UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
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July 18, 2014

United Parcel Service

Ms. Carolyn Jones
Program Manager
Office of the Chief of Staff for Installation Management
Attn: BRAC Division (DAIM-ODB)
2530 Crystal Drive (Taylor Bldg.), Room 5000
Arlington, VA 22202-3940

Subject: Dunn Field - Off Depot Air Sparge-Soil Vapor Extraction System Annual Operations Report, Year 4, Defense Depot Memphis, Tennessee, Revision 0 (March 2014): EPA Comments

Dear Ms. Jones:

This correspondence transmits EPA Region 4's comments on the draft March 2014 Dunn Field Off-Depot Air Sparge-Soil Vapor Extraction (AS/SVE) Year 4 Report for the Defense Depot Memphis, Tennessee (DDMT), U.S. EPA ID Number TN4210020570, in Shelby County, Tennessee.

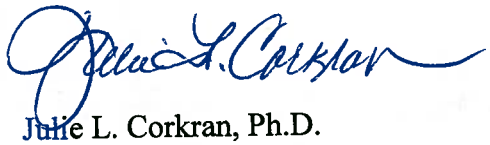
Subsequent to submission of this report in March of 2014 for Agency review, EPA provided comments (dated May 5, 2014) on the Annual 2013 Long Term Monitoring (LTM) Report for DDMT, including general and specific comments (dated May 5, 2014) regarding the status of the off-site Dunn Field groundwater contamination, the off-site AS/SVE treatment system, and the northeast off-site inbound contamination described in the 2002 Remedial Investigation Report, 2004 Record of Decision (ROD), and 2009 ROD Amendment for Dunn Field.

- In response to EPA comments on the Draft 2013 LTM Report, the Army requested a 30 day extension to evaluate and respond to EPA's comments on Dunn Field.
- EPA, TDEC and the Army discussed Dunn Field technical and schedule issues, and conducted an off-Depot potential source area tour, during our team meeting held in Memphis on May 29, 2014.
- On June 20, 2014, the Army provided amended responses to EPA comments on the Draft 2013 LTM Report, including the general and specific comments regarding Dunn Field.
- On June 27, 2014, the EPA Remedial Project Manager received courtesy copies from the Tennessee Department of Environment and Conservation (TDEC) of four (4) CERCLA pre-screening and site investigation reports that are part of a broader long-term State evaluation of potential sources for the observed northeast off-site inbound (Person Ave) contamination at Dunn Field. EPA understands that a work plan is under development in 2014 for State investigation of a fifth possible source.

EPA is resubmitting our May 5, 2014, Dunn Field general and specific comments on the Draft LTM Report (including the Army's June 2014 responses) as this Agency's comments on the Dunn Field AS/SVE Year 4 Annual Report. The EPA comments and Army's June 2014 responses to comments are provided as an enclosure to this letter to serve as a baseline for continuing discussions in 2014 regarding the technical and regulatory issues impacting the projected schedules for meeting remedial action objectives and constituent-specific remedial goals for completing the Dunn Field groundwater cleanup. EPA anticipates that the Dunn Field discussions will occur in conjunction with review and approval of the upcoming Fiscal Year 2015 annual update to the Site Management Plan for DDMT.

If you have any questions about this correspondence, please do not hesitate to contact me at 404-562-8547 or via electronic mail at corkran.julie@epa.gov.

Sincerely,



Julie L. Corkran, Ph.D.
Senior Remedial Project Manager
Federal Facilities Branch
Superfund Division

Enclosure: Army Amended Responses (June 20, 2014) to EPA Comments (May 5, 2014) on the Annual 2013 Long-Term Monitoring Report for DDMT (March 2014)

cc: Jamie Woods, TDEC
Ben Bentkowski, EPA R4 Technical Services Section

Corkran, Julie

From: Hutton, Joan <Joan.Hutton@calibresys.com>
Sent: Friday, June 20, 2014 12:48 PM
To: Corkran, Julie; Bentkowski, Ben; Jamie Woods (Jamie.Woods@tn.gov)
Cc: 'carolyn.a.jones28.civ@mail.mil'; delight.d.balducci.civ@mail.mil; Tyler.P.Jones@usace.army.mil; thomas.holmes@hdrinc.com
Subject: Amended Response to EPA Comments _ Annual LTM Report - 2013, Defense Depot Mempis, TN, Rev. 0 _ EPA ID Number TN4210020570
Attachments: 140620 2013 LTM RTC to EPA-TDEC.pdf; 20140619 Memphis Depot RTCs - Final.pdf

Julie / Ben / Jamie,

On behalf of Ms. Carolyn Jones of the Army BRAC Office, attached are the Amended RTCs for EPA comments on the Annual Long-Term Monitoring Report – 2013, Defense Depot Memphis, TN, Rev. 0. The RTCs were initially submitted on May 21, 2014 and did not address Dunn Field comments. The attached RTCs is the complete response package.

Thank you for the additional submittal time.

Respectfully,
Joan

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ENCLOSURE TO:

EPA Comments on the Dunn Field OU Depot Air Sparge - Soil Vapor Extraction System Annual Operations Report, Year 4, DDMT, Rev 0 (March 2014)

EPA Correspondence dated July 18, 2014 J. Corkran (EPA) to C. Jones (DAIM-ODB)

May 19, 2014

Responses to Comments from
U.S. Environmental Protection Agency (EPA) Region 4
Annual Long-Term Monitoring Report – 2013
Defense Depot Memphis, Tennessee
Revision 0, February 2014
Memphis, Shelby County
U.S. EPA ID Number TN4210020570

General Comments

1. Please revise the report cover page, the Introduction, and the CD label to include the EPA ID No. for DDMT: U.S. EPA ID Number TN4210020570.

   Army Response: The Army will include "U.S. EPA ID Number TN4210020570" on the report cover page and CD label and will move the sentence providing the ID from Section 1.1 to Section 1.0.

2. Section 1.2, Page 1-2, Para. 3. For clarity, please revise the last sentence in this paragraph to state the current State groundwater classification and EPA groundwater classification for DDMT.

   Army Response: The Army will add a final sentence to the referenced paragraph stating "The current Tennessee groundwater classification for DDMT is General Use (TDEC Chapter 1200-04-03).

3. This report focuses on post-implementation monitoring of the remedial actions at the Main Installation (MI) and Dunn Field (DF) portions of the Defense Depot Memphis, Tennessee (DDMT). The MI employs enhanced bioremediation treatment (EBT) and DF employs (most recently) an air sparge/soil vapor extraction (AS/SVE) system. Both areas have a relatively long history of groundwater monitoring of the progress of the remedial actions; approximately 6 years of semi-annual sampling. With this history of monitoring, EPA was able to evaluate the trends of the contaminant migration and contaminant attenuation. All the monitoring well installations have provided lithologic data to aid in understanding the layering of the sands and clays (the aquifer units and the confining layers). Water levels from the numerous monitoring wells provides a picture of the groundwater flow directions both horizontal and vertical. Because of this relatively large data set, EPA was able to evaluate the hydrogeology and the contaminant fate and transport and identify data gaps regarding (i) where the contaminants are not degrading and attenuating, and (ii) where up-gradient sources have not been identified. Annotated maps from the report are provided to illustrate the physical locations of the data gaps.

   Army Response: Comment noted.

4. EPA agrees with the Department of Army interpretation of the groundwater data presented in the 2013 LTM Report that contaminated groundwater migration is not stabilized at DDMT. For example, on the MI, PCE and TCE have migrated from the fluvial aquifer to the intermediate aquifer (IAQ) at concentrations above constituent-specific Maximum Contaminant Levels (MCLs). The IAQ plume extends to the northwest property boundary based on reported concentrations in MW-256 (Section 3.4.1, Page 3-6). Further, data from wells MW-141 and MW-202B in the IAQ "*demonstrate long-term increasing trends for PCE, from approximately 5*

ug/L to 25 ug/L" (page 3-10) and concentrations in MW-107, a transition zone well located in the "window" in the uppermost clay unit between the fluvial and intermediate aquifers in the northwest corner of the MI, "*increased significantly in 2011 and remain at elevated levels above the MCL....in April...and in October of 2013*" (page 3-10). PCE and TCE have been detected since 2012 above the MCL in MW-256, an IAQ sentinel well, and "*TCE was detected at 3.13 ug/L in April and 2.7 ug/L in October*" of 2013 in MW-254 (page 3-10), a sentinel well located in the Memphis Aquifer (MAQ).

Army Response: The first sentence in Section 4.1 states that the "Groundwater concentrations on the MI are generally stable …"; this was based on consideration of overall concentrations and plume extent. Thus, the comment that "Army interpretation … that contaminated groundwater migration is not stabilized at DDMT" is not accurate. However, the later statements in the comment regarding the plume extending to the northwest boundary and the wells with increasing concentrations are not disputed.

With regard to migration into the IAQ, PCE and TCE have been detected at concentrations above the MCL in the IAQ since the initial sample from MW-90 in 2002 (See: *Appendix H – Historical CVOC Results – MI LTM*). The conceptual site model was that contamination in the IAQ resulted from migration from the fluvial aquifer through the 'window'. When the ROD was completed in 2001, the consensus of the Defense Logistics Agency (DLA), USEPA and TDEC was that groundwater remediation in the fluvial aquifer would reduce contaminant concentrations in the IAQ and that only the higher contaminant concentrations in TTA-1 and TTA-2 warranted treatment. The Army will re-evaluate this position in 2014.

(EPA Comment 4, continued) Superfund Environmental Indicators (EI) under the Government Performance and Results Act (GPRA; 1993) are evaluated and updated by October 15 of each year for each Superfund site, or at any time when site conditions change. Based on the information presented in the 2013 LTM Report, EPA proposes changing the Contaminated Groundwater EI for DDMT to *Contaminated ground water migration not under control* – indicating that the migration of contaminated ground water at DDMT is not stabilized.

Army Response: Comment noted.

5. Unless stated otherwise in the body of this letter, EPA concurs with the Army recommendations for changes in well-specific long-term monitoring frequencies and well designations proposed in the 2013 LTM Report. EPA notes, however, that many of the wells involved in the long term monitoring program do not show much change or variation over the last several monitoring periods. EPA recommends a groundwater monitoring well program optimization effort in 2014: it may be reasonable to lengthen the period of time between sampling events for certain wells, resulting in a cost savings with minimal loss of understanding of contaminant behavior in the area around the well.

   Army Response: The Army agrees that many monitoring wells show little variation over time. We will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014, including a discussion of revised criteria for sampling frequency.

6. It is EPA's view that the Mann-Kendall (M-K) test analyses are of limited usefulness in evaluating the DDMT data. The M-K analysis can tell a conflicting story when compared to visual examinations of the trend graphs.

- For the DF graphs, concentrations are decreasing and plain to see absent M-K analysis.
- In the MI, the picture is not as simple. For example, MW-92 is listed as 'probably decreasing' in Table 23, the Mann Kendall Trend Analysis. Examination of the graph shows that the PCE decreased, the DCE increased and then the PCE rebounded with minimal vinyl chloride produced. This extra detail is not captured in the M-K designation 'probably decreasing' and is highly relevant to developing a path forward for additional treatment and secondary source investigation/mitigation, as appropriate.

Army Response: Mann-Kendall analysis has been performed in accordance with the LTM plan in the 2004 MI Remedial Design report. The Army agrees that at this juncture this analysis is of limited use and will discontinue its usage in future reports, pending regulatory concurrence.

Main Installation (See: Figures 19 & 20, annotated by EPA)

1. There are numerous wells where the data indication that relatively small secondary source areas are nearby that require identification and mitigation in order to reach Remedial Action Objectives and Remedial Goals in a timely fashion. This is indicated by concentrations that have remained steady or have increased through time and data sets which do not show complete breakdown of the PCE. These wells are listed in the comments below and shown on the attached annotated figures. Starting in the southwest corner of the site, going clockwise:

Army Response: Investigation of source areas based on wells with relatively low level contamination is not likely to provide useful results. In 2008, the DLA conducted a comprehensive data review to identify potential source areas in soil on the MI. Based on this information, a field investigation including a membrane interface probe survey and related soil confirmation sampling was performed to identify areas of soil contamination impacting the shallow groundwater and resulting in the observed groundwater plumes. Although areas of impacted soil were identified, the residual CVOC concentrations were low and not considered sufficient to warrant remedial action. See: *Main Installation Source Area Evaluation* (e^2M, 2008) and *Main Installation Source Area Investigation, Rev. 0* (e^2M, 2008). Since the soil investigations were conducted in the areas with higher groundwater concentrations, additional investigations in areas with lower groundwater concentrations are not likely to provide actionable information.

a. NE of MW-101B – What is the well number of the pink well? This spot indicates concentrations between 100 and 300 ug/L and it may not be delineated directly up gradient.

Army Response: The wells referenced are DR1-6/6A. These wells were sampled most recently on November 9, 2013 with the following results:

- DR1-6: 148 µg/L PCE, 1.69 µg/L TCE, 8.42 µg/L cDCE and <1 µg/L VC
- DR1-6A: 1.49 µg/L PCE, 2.12 µg/L TCE, 132 µg/L cDCE and 0.398 µg/L VC.

Monitoring wells MW-22 and MW-102B are considered upgradient of DR1-6/6A. No CVOCs were detected above method detection limits in the most recent groundwater samples collected on October 19, 2012 or in previous sampling rounds.

b. MW-219 – VOCs in this well have been trending up over the last three years. There is no directly up gradient delineation of the source of these increasing concentrations.

Army Response: An upgradient well (for TTA-1N) was recommended in Section 4.1.2. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014.

c. MW-256 – The source of the VOCs in this most up gradient location in the northwest corner of the site is not defined. Upon review of the A-A' cross section, the contamination in this well is connected to MW-202B and these plumes should be drawn as one.

Army Response: As noted above, contaminant migration from the fluvial aquifer is considered to be the source of VOCs in the IAQ. The Army agrees that VOCs in MW-256 and MW-202B are connected. Isopleths will be redrawn and a note added regarding the screen depth at MW-140.

d. MW-140 – This is an area where groundwater flow direction, and hence VOC migration, is unclear. Shallower portions of the aquifer could be flowing to the southeast. Deeper portions of the aquifer could be flowing to the northwest. There are distinct downward hydraulic gradients: as much as 2' in adjacent wells. Larger scale figures may help in future evaluations of this area.

Army Response: MW-140 is screened in the deeper section of the IAQ and groundwater flow is to the west-northwest (toward MW-255 and MW-254). The shallow fluvial aquifer is dry due to the elevation of the uppermost clay. The Army will consider using larger-scale figures for future work.

e. MW-258 – This well has increasing PCE concentrations without an obvious up gradient source.

Army Response: An additional well(s) in the North-central area was recommended in Section 4.1.2. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014.

f. MW-104 – Concentrations of TCE in this well have been holding steady at +/- 20 ug/L. The source of this TCE is not defined up gradient.

Army Response: Agree, additional well(s) in the North-central area were recommended in Section 4.1.2. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014.

g. MW-64 and MW-218 have steady concentrations of PCE and TCE. These locations are side gradient from the hot spot associated with DR 2-1 to the east. The up gradient source of these concentrations should be identified so it can be remediated.

Army Response: Agree, additional well(s) in TTA-2 area were recommended in Section 4.1.2. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014.

h. DR 2-1 – Concentrations in this well have rebounded indicating that treatment was insufficient to remediate this portion of the MI aquifer.

Army Response: Agree, current injection well IW-92-01 is adjacent to DR2-1and the lack of apparent effect is surprising. Additional action in this area should be discussed following regulatory review of the Year 3 EBT Report dated April 2014. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014.

i. PMW92-02 – The trend graph of the data indicates that the contamination has not degraded further past cis-DCE and additional treatment is warranted.

Army Response: The Army agrees that additional action is warranted where degradation of cDCE is not observed. Future actions will be determined as the Army re-evaluates the current remedial action on the MI.

j. MW-26 – Increasing concentrations in this well are likely from incomplete treatment in the area of DR 2-1.

Army Response: The Army agrees that additional action in this area is warranted. Future actions will be determined as the Army re-evaluates the current remedial action on the MI.

k. MW-52 – Concentrations of PCE are low, but still above the MCL. The source of the VOCs in this area has not been identified.

Army Response: The Army agrees that additional delineation is needed in this area. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014, including the criteria for remedial action.

2. Section 3.5.1.2, *Boundary Wells* (Page 3-9), describes trends in PCE contamination concentrations at MW-219: this well is located immediately upgradient of TTA-1 North at the eastern property boundary. Specifically, PCE concentrations have fluctuated, but current levels in October 2013 (53.6 ug/L) are not significantly different from the previous high detection of 48 ug/L five (5) years ago in 2008. The 2013 LTM Report concludes that there is the potential for plume migration onto the MI. It is not clear, however, whether all possible on-site sources for the sustained levels of PCE have been investigated and mitigated. Please revise the 2013 LTM report to discuss possible on-site and off-site sources for the contamination observed in MW-219 and the proposed path forward for remediating this contamination to meet RAOs and RGs for the MI.

Army Response: Source investigation was performed in the TTA-1N area during the 2008 source area investigation, as referenced in Main Installation Comment 1 (page 3). Although areas of impacted soil were identified, the residual CVOC concentrations were low and not considered sufficient to warrant remedial action. See: *Main Installation Source Area Evaluation (*e^2M, 2008*)* and *Main Installation Source Area Investigation, Rev. 0 (*e^2M, 2008*)*. There were no reported releases along the western boundary of DDMT. MW-219 was installed in 2007 to further delineate TTA-1N groundwater contamination. Results were well below the pretreatment concentrations in MW-21 and other downgradient wells. As stated above, an upgradient well (for TTA-1N) was recommended in Section 4.1.2.

Discussion of a path forward for the MI as a whole is envisioned following regulatory review of the Year 3 EBT report dated April 2014. Revision of the LTM report addressing this area alone

is not considered appropriate. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014.

3. EPA agrees with the Department of Army recommendation that the natural attenuation study and groundwater modeling should be reviewed to determine if the modeling assumptions are still valid, to determine whether additional response action may be warranted, and to develop new estimated date for achieving RAOs and RGs. The evaluation should include a re-evaluation of the potential for VOC transport within the MAQ beneath the MI to the nearest pumping well at the Allen Well Field (and confirm the current location of the nearest pumping well).

   Army Response: The scope of additional investigation, consistent with this comment, is being planned by the Army. Discussions with USEPA and TDEC following regulatory review of the Year 3 EBT Report dated April 2014 and Year 4 Off Depot AS/SVE Operations Report dated March 2014 will be helpful. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014.

   (EPA Comment 3, continued) As noted during our Site Management Plan discussions, EPA forecasts that, depending on the findings in the 2013 LTM Report and the annual EBT Report (currently under review by EPA), there will be a need for an MI ROD Amendment or Explanation of Significant Differences to update the RAOs and RGs to address: the need for response action in the IAQ; to clarify selection of monitored natural attenuation as an MI remedy component for fluvial groundwater; to address potential on-site impacts from a possible southeast off-site location; and possibly to select response actions in addition to, or other than, EBT in the fluvial aquifer at the MI.

   Army Response: The Army agrees that these issues warrant discussion and will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014.

Dunn Field

1. The FY2014 Site Management Plan for DDMT projects a September 2015 date for abandonment of the treatment systems at DF. The contaminant distribution seen in Figures 31-37 of the report and the associated tables and graphs tells a good story of decreasing concentrations in response to AS/SVE treatment. EPA is less confident than the Army in the 2014 SMP schedule projecting that DF RAOs will be achieved in 2019 with AS/SVE system abandonment in September 2015. The 2013 LTM Report notes that a further 60% decrease is required to meet the active treatment objective (reduce individual CVOC concentrations to 50 ug/L or less). Although not captured as an explicit recommendation in the recent Third Five year Review, re-evaluation of the schedule for meeting RAOs and RGs for Dunn Field is needed in 2014 in conjunction with review of this 2013 LTM Report and the Year 4 AS/SVE Report. Regardless, EPA concurs with the recommendation to operate the AS/SVE system in alternating months to restore the northerly groundwater flow from MW-159 to the treatment zone, extending the operating period without additional cost.

   Army Response: The Army agrees that re-evaluation of the schedule for meeting RAOs at DF is appropriate at this time.

2. In addition to the contaminant concentrations at MW-159, the schedule for the DF groundwater remedial action appears to be impacted by imminent co-mingling of the inbound off-site plume

(originating northeast of Dunn Field in the general vicinity of the railroad right of way/Mclean Road/Persons Road area) with the central plume at DF. PCE and TCE contamination migrating in from the northeast has contaminated the fluvial aquifer underlying DF and is migrating westerly toward the general area of the AS/SVE system. The 2013 LTM Report notes (page 4-7) that the increase in contamination in MW-03 in the northwest corner of DF is attributed to the northeast off-site plume.

Army Response: While groundwater contamination does migrate on to the northeast corner of DF from an off-site source, there is little apparent co-mingling of contaminants. The contaminant source areas for the plumes originating on DF are located west of the north-south access road. See: *Enclosure 1, Site Management Plan, Figure 13 – Dunn Field Disposal Sites, Source Areas and Off-Depot Groundwater Remedial Actions* (attached).

Total CVOC plume maps prepared by HDR from 2006 to 2013 and more recent TCE and 1,1-dichloroethene (DCE) plume maps from 2011 to 2013 are attached. See: *Enclosure 2A, Total CVOC Plume Maps (2006-2013)* and *Enclosure 2B, TCE and DCE Plume Maps (2011-2013).* These maps show the reduction in groundwater concentrations following startup of the SVE system in 2007. The earlier maps show the off-site plume with the highest concentration upgradient of DF and decreasing concentrations as it moves on to DF. The earlier maps also show higher contaminant concentrations near the northwest corner of DF resulting primarily from on-site sources. Later maps show concentrations in the northwest corner reduced below MCLs while only the wells impacted by the off-site plume and upgradient of the remediated Source Areas exceed MCLs (MW-07, MW-08 and MW-230). In addition, all of these wells with higher concentrations have a significant concentration of DCE in comparison to other VOCs detected; DCE has not been detected in the DF Source Areas. The current situation appears to be due solely to contaminant migration from an off-site source rather than co-mingling of plumes. In regard to the recent increase at MW-03, concentrations did not increase at any other wells monitoring rebound from FSVE shutdown. The increased concentrations for TCE, PCE and DCE may be indicative of migration of the off-site plume alone.

(EPA Comment 2, continued) The **2004 Record of Decision** (ROD) for DF acknowledged the northeast off-site plume situation and includes the following language (page 2-55):

"DLA, EPA, and TDEC believe that the contamination in the northeast upgradient plume will be adequately addressed by groundwater treatment components of the selected remedy. In the meantime, TDEC has initiated the process of locating the source(s) of the upgradient contamination in light of identifying the responsible party. A contingency plan may be implemented to further address remediation of the offsite VOC groundwater plume entering the northeast portion of Dunn Field in the even the parties determine the on-site remedy is inadequate and poses unacceptable risk to human health and the environment."

Further, the 2004 ROD states (page 2-59) that, with respect to deed and or lease restrictions on the Northeast Open Area at DF, *"...due to groundwater contamination from an upgradient offsite source, the northern-most portion of his area will be subject to groundwater use restrictions until remediation goals are achieved."*

The **2009 ROD Amendment** for DF revises the remedy language to strike the contingency language as follows (page 4):

"DLA, EPA, and TDEC believe that the contamination in the northeast upgradient plume will be adequately addressed by groundwater treatment components of the selected remedy. In the meantime, TDEC has initiated the process of locating the source(s) of the upgradient contamination in light of identifying the responsible party. ~~A contingency plan may be implemented to further address remediation of the offsite VOC groundwater plume entering the northeast portion of Dunn Field in the even the parties determine the on-site remedy is inadequate and poses unacceptable risk to human health and the environment.~~"

The November 2012 Third Five Year Review for DDMT appears to re-interpret the 2009 ROD language stating "The AS/SVE system will continue to operate until the upgradient concentrations from the Dunn Field plume do not exceed 50 ug/L for individual CVOCs for twelve months." This language does not address the expectation that the active treatment will also address the Northeast Plume contamination in the same manner.

Army Response: "… the system will continue to operate until the influent (upgradient) concentrations from the DF plume do not exceed 50 ug/L for individual CVOCs" is from page 21 of the 2009 ROD Amendment and was added at EPA's request. The period of twelve months was added per the Off Depot RD Section 6.4.6.

Concentrations from the off-site plume do not currently exceed that concentration beyond MW-07. Earlier maps also indicate MW-07 is the downgradient extent of the higher concentrations from the off-site plume and that the plume extent is relatively stable.

(EPA Comment 2, continued) In 2014, the DLA, EPA and TDEC plan of action regarding the northeast plume at DF requires re-evaluation and clarification to ensure that all parties on are the same page moving forward. As written, the selected remedy for Dunn Field groundwater states the expectation that the DLA treatment activities will remediate the off-site northeast plume that has migrated, and continues to migrate, onto the Superfund site. To support discussions in 2014, the 2013 LTM Report should consider the following:

Army Response: While Army accepts an invitation to discuss a plan of action regarding the off-site plume, including TDEC's investigation to find the source of contamination, Army continues to evaluate whether it has any obligation with respect to the off-site plume. It remains Army's position that the 2004 ROD and 2009 ROD Amendment do not assign liability for remediation of the off-site plume to DLA/Army. As such, to the extent that Army agrees to provide any of the following requested information, it is not an admission of liability or responsibility with respect to remediation of the off-site plume.

a. The 2013 LTM Report should evaluate, and draw conclusions regarding, whether the well coverage between the northeast corner of Dunn Field and across the upper half of Dunn Field is sufficient to know with reasonable certainty whether the northeast plume is, in fact, migrating to the AS/SVE system and is likely to be treated by that system pending source mitigation at some point in the future (TBD). Preliminary, it appears to EPA that the three largest detections in the NE plume would likely flow north of AS/SVE capture zones. Well MW-220 is on the southwest edge of the NE plume and it is also in the close vicinity of the two northern most units of the SVE system. A small portion of the NE plume would likely be captured by the northern-most parts of the AS/SVE system, were it running. Detections in MW-31 are past (to the west of) the capture zone and influence of the AS/SVE system. This preliminary analysis is inconsistent with the

2004 and 2009 ROD language that "*...that the contamination in the northeast upgradient plume will be adequately addressed by groundwater treatment components of the selected remedy*" and requires discussion among the parties regarding path forward.

Army Response: The extent of the off-site plume on DF is well defined by existing LTM wells. The northern extent of the off-site plume has also been delineated although several of the off-site wells have been abandoned. The isopleth maps for 2013 and earlier indicate the southern portion of the off-site plume migrates off DF near the mid-point of the northern boundary, before reaching the on-site Source Areas or the western boundary. Assuming that is the case, it is likely that the majority of the off-site plume would not reach the AS/SVE system's area of influence, whether it passed through a portion of DF or remained to the north. MW-79 located north of the AS/SVE system has had concentrations of DCE, PCE and TCE in excess of MCLs since the initial sample in 2001. MW-51, located north of DF on the 2011 map, contained similar concentrations of DCE and TCE above MCLs in samples from 1997 to 2011; it was abandoned in 2013.

b. Concurrently, efforts to identify and mitigate the off-site source(s) have been ongoing or planned since at least 2004. The status of those activities, including relevant TDEC investigation reports, need to be summarized in the revised 2013 LTM report in support of determining a path forward.

Army Response: The Army will request that TDEC provide a summary of the status of its investigations to date. Reviewing TDEC reports and developing a new summary are outside of the scope of this LTM report.

c. The 2013 LTM Report requires revision to include updated projections for AS/SVE treatment, or other treatment as necessary, of the northeast plume.

Army Response: Development of an updated projection for treatment of the off-site plume requires knowledge of the source and a schedule for source removal that is outside the scope of this LTM report. Moreover, Army continues to evaluate whether it has any responsibility for the off-site plume.

Specific Comments

Main Installation

1. Sections 1.4.1 and 3.5.1.4; Figure 2 - Please revise Figure 2, and other figures of the report as appropriate, to illustrate the new sixth and seventh plumes described for the MI in the current but not currently captured on the figures. The "North Central" plume (associated with MW-258) is introduced in Section 1.4.1 (Page 1-6) and the "South Central" plume (associated with MW-97) is introduced in Section 3.5.1.4 (pages 3-10 through 11). Also, evaluate the plume table on page 1-6 (describing six plumes) and revise as needed for consistency with the plume table on page 3-11 (describing seven plumes).

Army Response: Figure 2 is only intended to show areas/plumes where EBT is underway per discussion of remedial action in Section 1.2.1. No other figures call out the plume names. The Army will include a new Figure 38 that will show TCE and PCE contours and identify each of the designated plumes; the figure will be introduced following the table in Section 3.5.1.4.

Section 1.4 discusses previous groundwater monitoring results. The six fluvial aquifer plumes and the Sentinel well plume, as listed on the table in Section 1.4.1, were initially described in the first LTM report (MACTEC, 2006). The names for the West-Central and North-Central plumes were changed in the 2007 LTM report (HDR, 2010) and have remained the same until this current LTM report. As noted, the South-Central plume is added in Section 3.5.1.4 based on the review performed for the current report; the table on the following page therefore includes it as the seventh fluvial aquifer plume. No change is considered necessary.

2. Section 4.1.2, Page 4-4, 1st bullet – MW-66 is not directly up gradient of MW-219: EPA recommends installation of an appropriately located well.

   Army Response: The Army agrees that a new well upgradient of MW-219 would be helpful. That location and several others are noted in the two paragraphs at the end of Section 4.1.2. The Army will include this as an agenda item for discussion during the regulatory meeting on May 29, 2014, including well locations and data quality objectives.

Dunn Field

1. A figure illustrating the AS/SVE location, the FSVE location, key monitoring wells associated with the two treatment systems, the "background wells" that are associated with the Northeast Plume originating off-site, the plume itself, the off-site geographic area to the northeast with roads and features (such as the railroad right of way) labeled, would support a path forward discussion in 2014 for the Northeast Plume.

   Army Response: As noted in our response to DF General Comment 2, while Army accepts EPA's invitation to discuss a path forward for the off-site plume, Army continues to evaluate whether it has any responsibility with respect to the off-site plume.

   Notwithstanding the foregoing, other than the off-site area, the information is provided on figures in the LTM report. Figure 6 identifies the Background-NE wells and the performance wells selected for monitoring potential rebound following the FSVE shutdown. A new figure with the well classification symbols from Figure 6 can be prepared on an aerial photo base with addition of the AS/SVE area and FSVE system and recent isopleths. Addition of the figure to the LTM report is not considered necessary.

ENCLOSURE 1

SITE MANAGEMENT PLAN, FIGURE 13

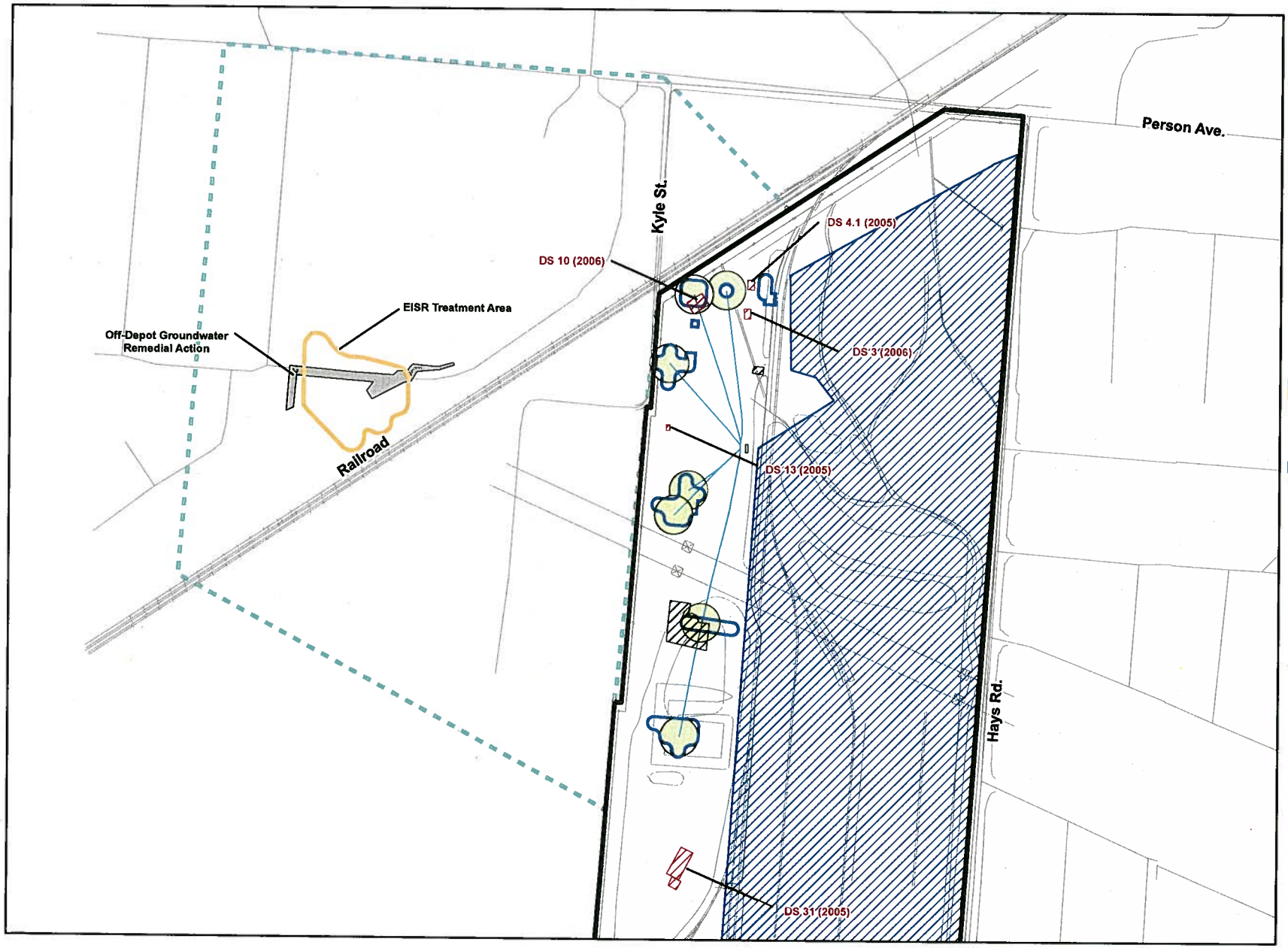

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Figure 13

DUNN FIELD DISPOSAL SITES, SOURCE AREAS AND OFF-DEPOT GROUNDWATER REMEDIAL ACTIONS

2014 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend
- Original Dunn Field Perimeter
- Unrestricted Use Area from ROD
- Off-Site Treatment Area
- EISR Treatment Area
- Disposal Sites Excavation Area
- Fluvial SVE Well - 60-foot radius of influence
- Fluvial SVE Conveyance Line
- SVE Control Building
- Loess Excavation Areas
- Loess Thermal-Enhanced SVE Treatment Areas
- Air Sparge-SVE Area

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

Aerial Photo Date: 2006

0 100 200 400
Feet

Installation Location
Memphis, Tennessee

Date: November 2013
Edition: Rev 0

HDR

Path: G:\DDMT\2014 SMP\GIS\Figure 13.mxd

ENCLOSURE 2A

TOTAL CVOC PLUME MAPS (2006 – 2013)

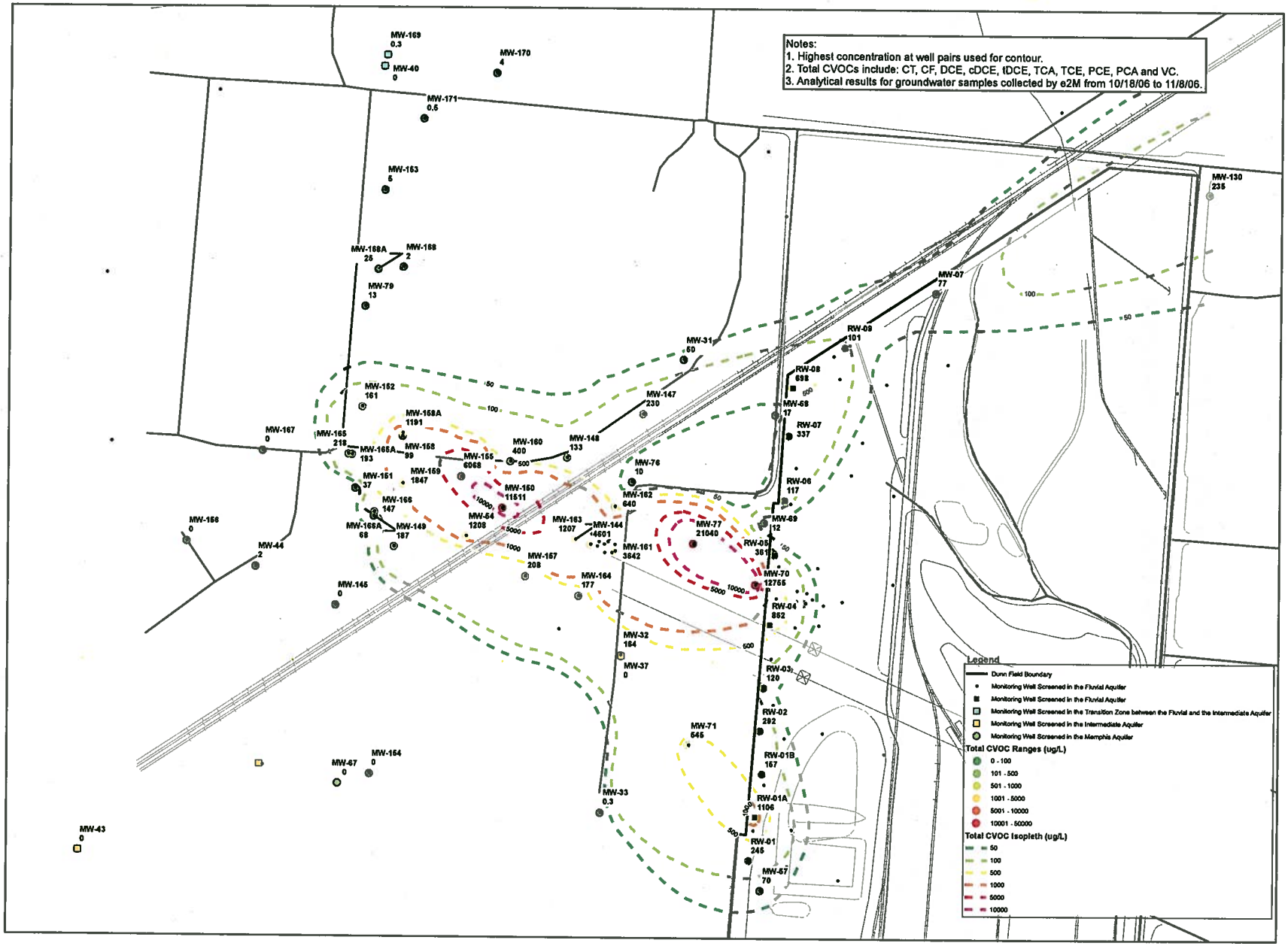

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Figure 4-4

TOTAL CVOC CONCENTRATIONS, OCTOBER 2006

ANNUAL OPERATIONS REPORT 2006

DUNN FIELD GROUNDWATER IRA YEAR EIGHT

DEFENSE DEPOT MEMPHIS, TENNESSEE

Projection: NAD 1927 StatePlane Tennessee
Datum : WGS 84
Units: Feet

1:3,200

0 50 100 150 Feet
0 10 20 30 Meters

Installation Location
Memphis, Tennessee

Date: January 2007
Edition:DRAFT

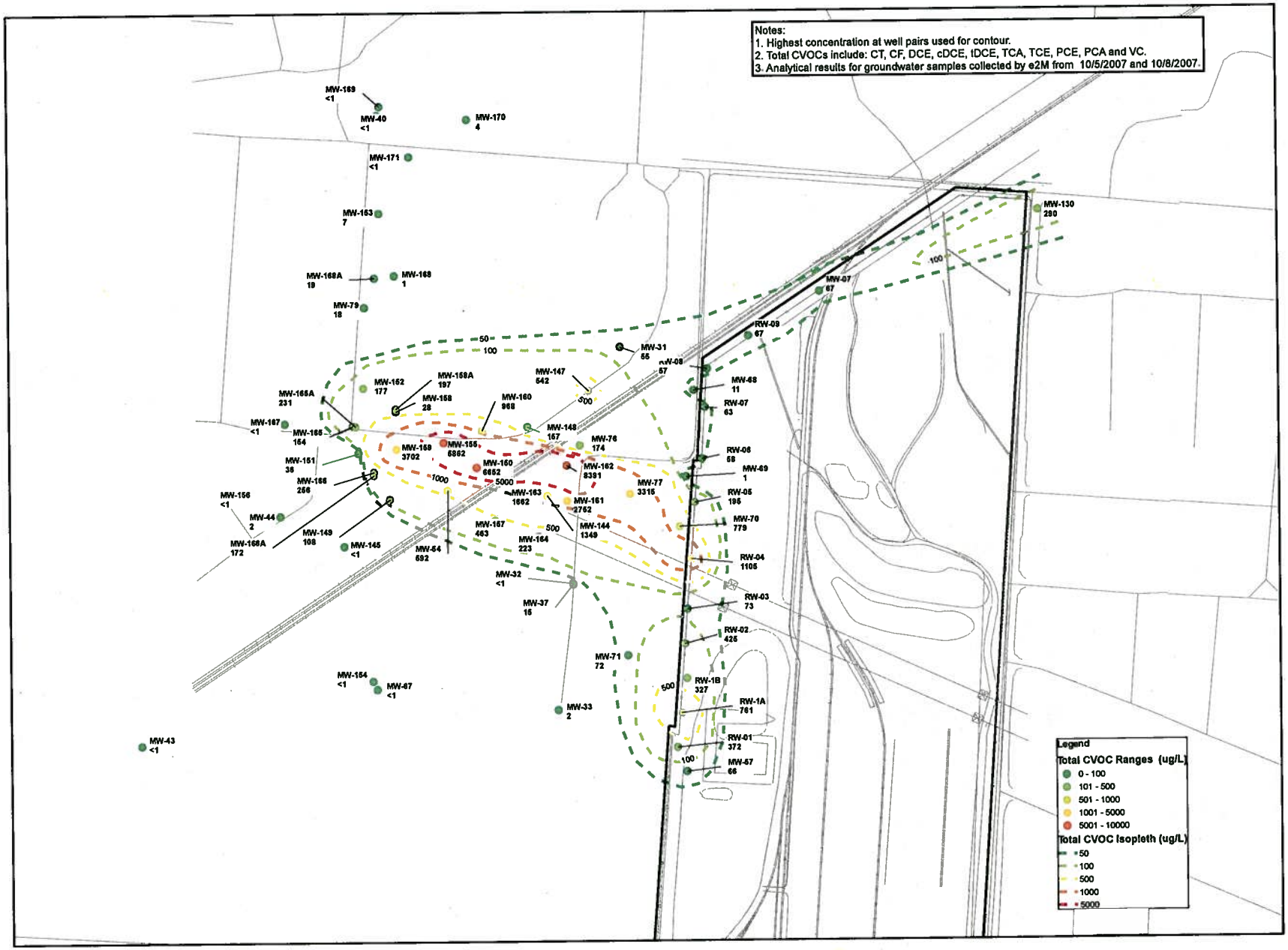

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Figure 4-4

TOTAL CVOC CONCENTRATIONS, OCTOBER 2007

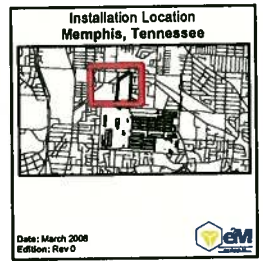
ANNUAL OPERATIONS REPORT 2007

DUNN FIELD GROUNDWATER IRA YEAR NINE

DEFENSE DEPOT MEMPHIS, TENNESSEE

0 150 300 600

Feet



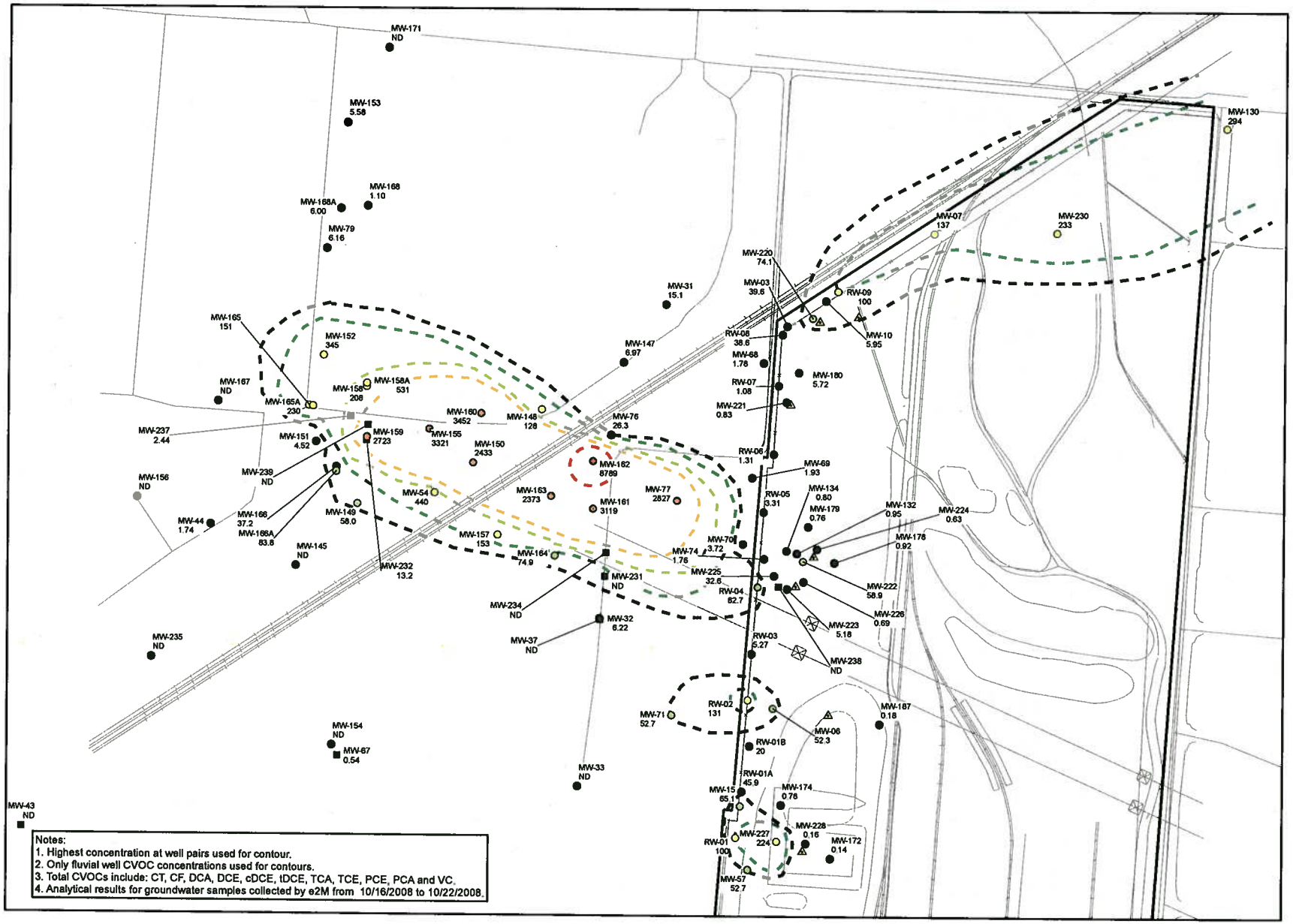


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Figure 4-4

TOTAL CVOC CONCENTRATIONS, OCTOBER 2008

ANNUAL OPERATIONS REPORT - 2008

DUNN FIELD GROUNDWATER IRA YEAR TEN

DEFENSE DEPOT MEMPHIS, TENNESSEE

Legend

CVOCs Fluvial Wells
ug/L
- 0 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- 1001 - 5000
- 5001 - 10000

CVOCs Non-Fluvial Wells
ug/L
- 0 - 50

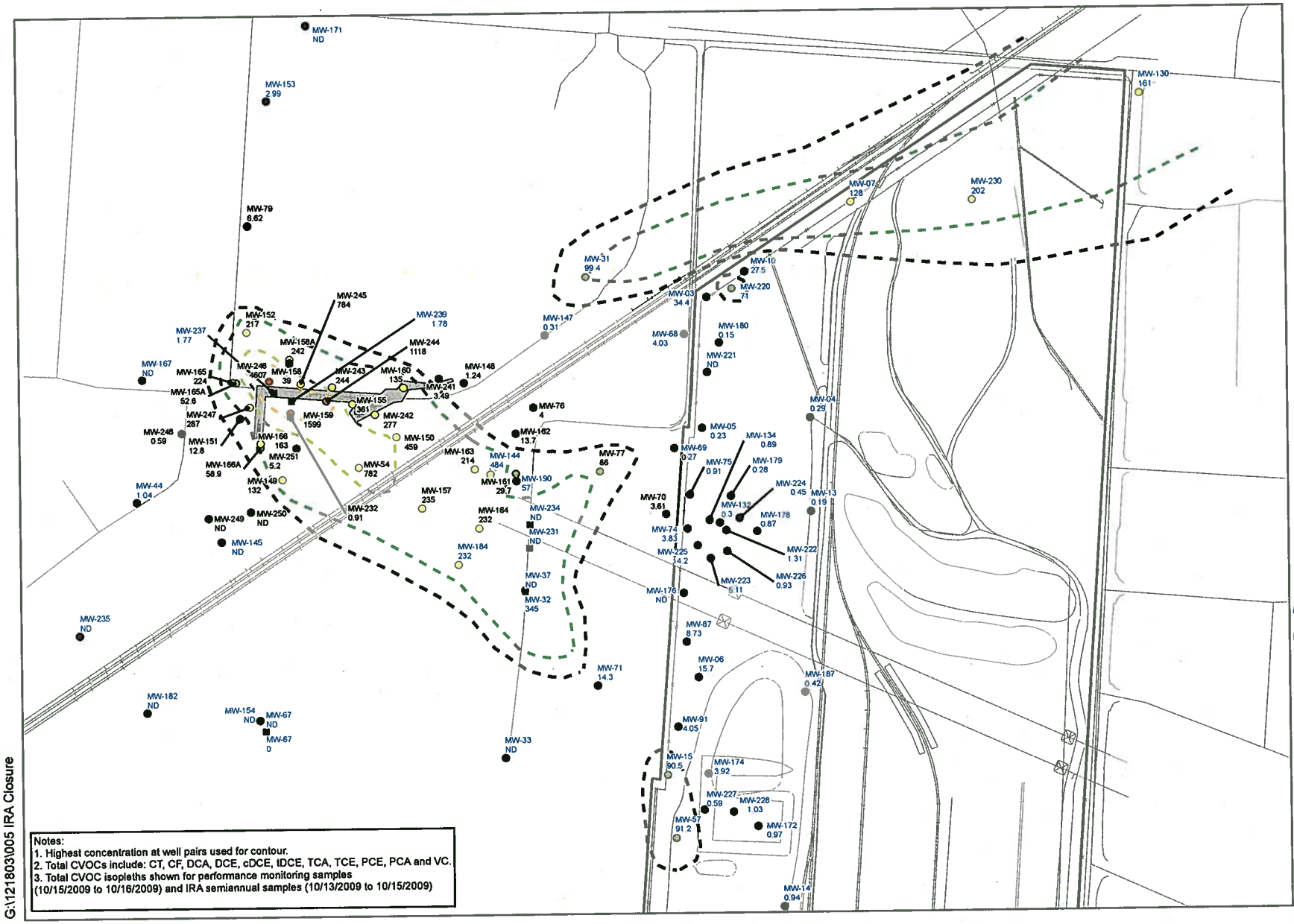
Total CVOC Isopleth (ug/L)
- 50
- 100
- 500
- 1000
- 5000

▲ SVE -Soil Vapor Extraction Point

0 50100 200 300 400
Feet

Installation Location
Memphis, Tennessee

Date: February 2009
Edition: Rev 0



Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, PCA and VC.
3. Total CVOC isopleths shown for performance monitoring samples (10/15/2009 to 10/16/2009) and IRA semiannual samples (10/13/2009 to 10/15/2009)

G:\121803\005 IRA Closure

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Figure 7

TOTAL CVOC CONCENTRATIONS, OCTOBER 2009

2009 OPERATIONS AND CLOSURE REPORT
DUNN FIELD GROUNDWATER INTERIM REMEDIAL ACTION

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

CVOCs Fluvial Wells
ug/L
- 0 - 50
- 50 - 100
- 100 - 500
- 500 - 1000
- 1000 - 5000

Total CVOC Isopleth (ug/L)
- 50
- 100
- 500
- 1000

CVOCs Non-Fluvial Wells
ug/L
- 0 - 50

AS-SVE Area

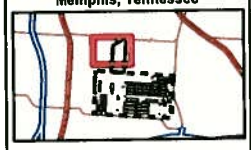
Original Dunn Field Property Boundary

MW-05 100 Blue: IRA Sample Event

MW-249 100 Black: Off Depot Performance Monitoring Sample Event

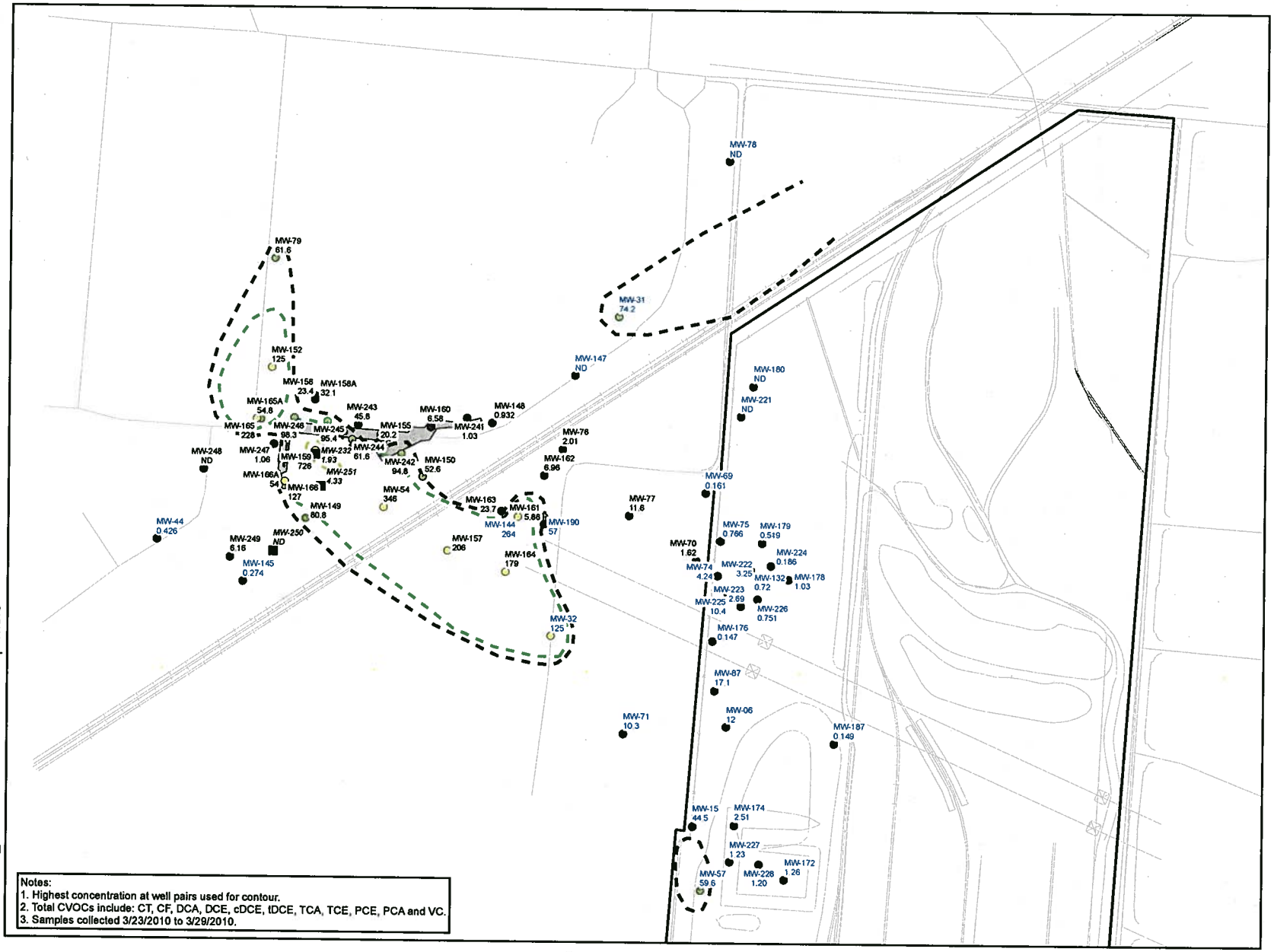
0 100 200 300 400
Feet

Installation Location
Memphis, Tennessee



Date: December 2010
Edition: Rev 0

HDR



Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, PCA and VC.
3. Samples collected 3/23/2010 to 3/29/2010.

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Figure 5

TOTAL CVOC CONCENTRATIONS, MARCH 2010

OFF DEPOT GROUNDWATER ANNUAL LONG TERM MONITORING REPORT - 2010

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

CVOCs Fluvial Wells
ug/L
- 0 - 50
- 50 - 100
- 100 - 500
- 500 - 1000

Total CVOC Isopleth (ug/L)
- 50
- 100
- 500

CVOCs Non-Fluvial Wells
ug/L
- 0 - 50
- SVE -Soil Vapor Extraction Point
- Original Dunn Field Property Boundary

MW-05 100 Blue: Off Depot LTM Sample Event

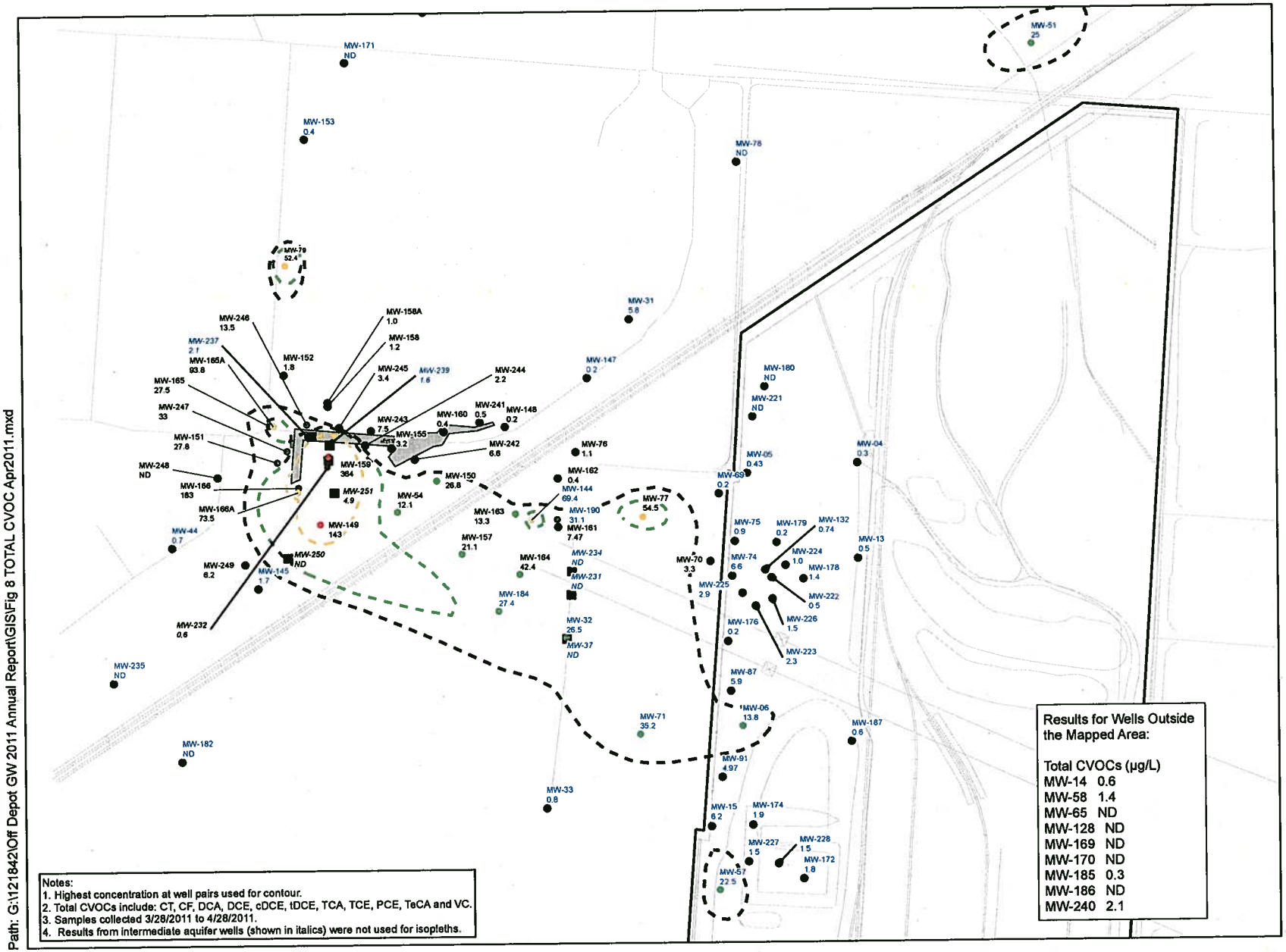
MW-249 100 Black: Off Depot Performance Monitoring Sample Event (Non-Fluvial Wells - Italics)

0 100 200 300
Feet

Installation Location
Memphis, Tennessee

Date: January 2011
Edition: Rev 0

HDR



Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, TeCA and VC.
3. Samples collected 3/28/2011 to 4/28/2011.
4. Results from intermediate aquifer wells (shown in italics) were not used for isopleths.

Results for Wells Outside the Mapped Area:

Total CVOCs (µg/L)

MW-14	0.6
MW-58	1.4
MW-65	ND
MW-128	ND
MW-169	ND
MW-170	ND
MW-185	0.3
MW-186	ND
MW-240	2.1

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Figure 8

TOTAL CVOC CONCENTRATIONS, MARCH - APRIL 2011

OFF DEPOT
ANNUAL GROUNDWATER MONITORING REPORT – 2011

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

Total CVOC Ranges (ug/L)
- 0 - 10
- 10 - 50
- 50 - 100
- 100 - 500

Total CVOC Isopleth (ug/L)
- 10
- 50
- 100

Air Sparge Well Area

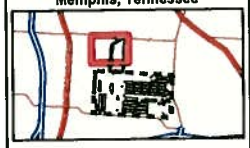
Original Dunn Field Property Boundary

MW-05 100 Blue: Off Depot LTM Sample Event

MW-249 100 Black: Off Depot Performance Monitoring Sample Event (Non-Fluvial Wells - Italics)

0 100 200 300
Feet

Installation Location
Memphis, Tennessee



Date: March 2012
Edition: Rev 0

HDR

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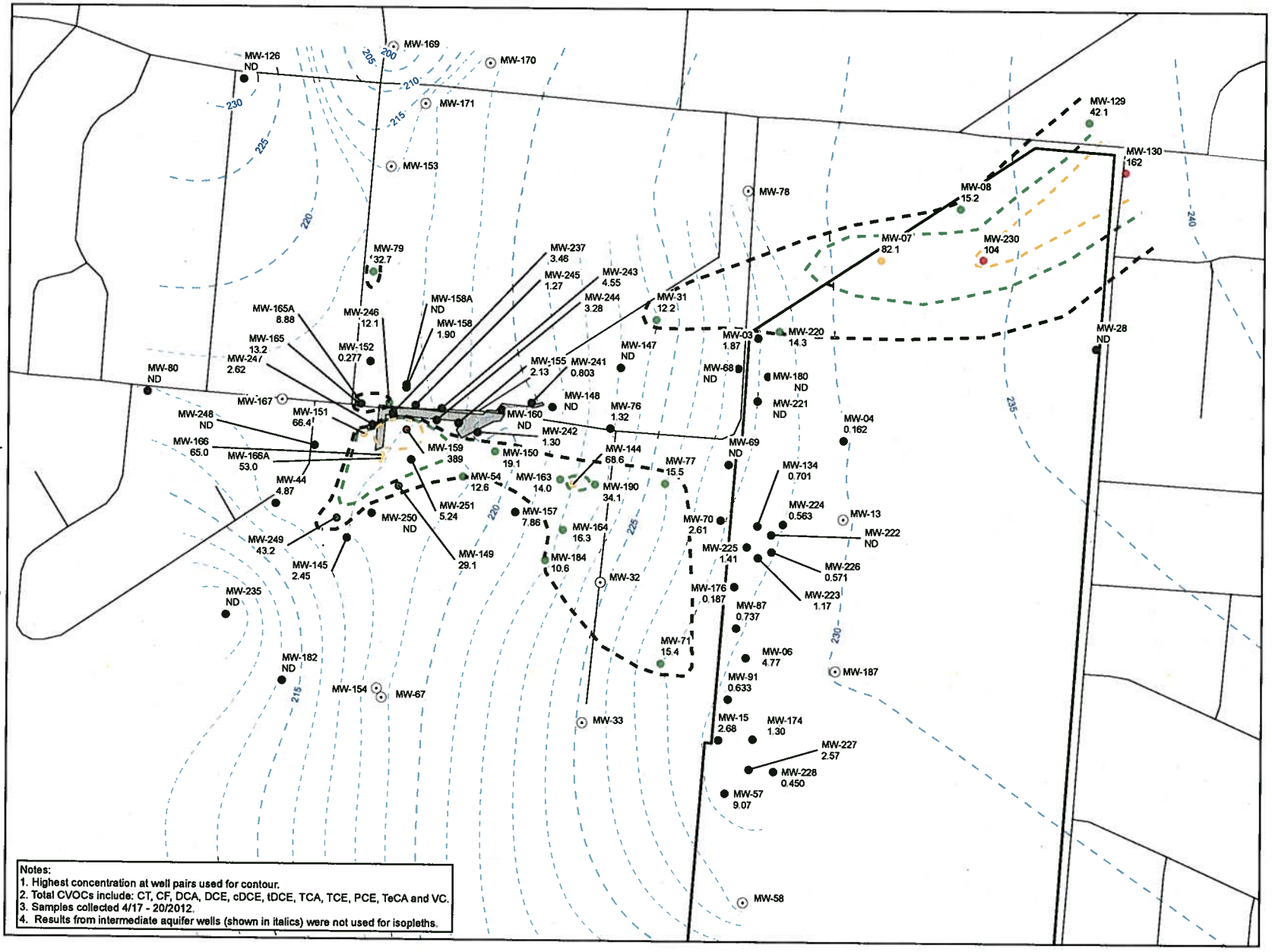

Notes:
1. Highest concentration at well pairs used for contour.
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, TeCA and VC.
3. Samples collected 4/17 - 20/2012.
4. Results from intermediate aquifer wells (shown in italics) were not used for isopleths.

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Figure 21

DUNN FIELD TOTAL CVOC CONCENTRATIONS, APRIL 2012

ANNUAL LONG TERM MONITORING REPORT - 2012

DEFENSE DEPOT MEMPHIS, TENNESSEE

Legend

Total CVOC Ranges (ug/L)
- 0 - 10
- 10 - 50
- 50 - 100
- 100 - 500
- Not Sampled

Total CVOC Isopleth (ug/L)
- 10
- 50
- 100

Air Sparge Well Area

Original Dunn Field Property Boundary

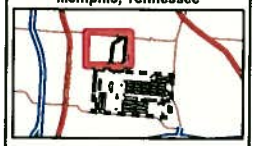
Potentiometric surface of the Fluvial Aquifer 1-ft. contour

Potentiometric surface of the Fluvial Aquifer 5-ft. contour

0 100 200 300

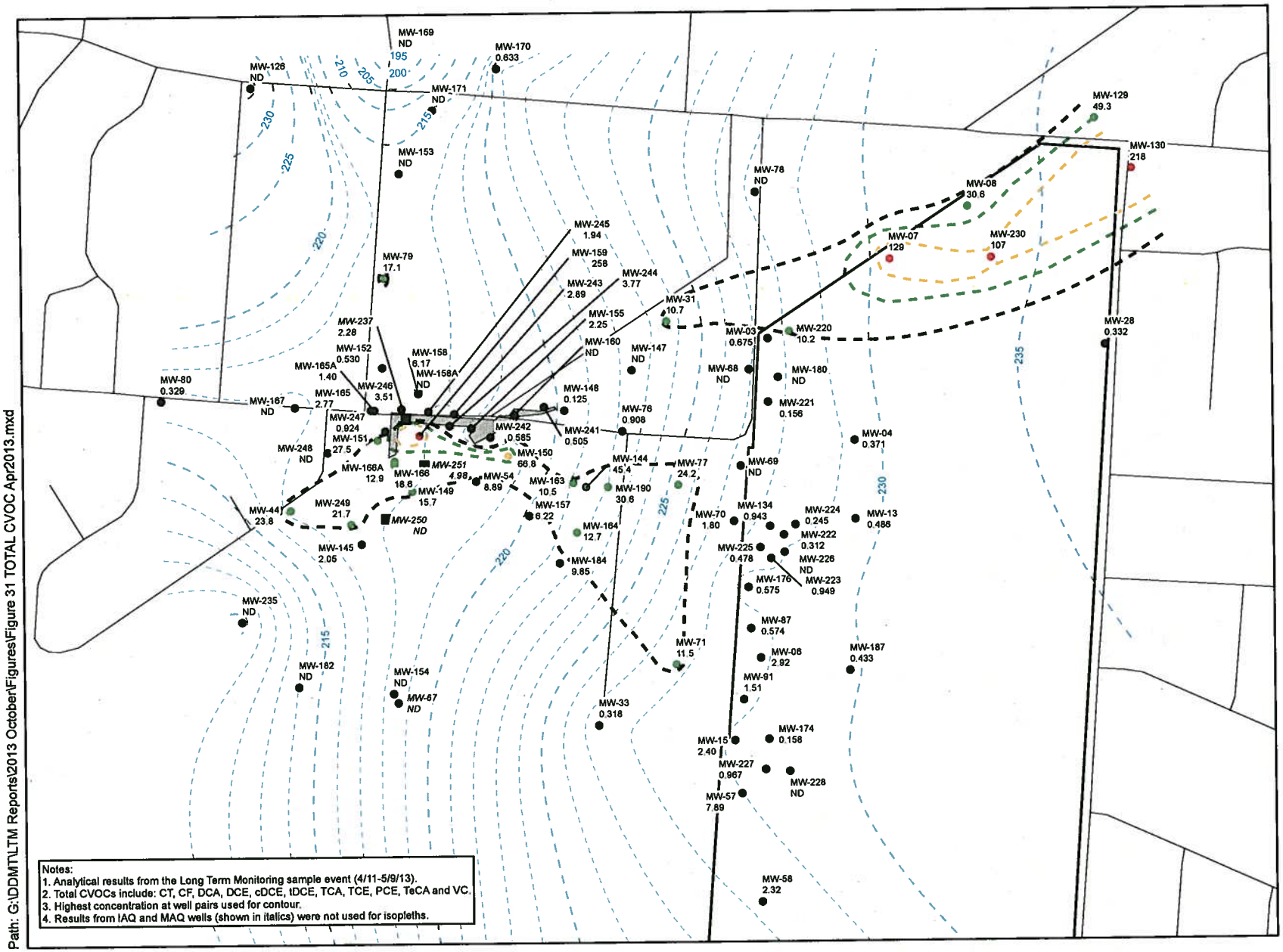
Feet

Installation Location
Memphis, Tennessee



Date: December 2012
Edition: Rev 0

HDR



Notes:
1. Analytical results from the Long Term Monitoring sample event (4/11-5/9/13).
2. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, TeCA and VC.
3. Highest concentration at well pairs used for contour.
4. Results from IAQ and MAQ wells (shown in italics) were not used for isopleths.

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Figure 31

DUNN FIELD
TOTAL CVOC
CONCENTRATIONS,
APRIL 2013

ANNUAL LONG
TERM MONITORING
REPORT - 2013

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

Total CVOC Ranges (ug/L)
- 0 - 10
- 10 - 50
- 50 - 100
- 100 - 500

Total CVOC Isopleth (ug/L)
- 10
- 50
- 100

Air Sparge Well Area

Original Dunn Field Property Boundary

Potentiometric surface of the Fluvial Aquifer 1-ft. contour

Potentiometric surface of the Fluvial Aquifer 5-ft. contour

0 100 200 300
Feet

Installation Location
Memphis, Tennessee

Date: December 2013
Edition: Rev 0

HDR

ENCLOSURE 2B

TCE AND DCE PLUME MAPS (2011 – 2013)

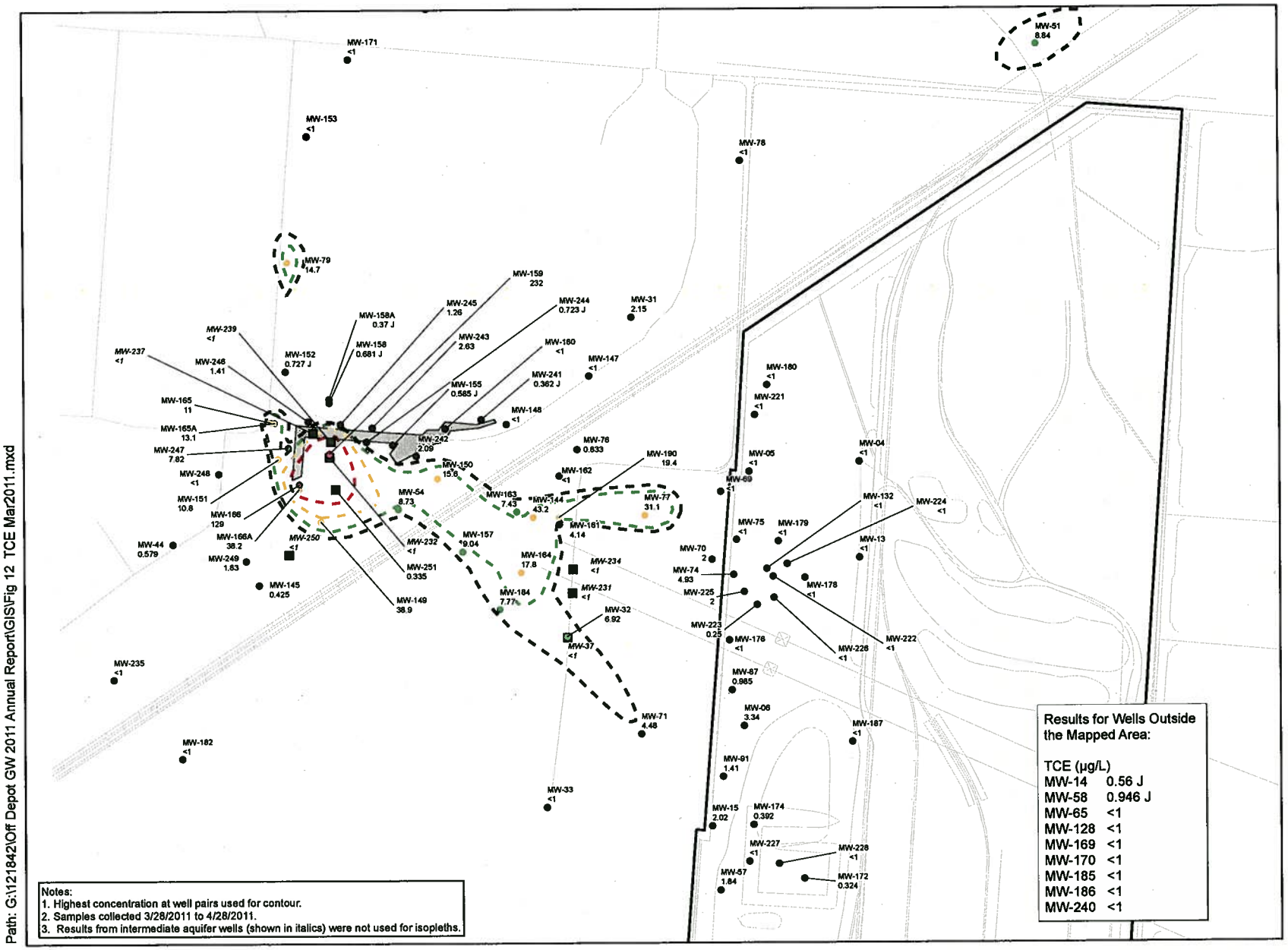

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Figure 12

TCE CONCENTRATIONS, MARCH - APRIL 2011

OFF DEPOT
ANNUAL GROUNDWATER
MONITORING REPORT – 2011

DUNN FIELD
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE Ranges (ug/L)
- 0-5
- 5-10
- 10-50
- 50-100
- 100-250

TCE Isopleth (ug/L)
- 5
- 10
- 50
- 100

Air Sparge Well Area

Original Dunn Field Property Boundary

0 100 200 300
Feet

Installation Location
Memphis, Tennessee

Date: March 2012
Edition: Rev 0

HDR

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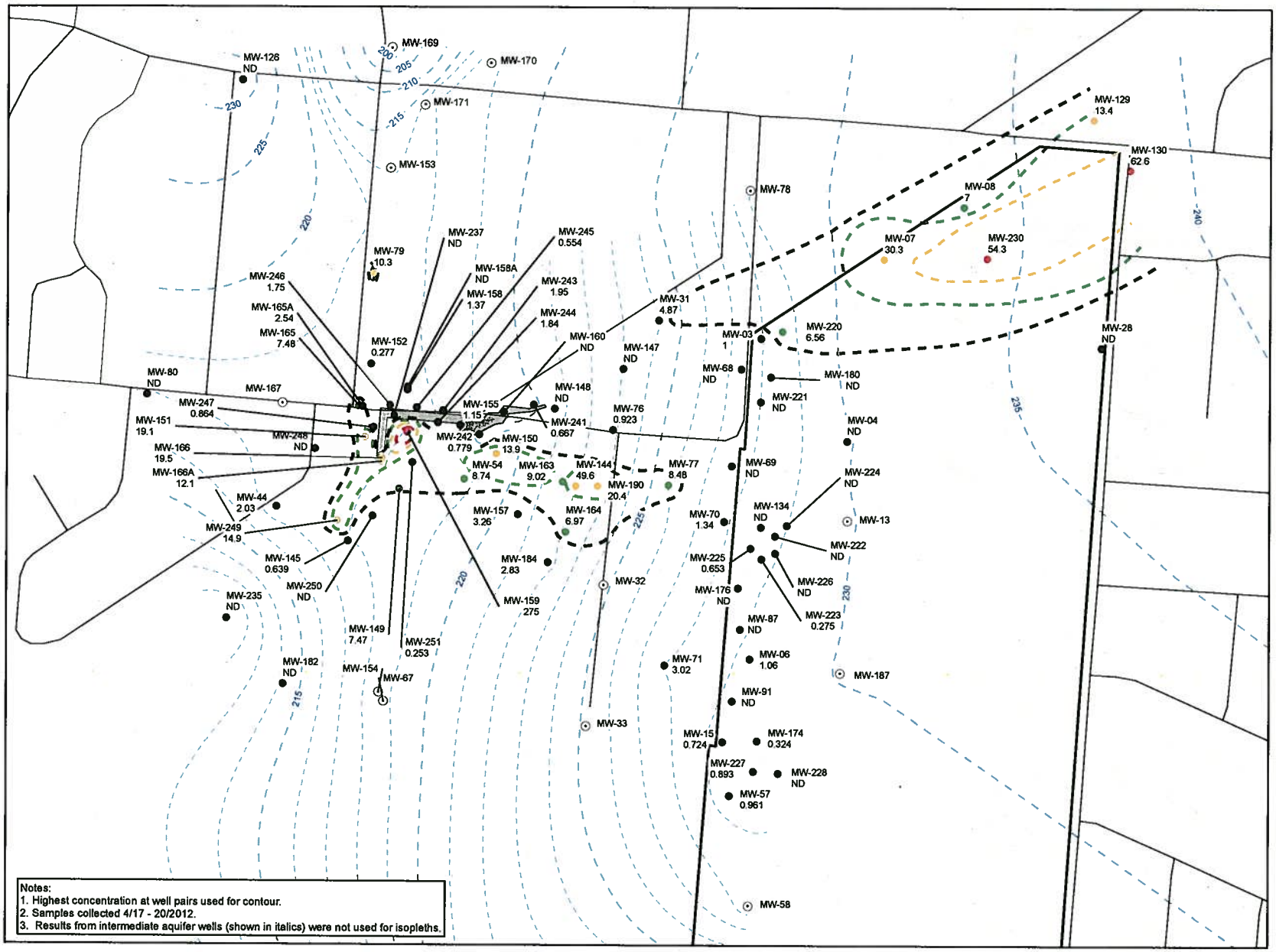

Notes:
1. Highest concentration at well pairs used for contour.
2. Samples collected 4/17 - 20/2012.
3. Results from intermediate aquifer wells (shown in italics) were not used for isopleths.

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Figure 25

DUNN FIELD TCE CONCENTRATIONS, APRIL 2012

ANNUAL LONG TERM MONITORING REPORT - 2012

DEFENSE DEPOT MEMPHIS, TENNESSEE

Legend

TCE Ranges (ug/L)
- 0-5
- 5-10
- 10-50
- 50-100
- 100-300
- Not Sampled

TCE Isopleth (ug/L)
- 5
- 10
- 50
- 100

Air Sparge Well Area

Original Dunn Field Property Boundary

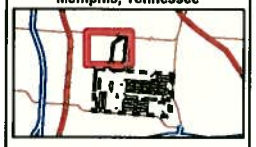
Potentiometric surface of the Fluvial Aquifer 1-ft. contour

Potentiometric surface of the Fluvial Aquifer 5-ft. contour

0 100 200 300

Feet

Installation Location
Memphis, Tennessee



Date: December 2012
Edition: Rev 0

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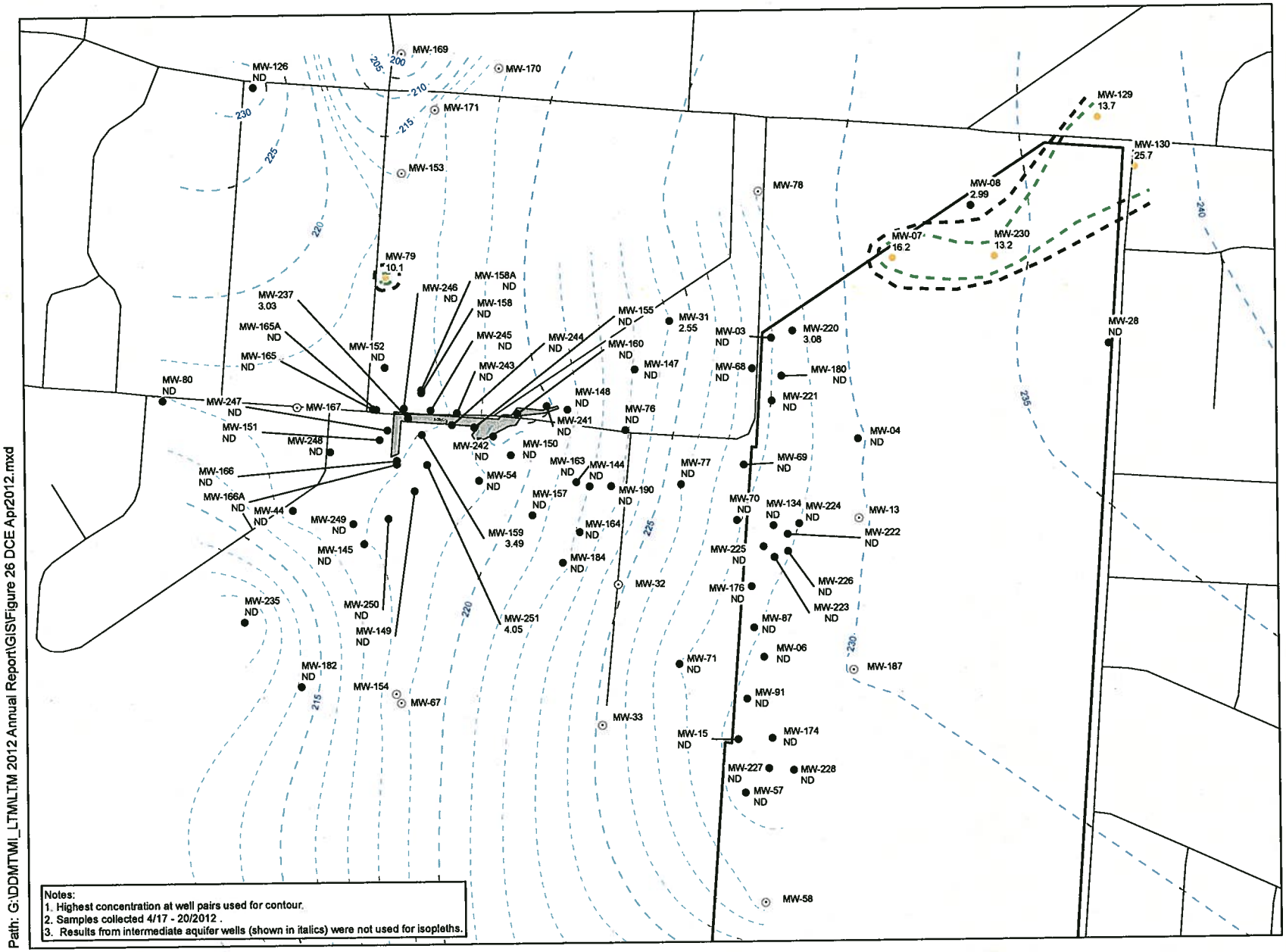

Notes:
1. Highest concentration at well pairs used for contour.
2. Samples collected 4/17 - 20/2012 .
3. Results from intermediate aquifer wells (shown in italics) were not used for isopleths.

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Figure 26

DUNN FIELD DCE CONCENTRATIONS, APRIL 2012

ANNUAL LONG TERM MONITORING REPORT - 2012

DEFENSE DEPOT MEMPHIS, TENNESSEE

Legend

DCE Ranges (ug/L)

- 0-7
- 7-10
- 10-50
- Not Sampled

DCE Isopleth (ug/L)

- 7
- 10

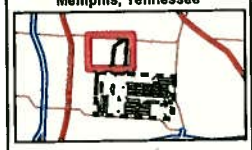
Air Sparge Well Area

Original Dunn Field Property Boundary

0 100 200 300

Feet

Installation Location
Memphis, Tennessee



Date: December 2012
Edition: Rev 0

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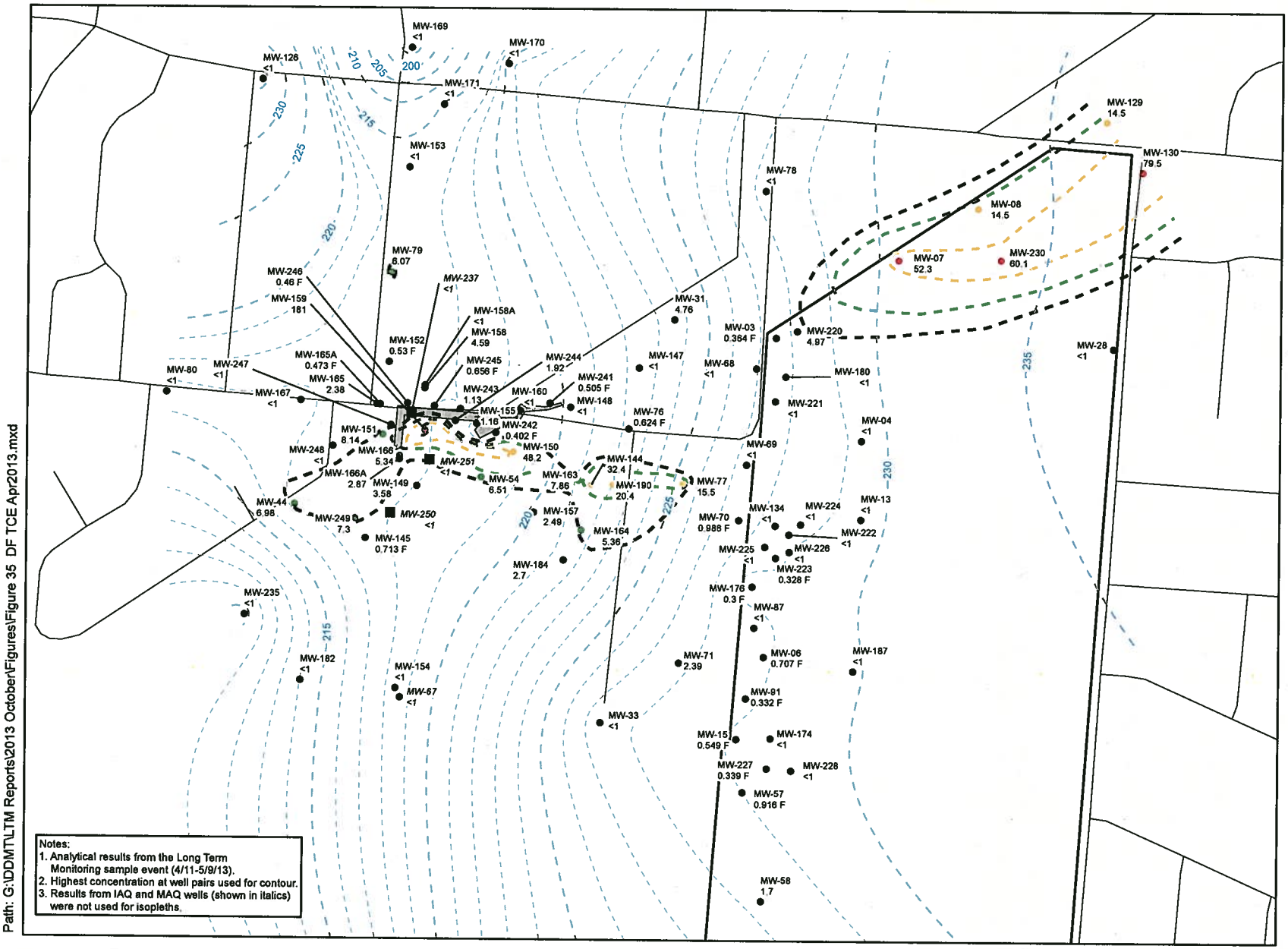

Notes:
1. Analytical results from the Long Term Monitoring sample event (4/11-5/9/13).
2. Highest concentration at well pairs used for contour.
3. Results from IAQ and MAQ wells (shown in italics) were not used for isopleths.

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Figure 35

DUNN FIELD
TCE
CONCENTRATIONS,
APRIL 2013

ANNUAL LONG
TERM MONITORING
REPORT - 2013

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE Ranges (ug/L)
- 0-5
- 5-10
- 10-50
- 50-100
- 100-300

TCE Isopleth (ug/L)
- 5
- 10
- 50
- 100

Air Sparge Well Area

Original Dunn Field Property Boundary

Potentiometric surface of the Fluvial Aquifer 1-ft. contour

Potentiometric surface of the Fluvial Aquifer 5-ft. contour

0 100 200 300
Feet

Installation Location
Memphis, Tennessee

Date: December 2013
Edition: Rev 0

HDR