pH (std units)	temp. (°C)	SC (μS/cm)	turbidity (NTU / FTU)	Color	Comments
11/13/2003									
~1200									begin pumping
1205		0.67	0.67						pumped dry
~1420									still dry
~1535									insufficient head
11/14/2003									
855									collect sample, dry
11/15/2003									
~1328									begin pumping
~1328		0.125	0.795						pumped dry
4/15/2004									
1432									begin pumping
1436		0.5	1.295	5.41	19.9	1046	530		
1441		0.5	1.795	5.42	20.4	1036	1000		
1446		0.5	2.295	5.17	20.36	1059	1000		
1448									pumped dry
1615									collect sample

MONITOR WELL DEVELOPMENT RECORD

Date: Page of

**Environmental Resources Management**  
MONITOR WELL DEVELOPMENT RECORD

Area: Whirlpool- Fort Smith, AK  
Well No.: MW-43

Client: Whirlpool	Date: 11/13/2004, 11/14/2004, 11/15/2004
Location: Fort Smith, AK	Well Casing Diameter ( $d_{wc}$ ): 3/4 in.
W.O. #581-013/ 0014507	Borehole Diameter ( $d_b$ ): 3 in.
	Measuring Point: Ground Surface
Developer(s): Tristram Dodds	Measuring Point Elevation: ft.

Total Well Depth <b>TD</b> :	26 ft.	Well Volume $V_w = 3.14 \times (d_{wc}/24)^2 \times h_{wc} \times 7.5 \text{ gal/ft}^3$
Depth to Water <b>DTW</b> :	10.68 ft.	$V_w = 0.4$ gal.
Height of Water Column $h_{wc} = TD - DTW$	15.32 ft.	
Depth to Product, if present, <b>DTP</b>	ft.	Use DTP=DTW to calculate $h_{wc}$ , if product is present.
Height of Filter Sand Above Sump $h_{fs}$	11 ft.	
Volume of Water in Filter Sand $V_{fs} = 3.14 \times ((d_b/24)^2 - (d_{wc}/24)^2) \times 0.3 \times h_{fs} \times 7.5 \text{ gal/ft}^3 =$		1.1 gal.
Assumed 30% porosity for filter sand.		
Borehole Volume $V_b = V_{wc} + V_{fs} =$		1.5 gal.

**Minimum** volume to be purged for well development:

Five borehole volume: $5 \times V_b =$	7 gal.
Volume of water added during well installatio	+ gal.
Minimum volume to be removed	7 gal.

**Maximum** volume not to exceed if water parameters do not stabilize. Check with **ERM** project manager.

Ten borehole volume: $10 \times V_b =$	15 gal.
Volume of water added during well installatio	+ gal.
Maximum volume to be removed	15 gal.

MONITOR WELL DEVELOPMENT RECORD

Page 1 of 1

Method:	Area: Whirlpool- Fort Smith, AK
Field Instruments: peristaltic pump, YSI	Well No.: MW-43

		Volume		pH (std units)	temp. (°C)	SC (μS/cm)	turbidity (NTU / FTU)	Color	Comments
Depth	Removed	Cumulative							
Time (ft)	(gal)	(gal)							
11/13/2003									
~1300									begin pumping
1306		0.5	0.5						pumped dry
1429									still dry
1535									insufficient head
11/14/2003									
915									collect sample, dry
11/15/2003									
~1331									begin pumping
~1340		0.125	0.625						pumped dry
4/15/2004									
1507									begin pumping
1512		0.5	1.125	9.48	19.53	381	234		
1517		0.5	1.625	7.13	19.28	388	1000		
1522		0.5	2.125	6.97	19.41	414	1000		
1526									pumped dry
1625									collect sample

MONITOR WELL DEVELOPMENT RECORD

Date: Page of



**Environmental Resources Management**  
MONITOR WELL DEVELOPMENT RECORD

Area: Whirlpool- Fort Smith, AK  
Well No.: MW-46

Client: Whirlpool  
Location: Fort Smith, AK  
W.O. #581-013/ 0014507

Date: 11/13/2004, 11/14/2004, 11/15/2004  
Well Casing Diameter ( $d_{wc}$ ): 3/4 in.  
Borehole Diameter ( $d_b$ ): 3 in.  
Measuring Point: Ground Surface  
Developer(s):  
Measuring Point Elevation: ft.

Total Well Depth **TD**: 22 ft.  
Depth to Water **DTW**: 8.55 ft.  
Height of Water Column  $h_{wc}=TD - DTW$  13.45 ft.  
Depth to Product, if present, **DTP** ft. Use DTP=DTW to calculate  $h_{wc}$ , if product is present.  
Height of Filter Sand Above Sump  $h_{fs}$  7 ft.  
Volume of Water in Filter Sand  $V_{fs} = 3.14 \times ((d_b/24)^2 - (d_{wc}/24)^2) \times 0.3 \times h_{fs} \times 7.5 \text{ gal/ft}^3 =$  0.7 gal.  
Assumed 30% porosity for filter sand.  
Borehole Volume  $V_b = V_{wc} + V_{fs} =$  1.0 gal.

**Minimum** volume to be purged for well development:  
Five borehole volume:  $5 \times V_b =$  5 gal.  
Volume of water added during well installatio + gal.  
Minimum volume to be removed 5 gal.  
**Maximum** volume not to exceed if water parameters do not stabilize. Check with **ERM** project manager.  
Ten borehole volumes:  $10 \times V_b =$  10 gal.  
Volume of water added during well installatio + gal.  
Maximum volume to be removed 10 gal.

MONITOR WELL DEVELOPMENT RECORD

Page 1 of 1

Method:  
Field Instruments: peristaltic pump, YSI

Area: Whirlpool- Fort Smith, AK  
Well No.: MW-46

		Volume		pH	temp.	SC	turbidity	Color	Comments
Time	Depth	Removed	Cumulative						
(ft)	(gal)	(gal)	(gal)	(std units)	(°C)	(μS/cm)	(NTU / FTU)		
11/13/2003									
~1400									begin pumping
1412		0.5	0.5						pumped dry
1550									insufficient head
11/14/2003									
950									collect sample, dry
11/15/2003									
~1342									begin pumping
~1347		0.25	0.75						pumped dry
4/15/2004									
1537									begin pumping
1541		0.5	1.25	7.29	19.5	4.2	424		
1546		0.5	1.75	7.01	19.59	421	929		
1551		0.5	2.25	6.92	19.63	425	1000		pumped dry
1635									collect sample

MONITOR WELL DEVELOPMENT RECORD

Date: Page of

# Environmental Resources Management

## MONITOR WELL DEVELOPMENT RECORD

Area:	Whirlpool- Fort Smith, AK
Well No.:	MW-50

Client: Whirlpool	Date: 11/15/2004	
Location: Fort Smith, AK	Well Casing Diameter ( $d_{wc}$ ):	3/4 in.
W.O. #581-013/ 0014507	Borehole Diameter ( $d_b$ ):	3 in.
	Measuring Point:	Ground Surface
Developer(s):	Measuring Point Elevation:	ft.

Total Well Depth <b>TD:</b>	<u>18.6</u> ft.	Well Volume $V_w = 3.14 \times (d_{wc}/24)^2 \times h_{wc} \times 7.5 \text{ gal/ft}^3$	
Depth to Water <b>DTW:</b>	<u>11.75</u> ft.	$V_w =$	<u>0.2</u> gal.
Height of Water Column $h_{wc} = \text{TD} - \text{DTW}$	<u>6.85</u> ft.		
Depth to Product, if present, <b>DTP</b>	<u>        </u> ft.	Use DTP=DTW to calculate $h_{wc}$ , if product is present.	
Height of Filter Sand Above Sump $h_{fs}$	<u>13.6</u> ft.		
Volume of Water in Filter Sand $V_{fs} = 3.14 \times ((d_b/24)^2 - (d_{wc}/24)^2) \times 0.3 \times h_{fs} \times 7.5 \text{ gal/ft}^3 =$			<u>1.4</u> gal.
Assumed 30% porosity for filter sand.		Borehole Volume $V_b = V_{wc} + V_{fs} =$	<u>1.6</u> gal.

<b>Minimum</b> volume to be purged for well development:			
	Five borehole volume: 5 x V <sub>b</sub> =		8 gal.
	Volume of water added during well installatio	+	gal.
	Minimum volume to be removed		8 gal.
<b>Maximum</b> volume not to exceed if water parameters do not stabilize. Check with <b>ERM</b> project manager.			
	Ten borehole volumes: 10 x V <sub>b</sub> =		16 gal.
	Volume of water added during well installatio	+	gal.
	Maximum volume to be removed		16 gal.

# MONITOR WELL DEVELOPMENT RECORD

Page 1 of 1

Method:	Area:
Field Instruments: peristaltic pump, YSI	Well No.: Whirlpool- Fort Smith, AK MW-50

[illegible]

# MONITOR WELL DEVELOPMENT RECORD

Date: \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_