Memorandum

To: Joan Hutton, CALIBRE Systems, Inc.
Melissa Shirley, USACE-Mobile

From: Clayton Mokri
Tom Holmes

Date: 24 May 2021

Re: **Final MW-87 Area Investigation Work Plan Addendum**
Defense Distribution Depot, Memphis Tennessee

This *Draft MW-87 Area Investigation Work Plan Addendum Memorandum* was prepared by HDR, Inc. under Contract Number W91278-16-D-0061-W9127819F0090 to the United States Army Corps of Engineers (USACE), Mobile District. This Addendum notes changes from the *MW-87 Area Investigation Work Plan* (Work Plan) (HDR, 2020) for additional investigation to include sampling, analysis and evaluation of soil, soil vapor and groundwater on Dunn Field at the former Defense Depot Memphis, Tennessee (DDMT).

Initial Investigation

The Work Plan was implemented with soil, soil vapor and groundwater samples collected in May to October 2020. The analytical results were compared to project action limits and evaluated through a human health risk assessment (HHRA). The *MW-87 Area Investigation Report* (HDR, 2021) was provided to United States Environmental Protection Agency (USEPA), Region 4 and Tennessee Department of Environment and Conservation (TDEC) in February 2021 for their information. Conclusions and recommendations from the report follow.

An area of residual soil contamination by 1,1,2,2-tetrachloroethane (TeCA), 1,1,2-trichloroethane (TCA) and vinyl chloride (VC) was observed in soil samples from borings SB-06 and SB-07 (Figure 1). The lateral and vertical extent of contamination was not delineated by additional borings.

Concentrations of TeCA, TCA, chloroform (CF) and trichloroethene (TCE) in groundwater samples from MW-06 and MW-328 (Figure 1) exceed maximum contaminant levels (MCLs) and target concentrations (TCs) from the *Dunn Field Record of Decision* (ROD) (CH2MHILL, 2004); these two wells are located south and southwest from SB-07. VC was not detected in the groundwater samples. Groundwater concentrations of TeCA at MW-06 exceeded the active remediation objective of 50 micrograms per liter (µg/L) in samples collected in May and July 2020 but not in October 2020. Remedial action to address soil and groundwater concentrations in this area is not considered necessary at present.

Although the risk assessment identified potential for unacceptable hazards from exposure to constituents of potential concern (COPCs) in the groundwater and soil vapor for future on-site workers and future off-site residents, there are no complete pathways of exposure at this time. The MW-87 Area is not in active use and groundwater from the fluvial deposits aquifer (FDAQ) in this area is not used as a source of tapwater.

Additional soil sampling is planned to delineate the lateral and vertical extent of soil contamination at SB-06 and SB-07 and to confirm that the concentrations evaluated in the risk assessment are appropriate. Additional vapor monitoring points (VMPs) will be installed to determine volatile organic compound (VOC) concentrations in soil vapor, if expanded areas of soil contamination are identified. Shallow VMPs will be installed with screens at approximately 5-feet (ft) below ground surface (bgs) and deep VMPs will be installed with screens in the first sand layer below the fine-grained soil, at approximately 25 to 30 ft bgs. An additional monitoring well will be installed upgradient of the GW-10 groundwater grab sample to better delineate the extent of VOCs in groundwater. Data from the additional soil, soil vapor and groundwater sampling and from LTM sample events will be used to update the risk assessment.

Locations for nine additional soil borings and the monitoring well are shown on Figure 1. The location for a tenth soil boring will be determined based on photoionization detector (PID) measurements and observations at the nine borings, and locations for the additional VMPs will be determined based on the soil sample analytical results. The sampling, analysis and updated risk calculations will be presented in an addendum to the February 2021 MW-87 Area report.

Changes from the Work Plan

Project Personnel and Schedule

An additional contact for the laboratory performing soil sample analyses has been added to Table 1. The schedule for the additional investigation is provided on Table 2.

Site Investigation

All planned sample locations are on Dunn Field; no access agreements are required.

Ten soil borings are planned; eight new boring locations and a boring for additional sampling adjacent to SB-07 are shown on Figure 1. The tenth boring location will be selected based on PID measurements for samples collected at the other locations.

The new boring locations are in a partially cleared area of brush and trees; photographs of the area are provided in Appendix A. The remaining vegetation limits access to boring locations SB-18, SB-20, SB-22, SB-25 and possibly to other locations on the edge of the vegetated area. An area of approximately 110 feet by 50 feet encompassing the boring locations will be cleared by Robinson Tree of Memphis; the brush and trees will be chipped and spread on Dunn Field outside the area of investigation.

Photograph 1 in Appendix A shows concrete, rock, steel pipe and other debris in the area near MW-06. Debris was observed throughout the area to be cleared by Robinson Tree. After the vegetation is cleared, McCray Drilling will clear debris from a 5-foot radius around each of the eight boring locations. The debris appears to be on the ground surface but may extend below

the surface. A 4-ft metal utility probing rod will be used to check for buried obstructions; borings may be shifted a few feet or debris removed to a depth of up 2 feet, as necessary to allow the direct push technology (DPT) rig to advance borings to the desired depth.

Soil samples will be collected from 4-ft sections of soil core in DPT borings as in the initial investigation. However, in addition to lateral delineation of soil contamination, vertical delineation is also a defined goal for this additional investigation.

Soil samples will be collected from multiple depth intervals in DPT borings SB-18 to SB-26 for analysis of VOCs. At least four samples will be collected at each of these borings from the depth intervals listed below; samples will be collected at the depth with the highest PID measurement within each interval.

- Fine-grained soil samples from the loess and upper fluvial deposits will be collected from the surface (0 to 2 ft bgs), subsurface (2 to 10 ft bgs), and deep intervals (10 ft bgs top of sand). If debris is excavated from 0 to 2 ft bgs prior to drilling, the side wall of the excavation will be screened with the PID and the soil sample collected.
- Coarse-grained soil samples from the lower fluvial deposits will be collected from the top of sand until PID measurements from a 4-ft soil core are 0 ppm or the DPT boring reaches refusal. Samples will be collected from the depth with the highest PID measurement and from the final core section. If the initial core section in the coarse-grained soil does not have PID measurements above 0 ppm, a single coarse-grained soil sample will be collected from that core.
- Additional samples of fine- and coarse-grained soil may be collected if PID readings above 0 parts per million (ppm) are observed at multiple depths; up to 60 soil samples will be collected.

Grab groundwater samples from the soil borings are not planned.

Three shallow VMPs and three deep VMPs will be installed at locations determined from the soil sample analytical results. VMP installation and sampling will be performed as described in the Work Plan. Samples from the new VMPs, from the ten VMPs installed in the initial investigation, and from the VMPs (VP-7A and VP-7B) installed for the soil vapor extraction remedy (Figure 1) will be collected during two sample events as shown on Table 2.

Monitoring well MW-329 will be installed upgradient of GW-10 at the location shown on Figure 1. The well may be moved several feet to the south for the drill rig to be the necessary distance (20 ft) from the overhead power transmission lines. The surface elevation at the planned location is approximately 300 ft, NAVD (North American Vertical Datum of 1988); the April 2021 groundwater elevation at the location is approximately 235 ft NAVD, and the depth to water is approximately 65 ft below ground surface. The drilling, well construction, development and sampling will be as described in the Work Plan.

Two rounds of soil vapor and groundwater sampling are planned for the new VMPs and monitoring well; samples will also be collected from the existing VMPs and selected monitoring wells (MW-06, MW-87 and MW-328). Water level measurements will be collected during each

groundwater sample event at the sampled wells and adjacent wells (Table 3) as described in the Work Plan.

The locations for soil borings, VMPs and the monitoring well will be marked using coordinates from Figure 1, as determined by sub-meter GPS and visual observation of existing wells and VMPs. Following completion, the locations will be surveyed as described in the Work Plan.

Quality Control will be as described in the Work Plan. The number of field and quality control samples and other sample details are provided on Table 4. A passive diffusion bag (PDB) sampler will be installed in MW-329 after the initial sample is collected by low-flow sampling with a bladder pump, in accordance with the Work Plan. The existing wells (MW-06, MW-87 and MW-328) have PDB samplers installed. During the two groundwater sample events, samples will be collected from the PDBs and repeat samples by low-flow sampling with a bladder pump. Seven samples will be collected during the first sample event: one low-flow sample from MW-329; and PDB and low-flow samples from the other three wells. Eight samples will be collected during the second sample event, PDB and low-flow samples from all four wells. The repeat samples are being collected to address questions about consistency between PDB and low-flow samples.

Risk assessment will be conducted as described in the Work Plan.

Equipment decontamination and handling of investigation-derived waste will be managed as described in the Work Plan.

References

CH2MHILL, 2004. *Memphis Depot Dunn Field Record of Decision, Defense Distribution Center (Memphis), Final*. Prepared for the U.S. Army Engineering and Support Center, Huntsville, Alabama. March 2004.

HDR, 2020. *Final MW-87 Area Investigation Work Plan, Defense Depot Memphis, Tennessee, U.S. EPA I.D. Number TN4210020570.* Prepared for the U.S. Army Corps of Engineers, Mobile District. February 2020.

HDR, 2021. *MW-87 Area Investigation Report, Revision 0, Defense Depot Memphis, Tennessee, U.S. EPA I.D. Number TN4210020570.* Prepared for the U.S. Army Corps of Engineers, Mobile District. February 2021.

Tables

TABLE 1
PROJECT PERSONNEL AND CONTACT INFORMATION
MW-87 AREA INVESTIGATION WORK PLAN ADDENDUM
Dunn Field, Defense Depot Memphis Tennessee (DDMT)

Name	Organization	Role	Email	Office	Mobile
James Foster	DAIN-ODB	Program Manager	James.C.Foster10.civ@mail.mil	703-545-2541	
Joan Hutton	CALIBRE Systems, Inc.	BRAC Environmental Coordinator	joan.hutton@calibresys.com	571-403-3333	770-317-4323
Melissa Shirley	USACE-SAM	Contracting Officer's Representative	Melissa.L.Shirley@usace.army.mil	251-690-2616	
Bob Beacham	USACE-SAM	Project Manager	robert.p.beacham@usace.army.mil	251-690-3077	251-581-2787
Laura Roebuck	USACE-SAM	Technical Manager	Laura.W.Roebuck@usace.army.mil	251-690-3480	251-455-5340
Diedre Lloyd	USEPA	Remedial Project Manager	lloyd.diedre@epa.gov	404-562-8855	
Jamie Woods	TDEC	Remedial Project Manager	jamie.woods@tn.gov	901-371-3041	
Glen Turney	HDR	Managing Principal	Glen.turney@hdrinc.com	210-253-6503	210-317-5448
Tom Holmes	HDR	Project Manager	thomas.holmes@hdrinc.com	404-295-3279	404-295-3279
Thomas Lyons	HDR	Health and Safety Manager	thomas.lyons@hdrinc.com	704-340-1350	405-420-9389
Lynn Lutz	HDR	Project Chemist	Lynn.Lutz@hdrinc.com	303-754-4266	720-633-2380
Travis Ritter	HDR	Project Database/ GIS Manager	warren.ritter@hdrinc.com	850-429-8946	210-464-8679
Clayton Mokri	HDR	MW-87 Investigation Task Manager	clayton.mokri@hdrinc.com	916-679-8726	530-902-7106
Denise Cooper	HDR	Environmental Scientist	denise.cooper@hdrinc.com	901-268-2478	901-268-2478
Stephanie Mossburg	Microbac Laboratories, Inc.	Groundwater Sample Laboratory	stephanie.mossburg@microbac.com	740-885-5803	304-299-4976
Sue Anderson	ALS Global	Vapor Sample Laboratory	sue.anderson@alsglobal.com	805-526-7161	
Traci Reilly	Torrent Laboratory	Soil Sample Laboratory	Traci.Reilly@torrentlaboratory.com	408-263-5258	408-609-2405

TABLE 2
PROJECT SCHEDULE
MW-87 AREA INVESTIGATION WORK PLAN ADDENDUM
Dunn Field, Defense Depot Memphis, Tennessee

Task Name	Start	Finish
MW-87 Area Investigation Work Plan Addendum	3-May-21	3-Jun-21
MW-87 Area Investigation Work Plan Addendum (Draft)	3-May-21	13-May-21
MW-87 Area Investigation Work Plan Addendum (Final)	27-May-21	3-Jun-21
Phase 1. Soil Borings, Well Installation and Sampling	7-Jun-21	15-Jul-21
Sampling and Laboratory Analysis	7-Jun-21	24-Jun-21
Prepare and Submit Data Report	24-Jun-21	1-Jul-21
Finalize VMP Recommendations	8-Jul-21	15-Jul-21
Phase 2. VMP Construction/Sampling	19-Jul-21	9-Aug-21
Sampling and Laboratory Analysis	19-Jul-21	2-Aug-21
Prepare and Submit Data Report	2-Aug-21	9-Aug-21
Phase 3. Second Round Groundwater and Vapor Sampling	30-Aug-21	4-Oct-21
Sampling and Laboratory Analysis	30-Aug-21	13-Sep-21
Final Laboratory Reports and Data Validation	13-Sep-21	4-Oct-21
Phase 4. Risk Assessment and Report Addendum	4-Oct-21	6-Dec-21
Risk Assessment	4-Oct-21	25-Oct-21
MW-87 Area Report Addendum (Draft)	4-Oct-21	1-Nov-21
MW-87 Area Report Addendum (Final)	22-Nov-21	6-Dec-21

TABLE 3
WATER LEVEL MEASUREMENT FORM
MW-87 AREA INVESTIGATION WORK PLAN ADDENDUM
Dunn Field, Defense Depot Memphis, Tennessee

Well ID	Aquifer	Top of Casing Elevation (ft, NAVD)	Top of Screen Elevation (ft, NAVD)	Date	Depth to Water (ft, btoc)	Groundwater Elevation ft NAVD
MW-06	Fluvial	289.11	238.1			
MW-13	Fluvial	300.01	234.0			
MW-70	Fluvial	304.99	224.2			
MW-71	Fluvial	294.40	228.9			
MW-87	Fluvial	294.93	231.9			
MW-91	Fluvial	291.99	237.0			
MW-164	Fluvial	287.48	232.2			
MW-176	Fluvial	299.68	223.7			
MW-184	Fluvial	283.12	225.1			
MW-187	Fluvial	302.74	226.7			
MW-225	Fluvial	304.52	229.5			
MW-226	Fluvial	303.19	229.0			
MW-329	Fluvial	288.58	230.2			
MW-330	Fluvial	NA	NA			

Notes:
ft, btoc: feet below top of casing
ft, NAVD: feet above North American Vertical Datum of 1988
NA: not available

TABLE 4
SAMPLING PLAN DETAIL
MW-87 AREA INVESTIGATION WORK PLAN ADDENDUM
Dunn Field, Defense Depot Memphis, Tennessee

Media	Field Phase	Analytical Method	Field Samples	Field Duplicates	MS	MSD	Trip Blanks	Equipment Blanks	Total No. of Samples	Preservative	Holding Time	Container Size and Type	Turn Around Time	Analytical Laboratory
Soil	1	SW8260B	60	6	3	3	8	4	84	2xsodium bisulfate, 1xMeOH Chill to ≤ 4±2 degrees Celsius (°C) HCl to pH<2 Chill to ≤ 4±2 degrees °C	14 days	2x40 mL glass VOA vials with sodium bisulfate; 1x40 mL VOA vial with methanol; and 60g poly jar. 3x40 mL glass VOA vials with HCl to pH<2; Teflon lined septa	5 Business Days	Torrent
Water	1	SW8260B	7	1	1	1	2	2	14	HCl to pH<2 Chill to ≤ 4±2 degrees °C	14 days	3x40 mL glass VOA vials with HCl to pH<2; Teflon lined septa	5 Business Days	Microbac
Vapor	2	TO-15	18	2	0	0	0	0	20	None	28 days	1 liter summa canister with 200-ml/min regulator	5 Business Days	ALS
Vapor	3	TO-15	18	2	0	0	0	0	20	None	28 days	1 liter summa canister with 200-ml/min regulator	5 Business Days	ALS
Water	3	SW8260B	8	1	1	1	1	2	14	HCl to pH<2 Chill to ≤ 4±2 degrees °C	14 days	3x40 mL glass VOA vials with HCl to pH<2; Teflon lined septa	5 Business Days	Microbac

Notes: ml = milliliter
VOA = volatile organic analysis
HCl = hydrochloric acid
MeOH = methanol
g = gram
min = minute
MS = matrix spike
MSD = matrix spike duplicate
TICs = tentatively identified compounds
VOCs = volatile organic compounds
poly = polyethylene

Figures

Figure 1

Sample Locations

MW-87 Area
Work Plan Addendum

Dunn Field, Defense Depot
Memphis, Tennessee

Legend

- Initial Soil Borings
- Initial VMP
- Additional Soil Borings
- Additional Fluvial Well
- Groundwater Grab Sample
- SVE System VMP
- Fluvial Well, Background
- Fluvial Well, DF West
- 1, 000 µg/kg (estimated)
- 1, 000 µg/kg
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Original Dunn Field Boundary
- TA-3 Loess Excavation Area
- In Situ Thermal Desorption Treatment Area
- Fluvial SVE Well 60-foot radius of influence

N
W E
S

0 25 50
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 5/19/2021
Edition: Rev 0

Path: W:\MW87\Phase 4\01_Soil Boring Locations.mxd

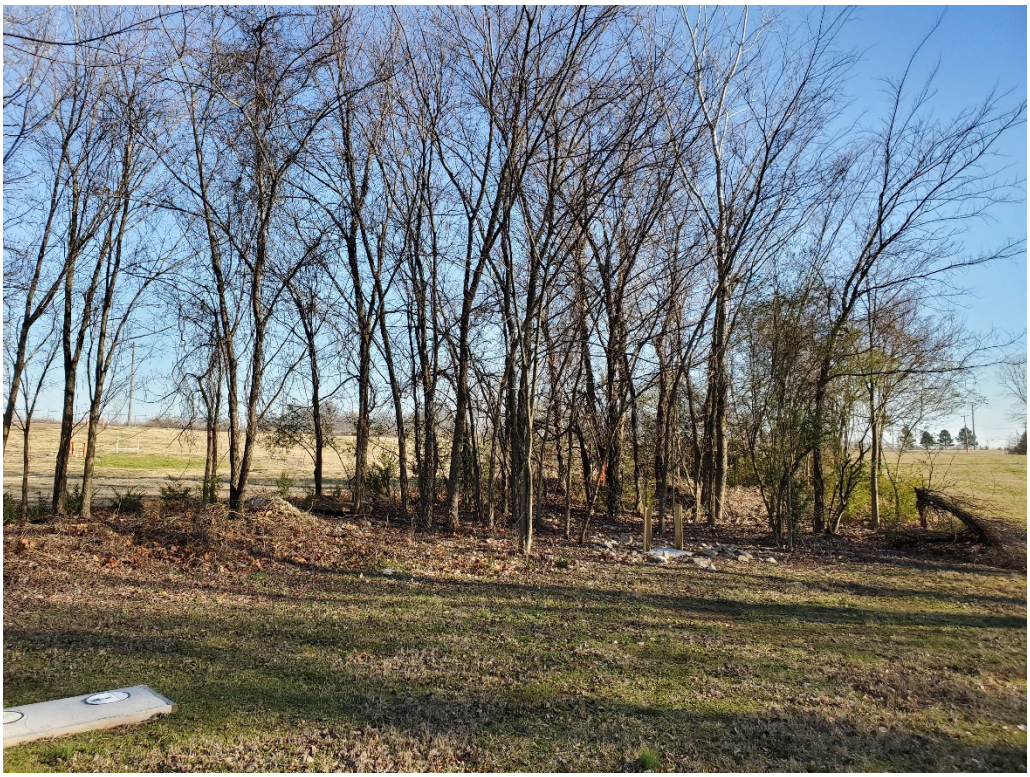
A

Appendix A

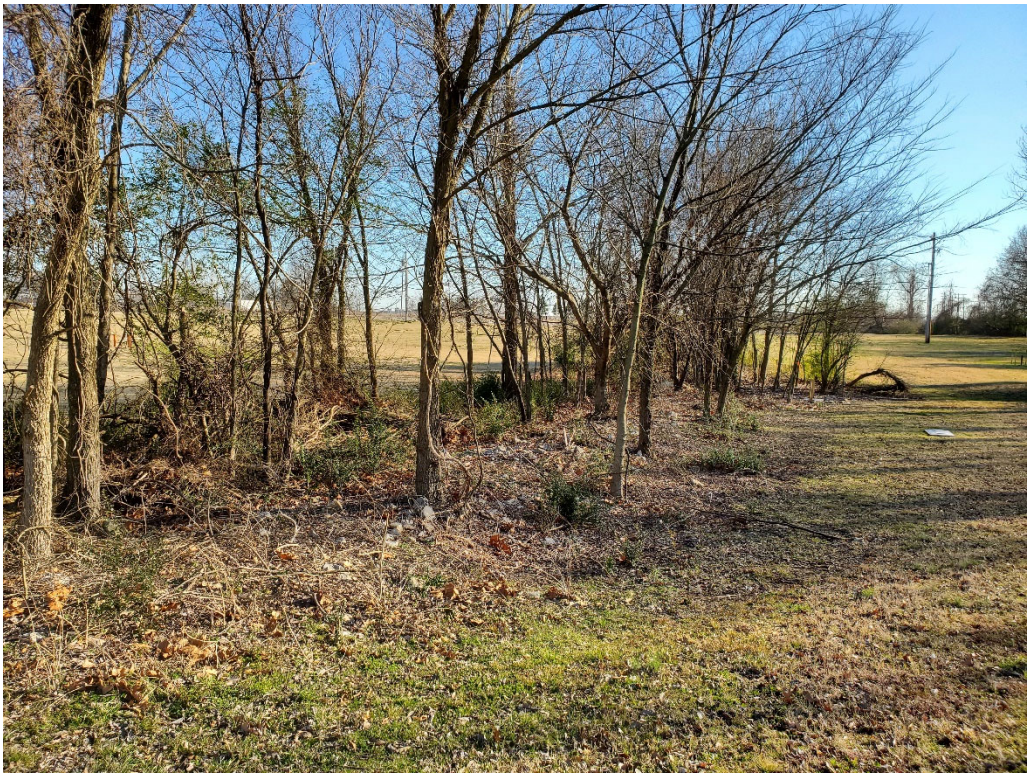
Site Photographs

1. Concrete, rock and steel pipe debris in wooded area. Covers the entire area, but largest debris piles NE of MW-06. May 2020.

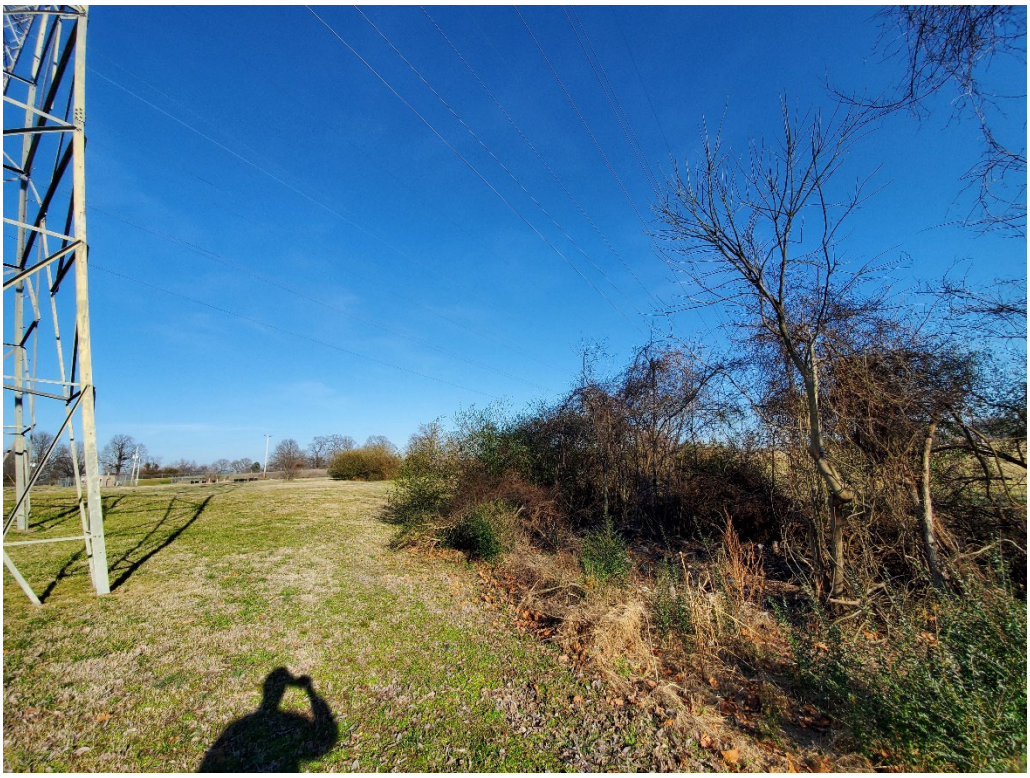
2. View facing north of wooded area. MW-06 visible in foreground. February 2021.



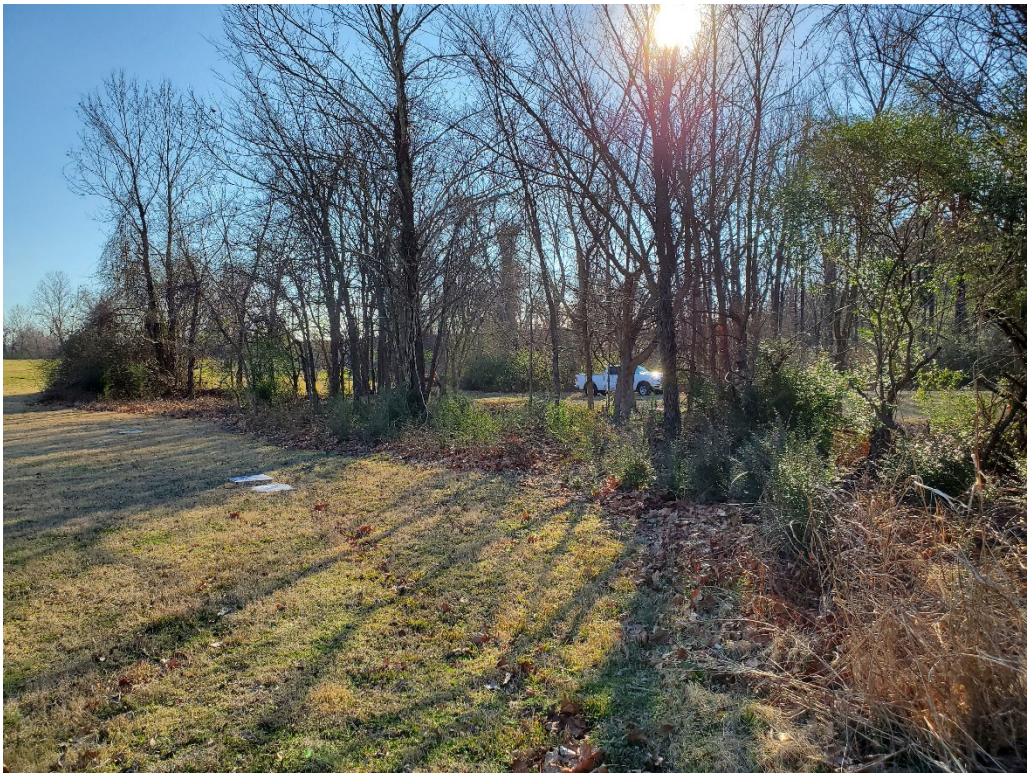
3. View facing SE, standing west of VMP-7. MW-06 visible in tree line. February 2021.



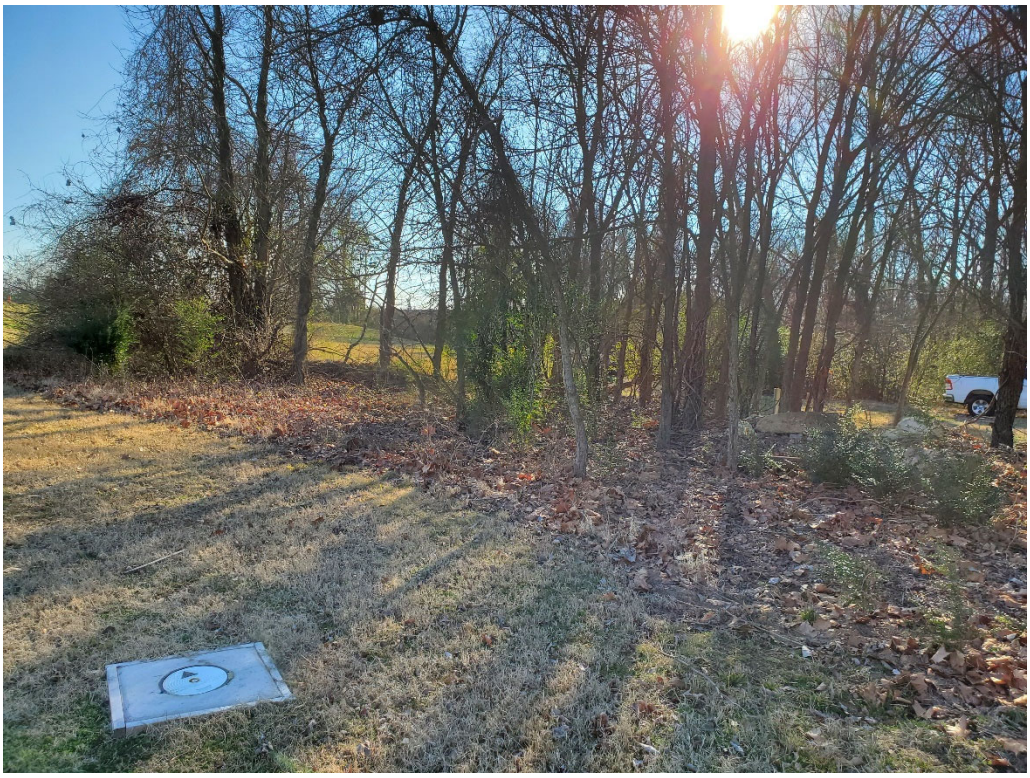
4. Facing south on western side of tree line east of MW-87. February 2021.



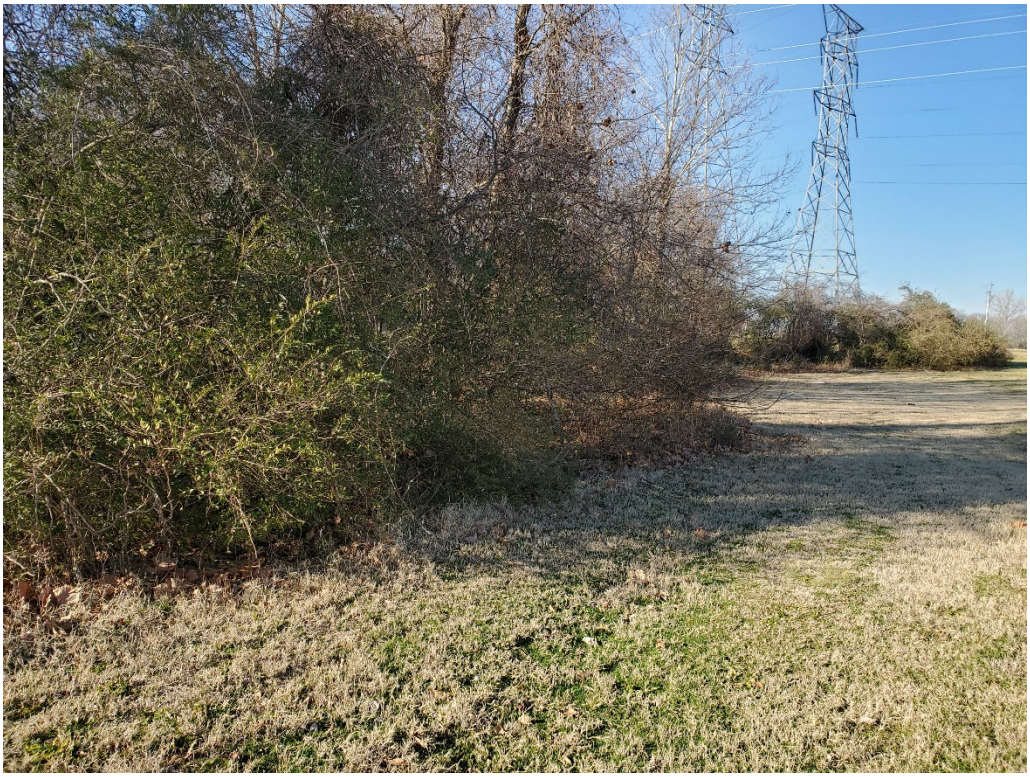
5. Facing N NE. View of shrubs in northern portion of tree line. February 2021.



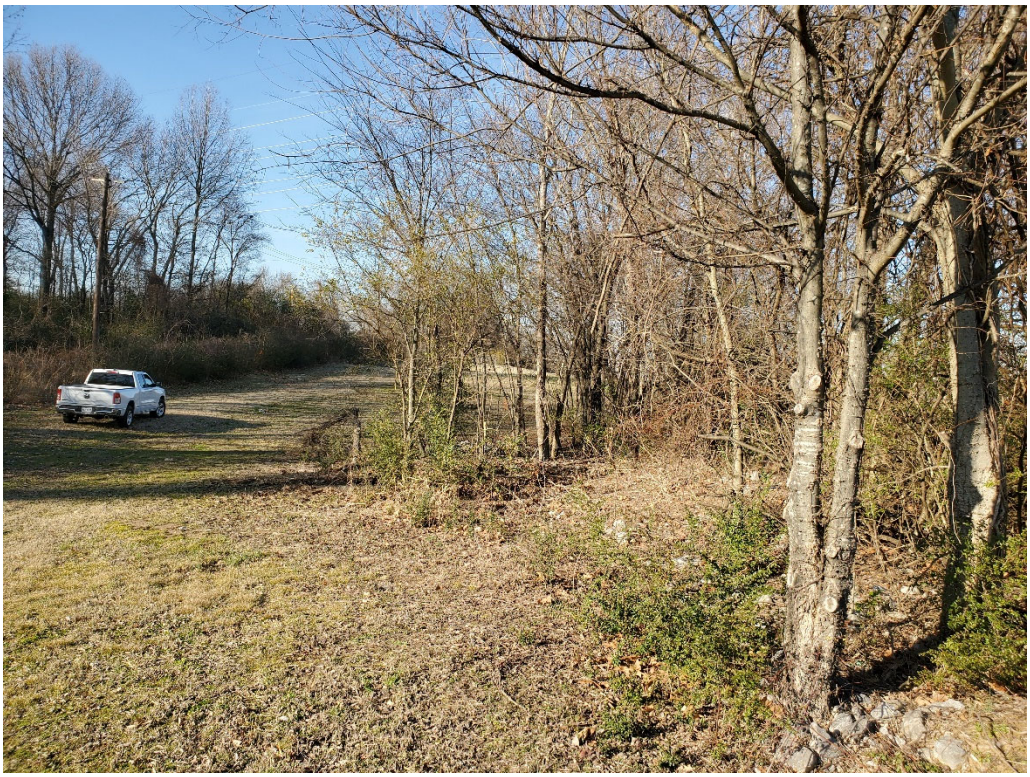
6. Facing S SW from northern tree line. VMPs 10 and 11 visible east of tree line. February 2021.



7. Facing SW, standing north of VMP-11S. Pile of concrete debris visible in photograph. February 2021.



8. Facing north from southeastern side of tree line. February 2021.



9. Facing north from SW side of tree line. MW-06 stick-up casing visible at edge of woods in middle pf photo. February 2021.