

Memorandum

To: Carolyn Jones, DAIM-ODB
John Hill, CIV AFCEE/EXA

From: John Sperry
Tom Holmes

Date: 5 July 2012

Re: **Well Abandonment Report, Enhanced Bioremediation Treatment System**
Main Installation - Defense Depot Memphis, Tennessee

HDR has prepared this memorandum to summarize the abandonment of selected wells used for Enhanced Bioremediation Treatment (EBT) on the Main Installation (MI) at Defense Depot Memphis, Tennessee. The work was performed for the Department of the Army, Base Realignment and Closure Division (DAIM-ODB) under Contract FA8903-08-D-8771, Task Order 0069 to the Air Force Center for Engineering and the Environment.

The selected remedy for the MI included EBT of chlorinated volatile organic compounds in the most contaminated part of the groundwater plume. EBT system construction included installation of 50 injection wells (IWs) and 30 performance monitoring wells (PMWs) in two target treatment areas (TTA-1 and TTA-2). MI EBT components were planned to be removed following a period of monitoring after injections were halted, but additional EBT is planned due to rebound in contaminant concentrations observed in long term monitoring.

Baseline groundwater samples were collected from 49 IWs and 24 PMWs in December 2011. Sample results were presented in *December 2011 Baseline Samples for the Enhanced Bioremediation Treatment System* (HDR, 2012). The sample results indicated rebound in concentrations of parent compounds, with increasing concentrations of tetrachloroethene in all areas, trichloroethene in TTA-1S and carbon tetrachloride in TTA-2.

Based on past EBT and groundwater monitoring results, fewer wells will be used for injection and performance monitoring in the additional EBT to commence later in 2012. The baseline samples report included recommendations for abandonment of selected EBT wells. United States Environmental Protection Agency and Tennessee Department of Environment and Conservation provided comments on the recommended well abandonment via email on 29 March 2012. The recommendations were accepted and the designated wells were abandoned on 6 to 8 June 2012. The abandoned wells are listed on [Table 1](#) and well locations are shown on [Figures 1](#) and [2](#).

Well Abandonment

The 11 PMWs and 20 IWs were abandoned by M&W Drilling, a licensed Tennessee well driller, in accordance with Memphis Shelby County Health Department regulations.

One-half gallon of bleach was poured into each well, and bentonite chips were added to seal the screened section and absorb water to limit waste water. The wells were then filled with grout (Portland type II cement with 5 percent bentonite) from the bottom up using a tremie pipe. After the grout had time to settle in all wells, additional grout was added to completely fill the well casing.

PMW manhole covers were removed and the manhole was filled with concrete. IW well vault lids and rings were removed. Reinforcing steel was placed in the vault; eight pieces were placed to create a "cage" of reinforcing steel. Concrete was placed around the steel to the ground surface.

Daily activities during well abandonment are listed below:

Date	Activity
6 June 2012	Conducted health and safety briefing. Total well depths were measured and no obstructions were found. Each well was disinfected by adding 0.5 gallon of bleach. Bentonite chips were added to seal the screen interval and decrease the waste water generated during grouting. Grout was placed in 6 wells.
7 June 2012	Grout was placed in the remaining 25 wells.
8 June 2012	Injection well vault covers were removed. A cage of reinforcing steel was placed in each vault and filled with concrete from a mixer truck. Monitoring well manholes were filled with concrete mixed on-site.

TABLES

1	Well Abandonment Summary
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TABLE 1
WELL ABANDONMENT SUMMARY
EBT WELL ABANDONMENT REPORT
Main Installation, Defense Depot Memphis, Tennessee

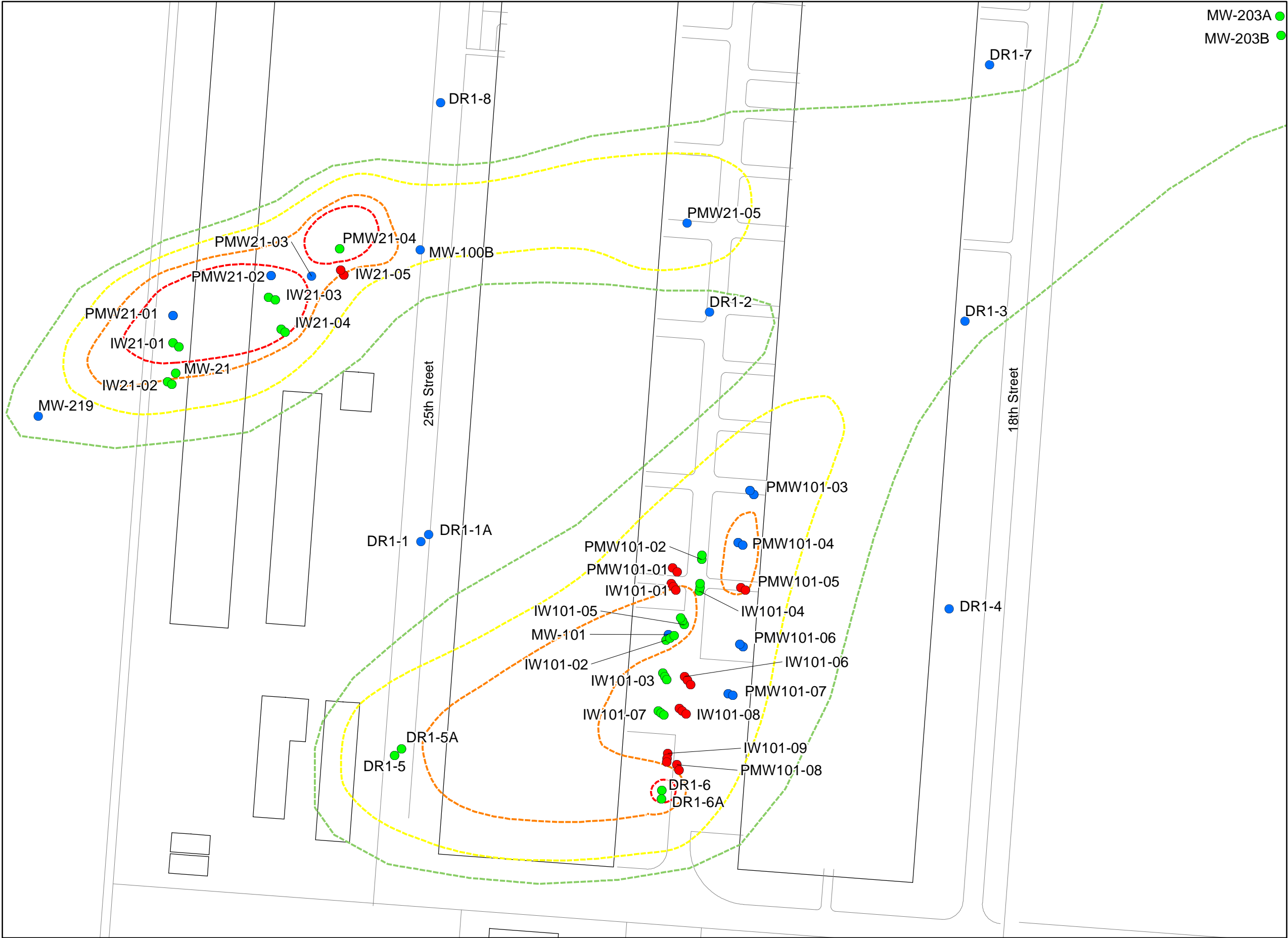
Well	Northing	Easting	Ground Elevation (ft, msl)	Date Abandoned	Well Diameter (inches)	Total Depth (ft, btoc)
IW101-01A	276256.7	801113.2	291.3	6/6/2012	4	137.6
IW101-01B	276253.7	801115.2	291.3	6/6/2012	4	122.7
IW101-01C	276250.1	801117.9	291.5	6/6/2012	4	107.7
IW101-06A	276161.3	801127.0	292.8	6/6/2012	4	139.2
IW101-06B	276157.4	801129.8	292.9	6/6/2012	4	124.2
IW101-06C	276153.0	801133.1	292.7	6/6/2012	4	109.7
IW101-08A	276128.3	801121.5	292.8	6/6/2012	4	140.7
IW101-08B	276125.7	801124.7	292.9	6/6/2012	4	123.4
IW101-08C	276122.9	801128.6	293.1	6/6/2012	4	108.3
IW101-09A	276081.9	801109.6	292.9	6/6/2012	4	140.4
IW101-09B	276076.8	801109.0	292.9	6/6/2012	4	125.3
IW101-09C	276073.0	801108.5	293.0	6/6/2012	4	110.3
IW21-05A	276574.9	800775.8	292.2	6/6/2012	4	111.2
IW21-05B	276579.9	800772.7	292.3	6/6/2012	4	100.4
IW85-01	276831.3	806201.3	305.2	6/6/2012	4	98.6
IW85-02	276797.4	806222.5	305.3	6/6/2012	4	101.6
IW85-04	276779.3	806187.6	305.5	6/6/2012	4	81.7
IW92-04	276681.9	806489.6	304.4	6/6/2012	4	93.9
IW92-05	276707.0	806449.3	304.3	6/6/2012	4	93.8
IW92-06	276723.9	806409.1	304.3	6/6/2012	4	94.7
PMW101-01A	276273.2	801114.5	291.2	6/6/2012	2	141.2
PMW101-01B	276269.1	801119.3	291.2	6/6/2012	2	118.4
PMW101-05A	276252.7	801184.9	291.8	6/6/2012	2	125.2
PMW101-05B	276250.1	801189.8	292.1	6/6/2012	2	105.3
PMW101-08A	276070.3	801119.0	293.3	6/6/2012	2	140.0
PMW101-08B	276065.1	801121.3	293.5	6/6/2012	2	118.5
PMW85-04	276763.5	806168.7	305.3	6/6/2012	2	101.9
PMW92-01	276635.3	806499.8	304.5	6/6/2012	2	102.9
PMW92-04	276690.6	806399.3	304.1	6/6/2012	2	101.4
PMW92-05	276730.2	806346.4	304.3	6/6/2012	2	98.6
PMW92-06	276766.9	806270.7	305.0	6/6/2012	2	102.0

Notes:

ft, btoc: feet below top of casing
ft, msl: feet mean sea level

FIGURES

- 1 TTA-1 Well Locations
- 2 TTA-2 Well Locations



N
W
E
S

Figure 1

TTA-1 WELL LOCATIONS

EBT WELL ABANDONMENT REPORT

MAIN INSTALLATION
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

Injection

Monitor

Abandoned

PCE Isopleth

ug/L

5

10

50

100

0

25

50

100

150

Feet

Installation Location
Memphis, Tennessee

Date: July 2012
Edition: Rev 0

HDR

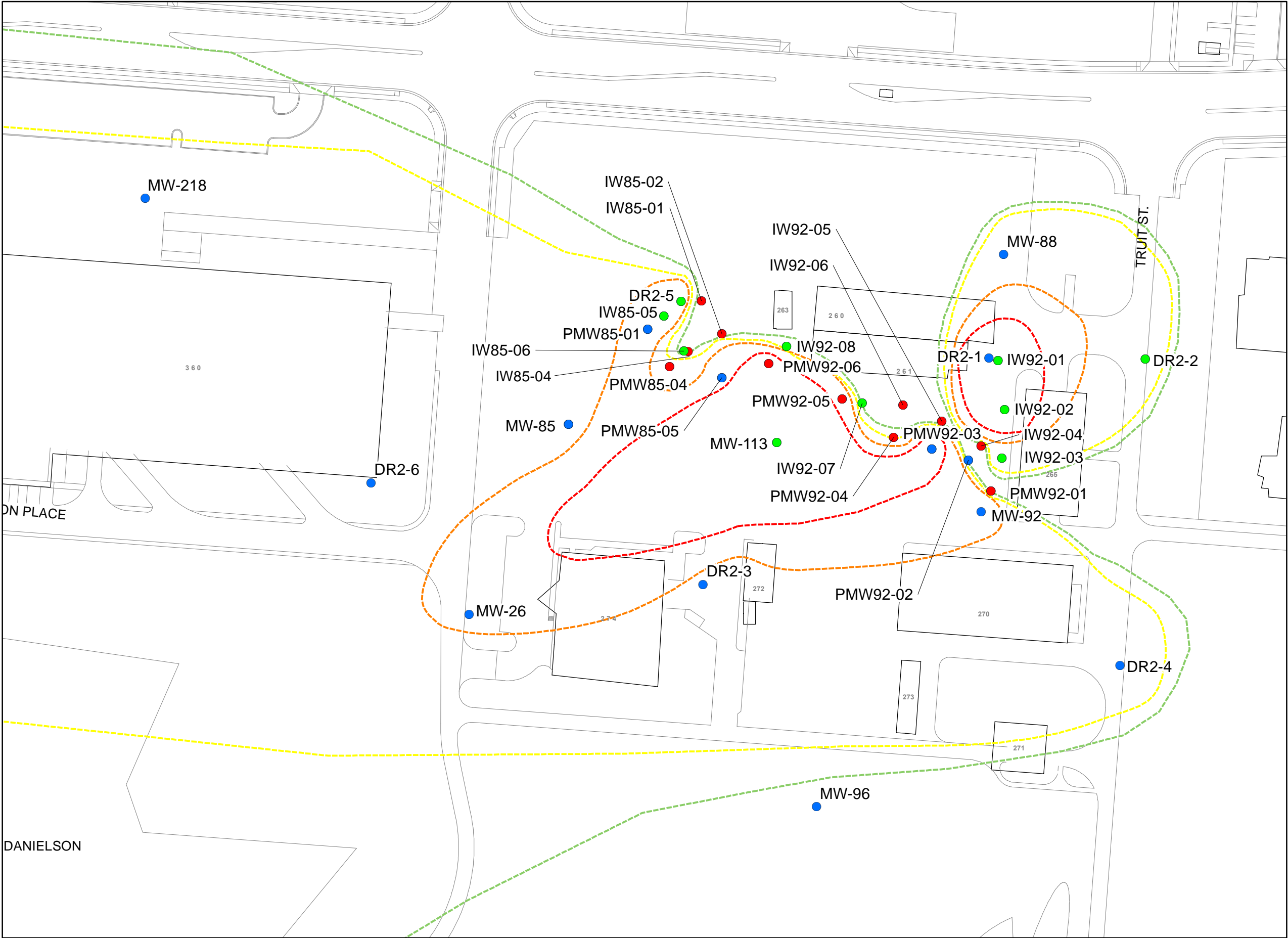


Figure 2

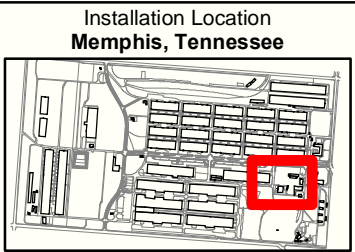
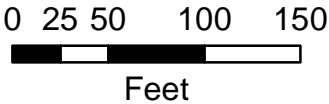
TTA-2 WELL LOCATIONS

EBT WELL ABANDONMENT REPORT

MAIN INSTALLATION
DEFENSE DEPOT
MEMPHIS, TENNESSEE

- Legend
- Injection (Green dot)
 - Monitor (Blue dot)
 - Abandoned (Red dot)

- PCE Isopleth
ug/L
- 5 (Green dashed line)
 - 10 (Yellow dashed line)
 - 50 (Orange dashed line)
 - 100 (Red dashed line)



Date: July 1 2012
Edition: Rev 0



Appendix A

Well Abandonment Permits



Mark H. Luttrell, Jr.
Mayor
Shelby County

SHELBY COUNTY HEALTH DEPARTMENT

YVONNE S. MADLOCK
DIRECTOR

HELEN MARROW, M. D.
HEALTH OFFICER



Public Health
Prevent. Promote. Protect.

May 31, 2012

HDR Inc.

Attention: Brad Sperry
2241 Truitt Street
Memphis, TN 38114

RE: EMERGENCY FILL AND ABANDONMENT: 1701 Dunn (Parcel ID # 060092 00029)
(Department of the Army IW101-01A-C, IW101-06A-C, IW101-081-C, IW101-09A-C, IW21-05 A,B,
PMW101-01 A,B, PMW101-05 A, B, PMW101-08A,B) **Permit # 12-069**

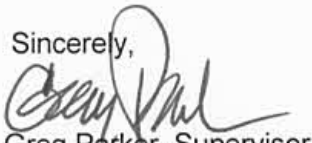
Dear Mr. Sperry:

This letter is to inform you that a construction permit has been issued to your selected well contractor, approving the fill and abandonment of the above referenced well. We appreciate the cooperation you have given the Health Department during the application review process. Complying with the following requires your further cooperation:

1. The Health Department is to be notified when the work is scheduled so that we can witness the procedures.
2. The Health Department is to be notified if the well driller violates any of the conditions for which the permit was issued.
3. The Health Department is to be notified for prior approval of any changes in plans for filling the well, or in the well contractor initially selected to do the work.
4. Inspection Fee Required? Yes ___ No xx Amount
5. Permit Application Fee Yes xx ___ No ___ Amount \$50.00

If you have any questions or need additional information, please contact Mr. Greg Parker at (901) 222-9599.

Sincerely,


Greg Parker, Supervisor
Water Quality Branch

BD: GP: bfd

Mission

To promote, protect and improve the health and environment of all Shelby County residents.

814 Jefferson Street ♦ Memphis, Tennessee 38105
(901) 222-9599



SHELBY COUNTY HEALTH DEPARTMENT
WATER QUALITY CONTROL
FILL AND ABANDONMENT CONSTRUCTION PERMIT



Public Health
Prevent. Promote. Protect.

WELL DRILLING COMPANY M & W Drilling, LLC

ADDRESS 8321 Oak Ridge HWY Knoxville, TN 37931

DATE ISSUED 5/30/2012 EXPIRATION DATE 8/28/2012 PERMIT # 12-069

DESCRIPTION OF WORK – Fill and Abandonment of Monitoring Well(s) at: 1701 Dunn (Parcel ID # 060092 00029) Emergency Permit Owner HDR Inc. (Department of the Army IW101-01A-C, IW101-06A-C, IW101-081-C, IW101-09A-C, IW21-05 A, B, PMW101-01 A, B, PMW101-05 A, B, PMW101-08A, B)

This permit is issued based on signed commitment by the driller and the owner of the well to fully comply with the requirements set forth in the approved application or as directed by the Shelby County Health Department. Deviation from the approved application or any conditions set forth by the Health Department shall void this permit.

CONDITIONS:

1. The abandoned well shall be sealed only by a licensed well contractor.
2. All procedures used in sealing the well shall be witnessed by a representative of the Shelby County Health department.
3. All water lines to the well are to be disconnected.
4. The well is to be dismantled in such a way that all working parts from inside the casing are removed.
5. Any obstructions found in the well are to be removed.
6. The empty casing is to be filled by one of two methods:
 - a. With a Portland Class A or quick setting cement in a ratio not over seven (7) gallons of water per ninety-four (94) pounds of cement.
 - b. A coarse-grained high solids non-drilling mud grade bentonite slurry such as Baroid Benseal, American Colloid or equal. The bentonite grout shall be mixed in accordance with the manufacturer's recommendations.
7. The grout shall be pumped from the bottom of the well upward through a tremmie pipe in one continuous operation in order to avoid separation or dilution of the seal material. A return shall be seen at the top as the same consistency as the material that is pumped into the well.
8. Chlorine shall be added at the beginning and during the sealing process.
9. The well must be sealed within thirty days of receipt of this permit.
10. The Health Department shall be notified before procedures are to begin in sealing the well. This includes all dismantling procedures and lowering the pipe used for grouting.
11. Abandoned wells on this site shall be sealed as required by Chapter 29, Article III, Water Quality Control of the Code of Shelby County, Tennessee.


Robert Rogers, P.E., Technical Manager
POLLUTION CONTROL

No authority is granted by this permit to construct, operate or maintain any well in violation of any law, statute, code, ordinance, rule or regulation of Memphis and Shelby County, Tennessee.

NON -TRANSFERABLE

POST OR FILE AT CONSTRUCTION SITE

AP 6/4/12

12-069



Mark H. Luttrell, Jr.
Mayor
Shelby County

SHELBY COUNTY HEALTH DEPARTMENT

YVONNE S. MADLOCK
DIRECTOR

HELEN MARROW, M. D.
HEALTH OFFICER



Public Health
Prevent. Promote. Protect.

May 31, 2012

HDR Inc.

Attention: Brad Sperry

2241 Truitt Street

Memphis, TN 38114

RE: EMERGENCY FILL AND ABANDONMENT: 2245 Truitt (Parcel ID # 060092 00033)
(Department of the Army IW85-01, IW85-02, IW85-04, IW92-04, IW92-05, IW92-06, PMW85-04, PMW92-01, PMW92-04, PMW92-05, PMW92-06
Permit # 12-068

Dear Mr. Sperry:

This letter is to inform you that a construction permit has been issued to your selected well contractor, approving the fill and abandonment of the above referenced well. We appreciate the cooperation you have given the Health Department during the application review process. Complying with the following requires your further cooperation:

1. The Health Department is to be notified when the work is scheduled so that we can witness the procedures.
2. The Health Department is to be notified if the well driller violates any of the conditions for which the permit was issued.
3. The Health Department is to be notified for prior approval of any changes in plans for filling the well, or in the well contractor initially selected to do the work.
4. Inspection Fee Required? Yes ___ No xx Amount
5. Permit Application Fee Yes xx No ___ Amount \$50.00

If you have any questions or need additional information, please contact Mr. Greg Parker at (901) 222-9599.

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WELL DRILLING COMPANY M & W Drilling, LLC

ADDRESS 8321 Oak Ridge HWY Knoxville, TN 37931

DATE ISSUED 5/30/2012 EXPIRATION DATE 8/28/2012 PERMIT # 12-068

DESCRIPTION OF WORK – Fill and Abandonment of Monitoring Well(s) at: 2245 Truitt (Parcel ID # 060092 00033) Emergency Permit Owner HDR Inc. (Department of the Army IW85-01, IW85-02, IW85-04, IW92-04, IW92-05, IW92-06, PMW85-04, PMW92-01, PMW92-04, PMW92-05, PMW92-06)

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NON-TRANSFERABLE

POST OR FILE AT CONSTRUCTION SITE

06/04/12