GROUNDWATER MONITORING PLAN (REVISED)

FORMER GENERAL MOTORS FAIRFAX I PLANT
KANSAS CITY, KANSAS

JULY 2007
REF. NO. 012559 (15)

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1.0 INTRODUCTION

1.1 INTRODUCTION

Conestoga-Rovers & Associates (CRA) has prepared this Groundwater Monitoring Plan for the former General Motors (GM) Fairfax I Plant in Kansas City, Kansas (Site). Refer to Figure 1.1 for the Site location. The Fairfax I Plant Site is vacant as operations ceased in 1986/87 and the facility was demolished in 1987. A number of monitoring wells, however, remain on the Fairfax I Plant Site. The Fairfax II Plant was constructed adjacent to the Fairfax I property beginning in 1998. The Fairfax II Plant Site is an active facility. Figure 1.2 presents the Site layout and the approximate locations of known existing monitoring wells at the former Fairfax I Plant Site.

1.2 BACKGROUND

The Site is located in the floodplain of the Missouri River. Underlying Site geology soils typically consist of an upper layer of silty clay ranging in thickness from approximately 7 to 15 feet. This layer is underlain by fine to medium sands to depths of 25 to 40 feet, grading into medium to coarse sands with some gravel and clay interbeds to depths of 60 to 80 feet. This layer is underlain by medium to coarse sands and gravels to the top of the bedrock. Shale bedrock occurs at approximately 102 to 117 feet below grade. Groundwater is expected to flow to the northwest and toward the Missouri River.

Soil and groundwater contamination was discovered at the Site in 1987 during an Environmental Site Assessment which was completed prior to demolition of the Fairfax I Plant. The primary sources of contamination were determined to be gasoline and paint thinner from a tank farm along with suspect historic releases of perchloroethylene from prior to GM operations. GM initiated a voluntary cleanup program in 1988, which included semi-annual groundwater monitoring, groundwater contamination plume definition, and remedial design and construction. The remediation system for the small tank farm area comprised groundwater extraction and treatment by air stripping along with soil vapor extraction and treatment by thermal oxidation. The remedial action was initiated in 1991 and shut down in 1994. The semi-annual groundwater monitoring at the Fairfax I Plant Site (which included analysis for benzene, toluene, ethylbenzene, and xylenes (BTEX); and 1,2-dichloroethylene) was also discontinued in 1994.

GM entered the former Fairfax I Site into the Voluntary Cleanup and Property Redevelopment Program (VCPRP) in March 14, 2001. CRA has performed numerous studies at the Site. The most recent studies, conducted in November 2006, were reported to the Kansas Department of Health and Environment (KDHE) in a letter report titled "Additional Groundwater and Soil Sampling Data" (CRA, February 2007). Quarterly groundwater sampling will be conducted in response to the March 12, 2007 letter from the KDHE and the subsequent March 22, 2007 telephone conversation with the KDHE.

2.0 SAMPLING AND ANALYSIS PLAN

GM proposes to sample the permanent monitoring wells which exist at the former Fairfax I Plant Site. These include shallow, intermediate, and deep depth wells.
The primary contaminants of concern in groundwater at the Site are now or have been petroleum hydrocarbons and chlorinated solvents. Previous sampling events at the Site have included the full scan for semivolatile organic compounds (SVOCs) and metals (analytical results from the November 2006 sampling event were provided to the KDHE in the February 19, 2007 letter report titled "Additional Groundwater and Soil Sampling Data"). As such, the proposed analysis plan for the quarterly groundwater events is for volatile organic compounds (VOCs) and total petroleum hydrocarbon as gasoline range organics (TPH-GRO) only.

One permanent monitoring well (MW-125) will be installed near SB-110 to monitor tetrachloroethane (PCE) previously detected in soil. The new well will be included in the quarterly groundwater sampling monitoring well network. Figure 1.2 presents the proposed location for monitoring well MW-125.

All work will be performed in accordance with the Site-specific Health and Safety Plan (HASP) (CRA, October 2006). The Site-specific HASP will be kept on Site at all times during performance of the work. This Groundwater Monitoring Plan is prepared as an addendum to the previously submitted and approved work plan titled "Pre-Design Investigations Work Plan") (CRA, August 2001) (Approved Work Plan). Field activities will be conducted in accordance with the Approved Work Plan and GM's ENCORE Field Method Guidelines (FMGs).

2.1 PERMANENT MONITORING WELL INSTALLATION

The monitoring well (MW-125) will be installed using a hollow stem auger (HSA) drill rig with 4.25-inch inside diameter augers. The monitoring well will be screened from approximately 25 to 35 feet below ground surface.

The monitoring well will be constructed of nominal 2-inch diameter, polyvinyl chloride (PVC) screens (No. 10-slot), and nominal 2-inch diameter schedule 40 PVC riser pipe. The monitoring well will be installed through the hollow stem of the augers. During monitoring well construction, the riser pipe will be capped temporarily to prevent the entrance of foreign materials into the well.

Silica sand will be placed in the annulus between the augers and the riser pipe to a height of at least 2 vertical feet above the top of the well screen as the augers are withdrawn from the borehole. If bridging of the silica sand occurs, the bridged material will be broken mechanically prior to proceeding with the addition of more silica sand.

A bentonite chip or pellet seal measuring a minimum of 2 vertical feet will be installed above the silica sand, using a tremie pipe if necessary. In lieu of chips or pellets, pure bentonite slurry may be used for the seal. If chips or pellets are used, sufficient time will be allowed for the bentonite seal to hydrate prior to grouting the remaining annulus.

The remainder of the annulus will be filled with a cement bentonite mixture to within 2 feet of the ground surface. Once the grout has set, the remaining portion of the unfilled annulus will be filled with concrete. An above ground protective steel casing will be installed. The monitoring well will be secured using a lock on the protective casing. The well casing will be capped with either a screw on cap or with an expandable locking cap.

2.2 MONITORING WELL DEVELOPMENT

The newly installed monitoring well will be developed to minimize the presence of fine grained, suspended sediment and to ensure optimum communication between the well and the screened formation. Development will consist of surging and pumping the well.

During monitoring well development the temperature, pH, and conductivity of the groundwater will be monitored to confirm stabilization of groundwater within the screened formation. These stabilization parameters will be monitored at selected intervals throughout development depending upon the anticipated volume of water to be removed from each well. In general, these parameters are measured every 2 to 4 well volumes in high yielding wells. However, in lower yielding monitoring wells, stabilization parameters will be monitored for every well volume removed.

Monitoring well development will continue until the turbidity has been minimized and three consecutive and consistent readings of pH, conductivity, and temperature are obtained. In the event that this cannot be achieved, well development will continue until turbidity is minimized or until a maximum of ten well volumes have been removed.

2.3 SURVEYING

The horizontal location of the newly installed monitoring well will be surveyed to an accuracy of ±0.1 feet and referenced to the GM Plant Grid Coordinate System. The ground surface elevation and top of riser elevation of the well will be surveyed to an accuracy of ±0.01 feet.

2.4 MONITORING WELL NETWORK

The Fairfax I quarterly groundwater sampling monitoring well network consists of 32 groundwater monitoring wells. Shallow depth wells are designated as "A" wells (or those with no designation), intermediate depth wells are designated as "B" wells, and deep depth wells are designated as "C" wells. Monitoring wells in the quarterly groundwater monitoring well network are listed on Table 1.1. Monitoring well locations are shown on Figure 1.2.

2.5 ANALYTES AND SAMPLING FREQUENCY

The monitoring wells listed on Table 1.1 will be sampled on a quarterly basis for 1 year. Groundwater samples will be analyzed for target compound list (TCL) VOCs by United States Environmental Protection Agency (USEPA) SW-846 Method 8260 and TPH-GRO by USEPA SW-846 Method 8015.

2.6 WATER LEVEL MONITORING

Water levels in the 32 monitoring wells listed on Table 1.1 will be measured prior to each sampling event. The water levels in the shallow wells have consistently provided useful data in mapping of the variable nature of groundwater flow at the Site.

Water levels will be acquired in a manner that provides accurate data which can be used to calculate vertical and horizontal hydraulic gradients and other hydrogeologic parameters. Accuracy in obtaining the measurements is critical to insure the usability of the data. The procedure for water level monitoring, found in the Approved Work Plan (CRA, August 2001), describes proper protocol for measurement of water levels in groundwater monitoring.

2.7 GROUNDWATER SAMPLING

The objective of this groundwater monitoring programs is to obtain samples that are representative of existing groundwater conditions and samples that retain the physical and chemical properties of the groundwater within an aquifer.

The sampling method recommended for the Site is "low stress/low flow" since particulate sorption may be an issue. Experience has shown that the "low stress/low flow" technique typically achieves representative groundwater samples with minimal particulate interference. During monitoring well purging the turbidity, temperature, pH, conductivity, dissolved oxygen (DO), and oxidation-reduction potential (ORP) of the groundwater will be monitored to confirm stabilization of groundwater within the monitoring well with the screened formation and thus collection of representative groundwater samples from the aquifer. Specifically, groundwater samples will be collected in accordance with the following protocols.

Prior to groundwater sample collection a static water level measurement will be taken at each well. The shallow wells each will be purged by peristaltic pump, bladder pump, or submersible electronic pump at a rate of from 100 to 500 milliliters per minute (mL/min). During purging, the water level should be monitored approximately every 5 minutes, or as appropriate, and drawdown should not exceed 0.3 feet. Field parameters should be recorded approximately every 5 minutes. Purging is considered complete once sediment free groundwater is obtained and three consecutive readings for each parameter are within the following limits:

pH	± 0.1 pH units of the average value of the three readings;
temperature	± 3 percent of the average value of the three readings;
conductivity	± 0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity <1 mS/cm and ± 0.01 mS/cm of the average value of the three readings for conductivity >1mS/cm;
ORP	± 10 millivolts (mV) of the average value of the three readings;
DO	± 10 percent of the average value of the three readings; and
turbidity	± 10 percent of the average value of the three readings, or a final value of less than 5 nephelometric turbidity units (NTU).

If stabilization of the field parameters has not occurred for all field parameters, purging is continued until a maximum of 20 well screen volumes have been purged from the well. The screen volume is based on a 5-foot screen length. After purging 20 screen volumes, purging is continued if the purge water remains visually turbid but appears to be clearing or if stabilization parameters are slightly outside of the stabilization criteria but appear to be approaching stabilization.

2.8 QUALITY ASSURANCE/QUALITY CONTROL

To ensure the validity of the sampling and analysis program, field quality control (QC) samples will be collected with the investigative samples. Duplicate groundwater samples will be collected at a rate of one duplicate for every ten samples collected. Matrix spike/matrix spike duplicate (MS/MSD) groundwater samples will be collected at a rate of one MS/MSD for every 20 samples collected.

Field blanks are used to determine if the equipment decontamination procedures have been sufficient. A field blank consists of a group of laboratory-cleaned sample containers that are transported empty into the field. At the field location, distilled water is passed through the pre-cleaned and/or decontaminated sampling equipment and placed into the empty group of containers for analysis. Field blanks are not collected when samples are collected directly into the sample container (i.e., the sample container is used as the collection device) using disposable sampling equipment.

A trip blank prepared by the project laboratory will accompany each shipment of groundwater samples submitted for VOC analysis.

More specifics on the Quality Control process are provided in the Sampling and Analysis Plan (SAP) and the Quality Assurance Project Plan (QAPP) for the Site. The SAP is provided as Appendix A and the QAPP is provided as Appendix B of the Approved Work Plan (CRA, August 2001).

2.9 SAMPLE LABELING

Each sample will be labeled with a unique sample code that will facilitate tracking and cross-referencing of sample information. Sample labeling protocols are provided in the Approved Work Plan (CRA, August 2001).

2.10 CHAIN-OF-CUSTODY FORMS

CRA chain-of-custody records will be used to track all samples from time of sampling to the arrival of samples at the laboratory. Chain-of-custody protocols are provided in the Approved Work Plan (CRA, August 2001).

2.11 SAMPLE CONTAINERS AND HANDLING

All samples will be placed in appropriate sample containers, labeled and properly sealed. Foam chips or bubble pack will be used to cushion sample containers. Samples will be kept cool by the use of sealed plastic bags of ice. A trip blank will accompany each shipment of groundwater samples submitted for VOC analysis. Additional sample container handling protocols are provided in the Approved Work Plan (CRA, August 2001).

3.0 SUPPORT PLANS

3.1 HEALTH AND SAFETY PLAN

A Site-Specific Health and Safety Plan (HASP) (CRA, October 2006) has been prepared and will be kept on Site during performance of the work.

3.2 WASTE MANAGEMENT PLAN

All wastes that are generated during the investigation will be stored, transported, and disposed in accordance with all applicable State and Federal regulations. Every effort will be made to minimize the amount and toxicity of wastes generated. It is anticipated that the following wastes will be generated during the investigation:

i) Wastewater will be generated during well development and purging. This water will be collected in 55-gallon steel drums for storage and will be characterized for off-Site disposal;

ii) Decontamination fluids, primarily water, may be generated during sampling activities to assure equipment is properly cleaned between locations. Decontamination waters will be collected in 55-gallon steel drums along with purge waters. Every effort will be made to minimize the amount of decontamination fluids generated by using dedicated and/or disposable equipment;

iii) Soil cuttings generated during monitoring well installation will be collected in 55-gallon steel drums and will be characterized for disposition; and

iv) Used Personal Protection Equipment (PPE) and other domestic trash will be generated during the sampling events. It will be treated as non-hazardous waste and discarded in the appropriate municipal waste dumpster or compactor.

All waste manifests, bills of lading, and other related paperwork will be maintained in the project files. All waste will be stored, transported, and disposed in accordance with applicable Federal and State rules and regulations.

All drums will be labeled as to their origin and contents and stored at a suitable location on Site pending final disposal disposition. GM via CRA will be responsible for preparing waste profiles and manifests or bills of lading for all waste shipments.

4.0 REPORTING OF MONITORING RESULTS

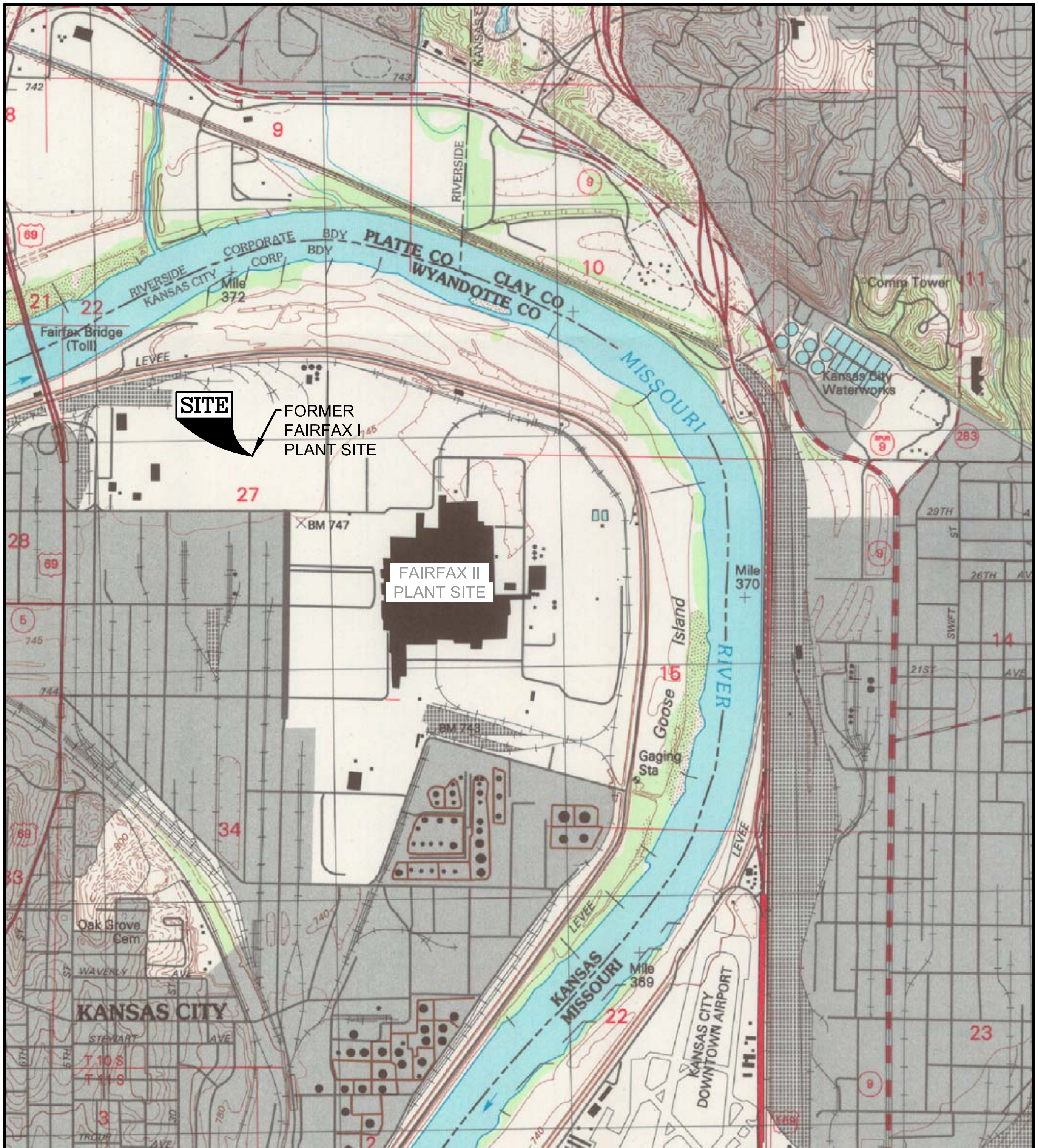
A quarterly summary report in letter format will be submitted to the KDHE prior to the start of the next quarterly sampling event.

The summary will include a description of field activities completed, a summary of quarterly groundwater monitoring field measurements, copies of field sampling forms, a summary of the analytical data compared to the KDHE groundwater standards, and groundwater contour maps.

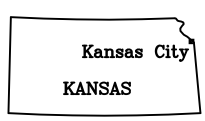
The necessity for the groundwater monitoring program for the Site will be re-evaluated at the conclusion of four consecutive quarterly sampling events.

5.0 SCHEDULE

Quarterly sampling events will be conducted in the next quarter and will continue for a total of four consecutive quarters. Quarterly reports will be submitted to the KDHE.



BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE;
NORTH KANSAS CITY, MO-KS 1990



0 1/4 1/2 mile

figure 1.1

SITE LOCATION MAP
FORMER FAIRFAX I PLANT SITE
Kansas City, Kansas

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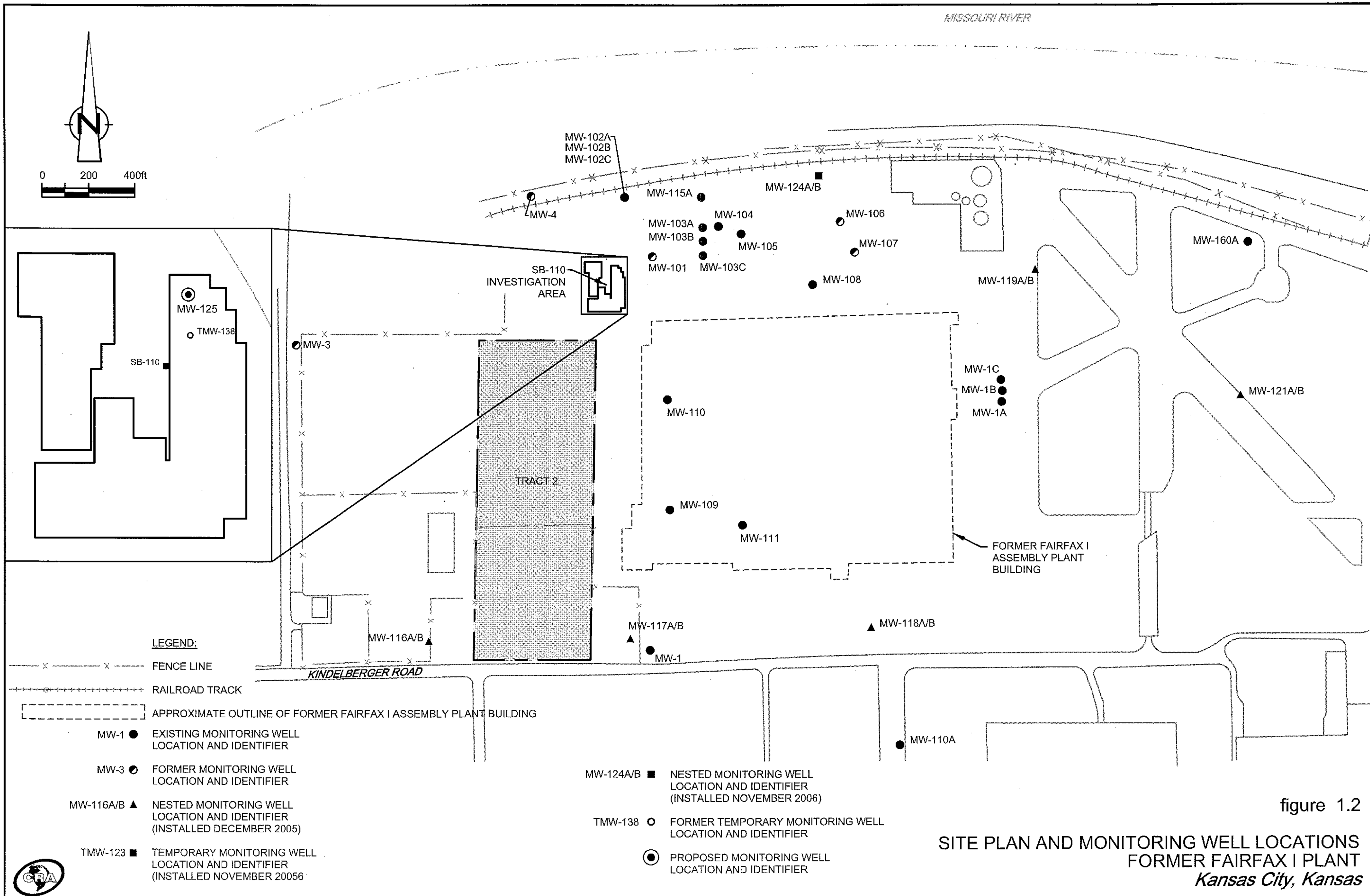

figure 1.2

SITE PLAN AND MONITORING WELL LOCATIONS
FORMER FAIRFAX I PLANT
Kansas City, Kansas

012559-04(015)GN-CO002 JUL 20/2007

TABLE 1.1

MONITORING WELL NETWORK
GM FORMER FAIRFAX I PLANT SITE
KANSAS CITY, KANSAS

Well ID	*Well ID*
MW-1	MW-111
MW-1A	MW-115A
MW-1B	MW-116A
MW-1C	MW-116B
MW-102A	MW-117A
MW-102B	MW-117B
MW-102C	MW-118A
MW-103A	MW-118B
MW-103B	MW-119A
MW-103C	MW-119B
MW-104	MW-121A
MW-105	MW-121B
MW-108	MW-124A
MW-109	MW-124B
MW-110	MW-125A
MW-110A	MW-160A