



SOIL AND GROUNDWATER CHARACTERIZATION WORK PLAN - TMW-130 AREA

**FORMER GENERAL MOTORS FAIRFAX I PLANT
KANSAS CITY, KANSAS**

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**OCTOBER 2008
REF. NO. 012559 (18)**

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1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) has been retained by General Motors (GM) to develop a remedial strategy for the recovery of light non-aqueous phase liquid (LNAPL) discovered at the TMW-130 area of the former GM Fairfax I Plant (Site) located in Kansas City, Kansas. The LNAPL has been characterized as a degraded diesel/fuel oil distillate material based on the results of laboratory analysis of the material and is situated approximately 22 to 32 feet below ground surface (bgs). The studies to date have been focused on the characterization of the LNAPL in the TMW-130 Area. Studies designed to develop an understanding of the nature and extent of dissolved petroleum hydrocarbons in soil and groundwater have yet to be completed in this area of the Site. Therefore, this Work Plan has been prepared to detail the soil and groundwater characterization investigation to be undertaken in the TMW-130 Area. This Work Plan is prepared as an addendum to the previously approved work plan titled *Pre-Design Investigations Work Plan* (CRA 2001) (Approved Work Plan).

2.0 **BACKGROUND**

GM formerly operated a manufacturing plant, referred to as the Fairfax I Assembly Plant, on Kindelberger Road in Kansas City, Kansas (Site). The Site is located in the floodplain of the Missouri River. The Fairfax I Plant Site is vacant as operations ceased in 1986/87 and the facility was demolished in 1987. A large number of monitoring wells, however, remain on the Fairfax I Plant Site. A Site plan showing monitoring well locations and historical Site features is provided as Figure 2.1.

Previous soil and groundwater investigations have identified the presence of LNAPL in the area of temporary monitoring well TMW-130. The LNAPL plume has been delineated with the installation of temporary monitoring wells and soil borings and the Laser-Induced Fluorescence (LIF) investigation. Figure 2.2 presents the temporary monitoring well locations in the TMW-130 Area. Figure 2.3 presents the locations of the previously installed soil borings, including five soil borings advanced in September 2008. Figure 2.4 shows the approximate location of the LNAPL plume based on an LIF investigation performed in February 2008. Figure 2.4 also presents soil boring and temporary monitoring well locations. CRA conducted a multi-phase extraction (MPE) pilot study at the LNAPL plume area in the vicinity of temporary monitoring well TMW-130 in September 2008. Results of the September 2008 MPE pilot study and soil boring installation will be presented in a separate report.

3.0 SOIL AND GROUNDWATER CHARACTERIZATION SCOPE OF WORK

This section presents the proposed Site activities that will be conducted in order to characterize soil and groundwater in the TW-130 Area. The scope of work includes the following major tasks:

- Advance nine soil sampling borings within the impacted area to the water table using direct push technology and observe and log soil conditions (physical characteristics, photoionization detector (PID) readings, and visual oil/petroleum impacts);
- At each soil sampling boring location, collect one shallow soil sample from 1 to 3 feet below ground surface (bgs) for laboratory analysis;
- At each soil sampling boring location, collect one deep sample from the depth interval above the water table that exhibited the highest UVOST result¹ for laboratory analysis;
- Advance five delineation borings outside the impacted area to the water table using direct push technology and observe and log soil conditions (physical characteristics, detector PID readings, and visual oil/petroleum impacts);
- At each delineation boring location, collect one soil sample from the depth interval above the water table that exhibits the highest PID reading and one soil sample from immediately above the water table for laboratory analysis;
- Submit soil samples from the soil sampling borings and the delineation borings to the project laboratory for analysis of target compound list volatile organic compounds (TCL VOCs), total petroleum hydrocarbon as gasoline range organics (TPH-GRO), and total petroleum hydrocarbon as diesel range organics (TPH-DRO);
- Gauge the nine temporary monitoring wells in the TMW-130 Area to determine the depth to water and the presence of LNAPL;
- Sample the nine temporary monitoring wells in the TMW-130 Area using low flow purging techniques;
- Submit groundwater samples for laboratory analysis of TCL VOCs, TPH-GRO, and TPH-DRO;
- Contain soil boring cuttings and groundwater-sample purge water in 55-gallon drums;
- Compile and evaluate data; and
- Report findings to the KDHE.

¹ UVOST measurements based upon data presented in CRA's May 22, 2008 "Results of LNAPL Investigations - TMW-130 Area" letter report to KDHE.

4.0 PROCEDURES

This section details the investigative sampling protocols to be used during soil and groundwater sampling activities.

Soil cuttings and monitoring well purge water/decontamination water will be containerized in 55-gallons drums.

4.1 SOIL BORINGS

Soils collected from the borings will be visually inspected, logged, and screened with a PID for evidence of petroleum impacts. Soil samples selected for laboratory analysis will be submitted to the project laboratory for analysis of TCL VOCs, TPH-GRO, and TPH-DRO. Completed soil borings will be backfilled with cement bentonite grout. Soil boring locations will be surveyed upon completion.

4.1.1 SOIL SAMPLING BORINGS

Soil sampling borings will be advanced at nine sample locations (B3, B5, D4, E2, E4, F4, F5, G2, and G4) from the UVOST grid within the LNAPL-impacted area, as indicated on Figure 2.4. Collect one shallow soil sample from 1 to 3 feet bgs for laboratory analysis. Collect one deep sample from the depth interval above the water table that exhibited the highest UVOST result for laboratory analysis. The deep sample interval may be modified in the field based on observed conditions and/or PID field screening results. Refer to Table 1 for the proposed deep sample collection depths.

4.1.2 DELINEATION BORINGS

Delineation borings will be advanced at five locations outside the limits of the LNAPL-impacted area as indicated on Figure 2.4. Collect one soil sample from the depth interval above the water table that exhibits the highest PID reading or exhibits visual/olfactory evidence of impact and one soil sample from immediately above the water table for laboratory analysis. If no intervals exhibit an elevated PID reading or visual/olfactory indication of impact, collect only the sample immediately above the water table at that boring location.

4.2 GROUNDWATER SAMPLING

Prior to sampling, the temporary monitoring wells in the TMW-130 Area will be gauged to determine the depth to water and the presence of LNAPL. A well where LNAPL is present will not be purged and sampled.

Nine temporary monitoring wells (TMW-130, TMW-139, TMW-140, TMW-141, TMW-142, TMW-143, TMW-144, TMW-145, and TMW-146) will be sampled using low flow purging and sampling techniques, as detailed in the report titled *LNAPL Investigation Work Plan – TMW-130 Area*, Section 5.7.2 Monitoring Well Purging and Sampling (CRA 2007). Temporary monitoring well locations are presented on Figure 2.2.

Groundwater samples will be submitted to the project laboratory for analysis of TCL VOCs, TPH-GRO, and TPH-DRO.

4.3 EQUIPMENT CLEANING

A temporary equipment decontamination facility will be constructed and operated at the Site. See the Approved Work Plan (CRA 2001) for drilling and sampling equipment cleaning protocols. Decontamination water will be containerized as stated in the Approved Work Plan (CRA 2001).

4.4 GENERAL SAMPLING PROTOCOLS

The following sections describe the labeling, tracking, and handling procedures to be used for vapor and soil samples collected at the Site during the implementation of this Work Plan.

4.4.1 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 2001).

4.4.2 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 2001).

4.4.3 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. Additional sample container handling protocols are provided in the Approved Work Plan (CRA 2001).

4.4.4 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. Additional details are provided in the Approved Work Plan (CRA 2001).

For soil samples, matrix spike/matrix spike duplicate (MS/MSD) samples will be designated/collected at a frequency of one per twenty investigative samples.

Groundwater field QC samples will consist of collection of one duplicate groundwater sample and one MS/MSD sample. A trip blank will accompany each shipment of groundwater samples submitted for VOC analysis.

4.5 WASTE CHARACTERIZATION SAMPLING

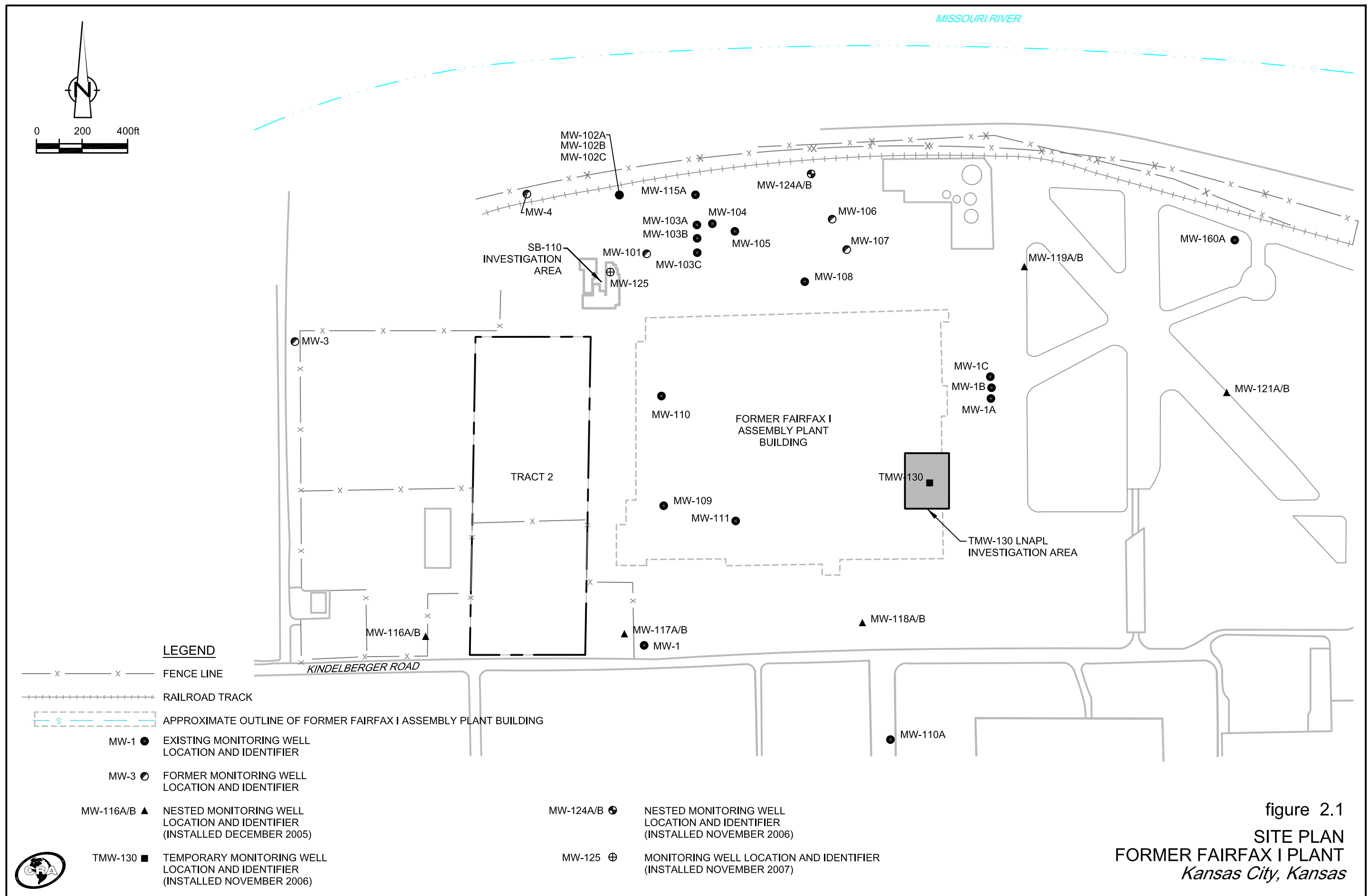
One groundwater sample will be collected to allow for its waste characterization for potential remediation purposes. The sample will be submitted to the project laboratory for analysis of Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP Semivolatile Organic Compounds (SVOCs), TCLP Resource Conservation and Recovery Act (RCRA) Metals, Ignitability, Reactive Cyanide, Reactive Sulfide, Corrosivity, and Biochemical Oxygen Demand. No soil sample will be submitted for waste characterization since soil in the TMW-130 Area was previously characterized for waste disposal during the September 2008 field activities.

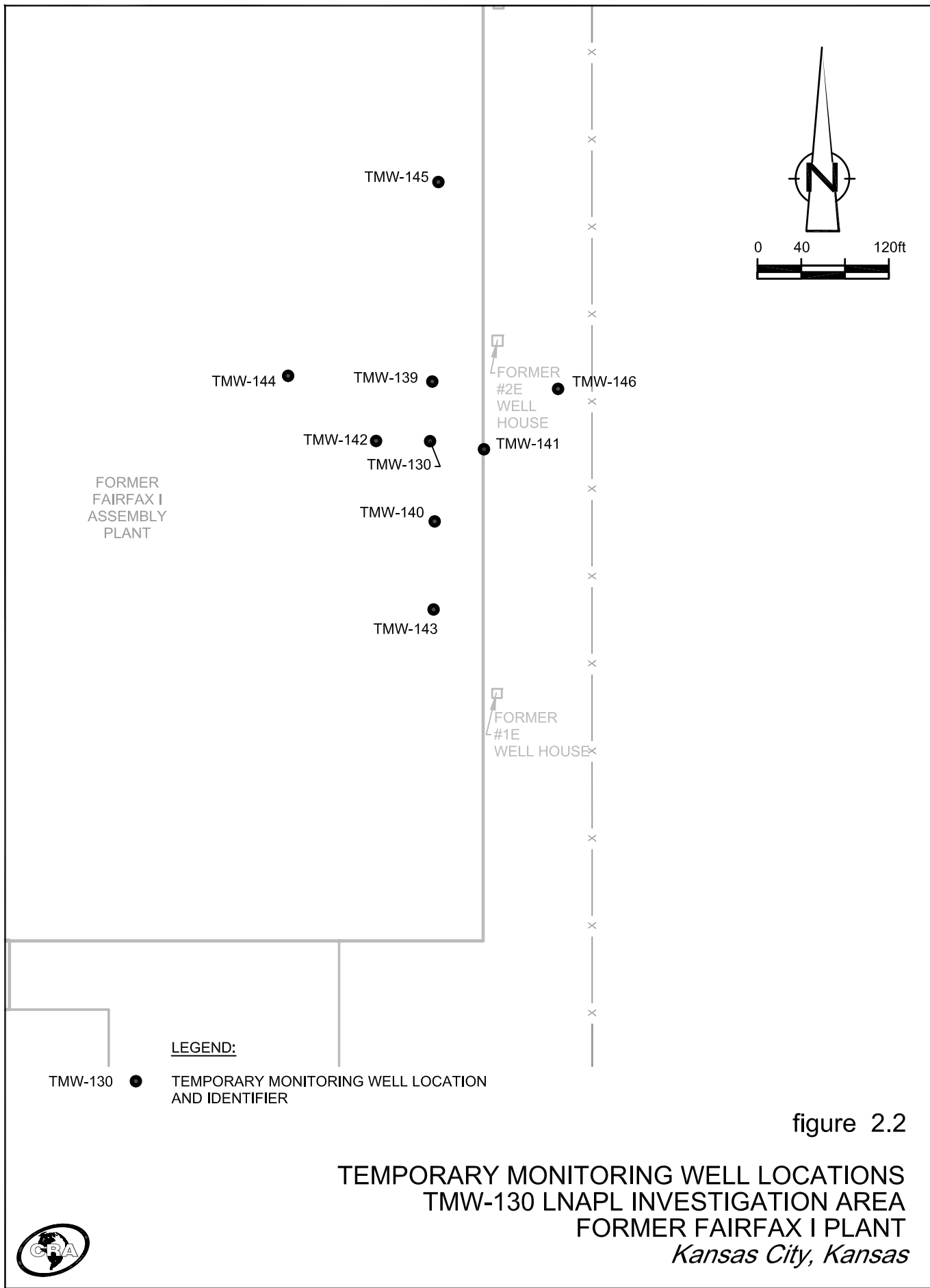
5.0 REFERENCES

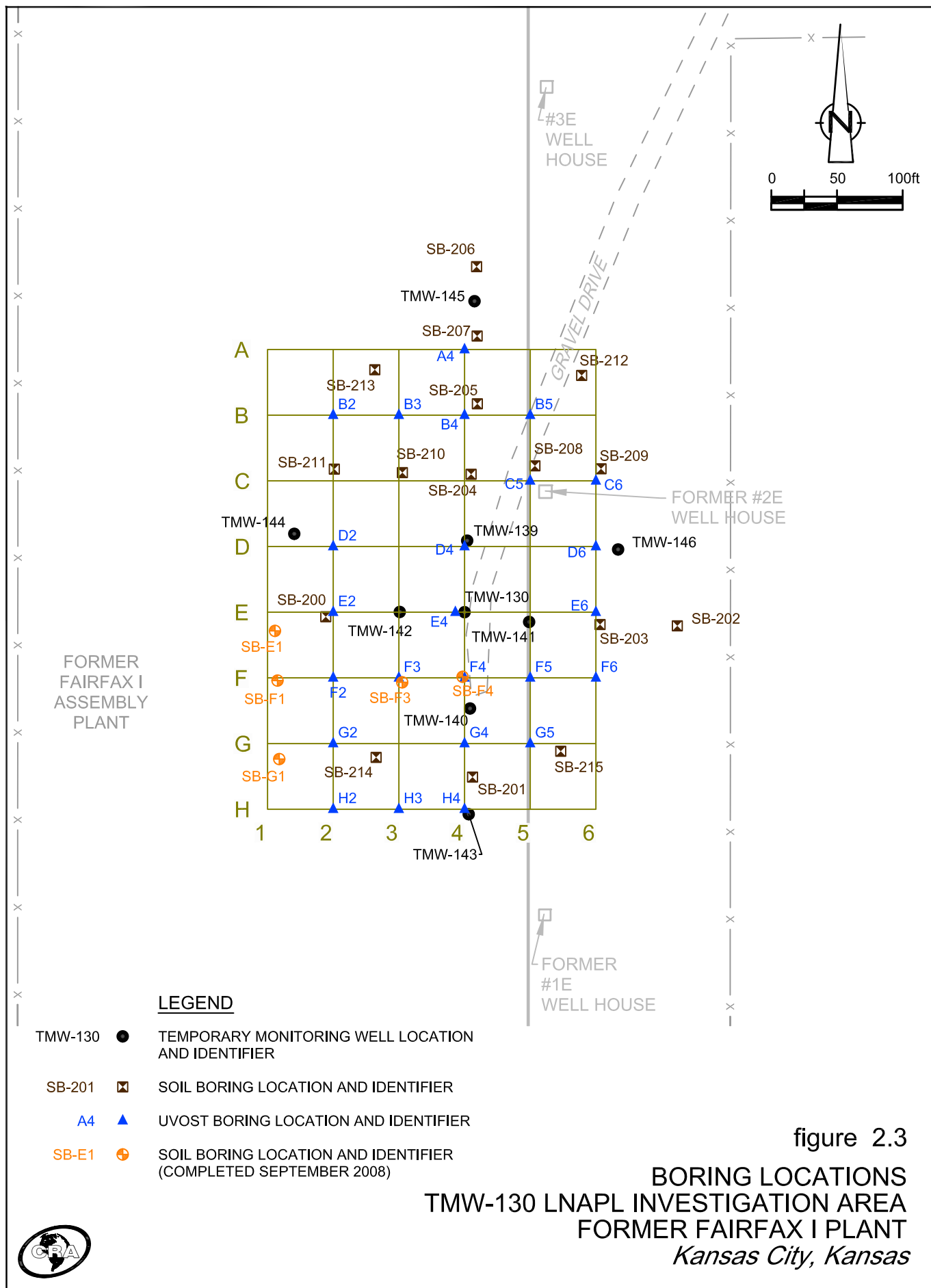
CRA 2001. Pre-Design Investigation Work Plan, Former General motors Fairfax I Plant, Kansas City, Kansas, August 2001.

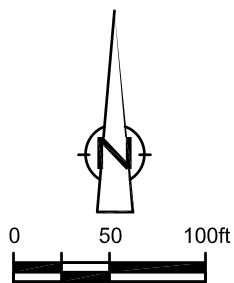
CRA 2007. LNAPL Investigation Work Plan – TMW-130 Area, Former General Motors Fairfax I Plant, Kansas City, Kansas, June 2007.

CRA 2008. Results of LNAPL Investigations - TMW-130 Area, Former General Motors Fairfax I Plant, Kansas City, Kansas, letter report dated May 22, 2008.









FORMER
FAIRFAX I
ASSEMBLY
PLANT

LEGEND



PROPOSED DELINEATION
BORING LOCATION



PROPOSED SOIL BORING LOCATION ADJACENT
UVOST BORING

TMW-130



TEMPORARY MONITORING WELL
LOCATION AND IDENTIFIER

SB-201



SOIL BORING LOCATION AND IDENTIFIER

A4



UVOST BORING LOCATION AND IDENTIFIER

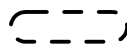
SB-E1



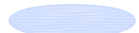
SOIL BORING LOCATION AND IDENTIFIER
(INSTALLED SEPTEMBER 2008)

[37.82]

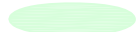
AVERAGE FLUORESCENCE COMPARED
TO REFERENCE EMITTER



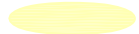
APPROXIMATE EXTENT OF OBSERVED LNAPL



AVERAGE FLUORESCENCE CONTOURS (10%)



AVERAGE FLUORESCENCE CONTOURS (50%)



AVERAGE FLUORESCENCE CONTOURS (100%)



AVERAGE FLUORESCENCE CONTOURS (150%)



AVERAGE FLUORESCENCE CONTOURS (180%)

NOTE:

AVERAGE FLUORESCENCE BY USING AN
INTERVAL OF ONE OR MORE FEET ABOVE AND
BELOW THE MAXIMUM UVOST FLUORESCENCE

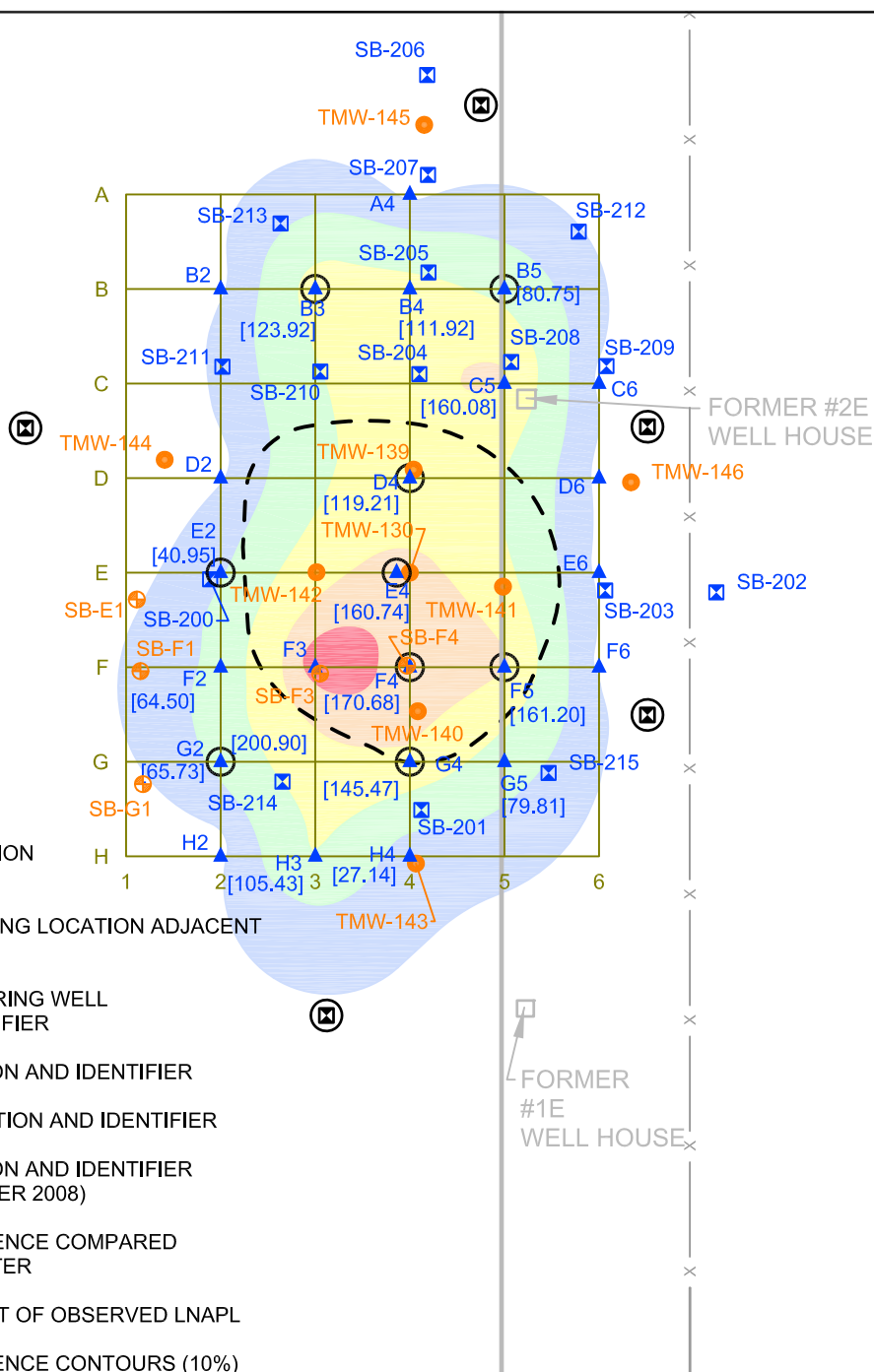


figure 2.4

PROPOSED SOIL BORING LOCATIONS
TMW-130 LNAPL INVESTIGATION AREA
FORMER FAIRFAX I PLANT
Kansas City, Kansas



TABLE 1
PROPOSED DEEP SOIL SAMPLE COLLECTION DEPTHS
FORMER FAIRFAX I PLANT
KANSAS CITY, KANSAS

<i>Soil Boring Location</i>	<i>Proposed Sample Collection Depth (feet below grade)</i>
B3	13 - 15
B5	13 - 15
D4	8 - 10
E2	23 - 25
E4	23 - 25
F4	23 - 25
F5	23 - 25
G2	23 - 25
G4	23 - 25

Notes:

Proposed sample collection intervals are based on the February 2008 UVOST results.
If the proposed sampling interval is below the water table, collect the sample immediately above the water table. The deep sample interval may be modified in the field based on observed conditions and/or PID field screening results.