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Subject: Statement of Work for Site 7c Characterization

John/Brian – attached is a draft Statement of work that was jointly developed by EPA and TDEC. Please look it over and provide any feedback you have. We are open to participating in a conference call to discuss.

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**Environmental Protection Agency
Tennessee Department of Environment and Conservation**

STATEMENT OF WORK

To Expedite Groundwater Characterization
Central Bear Creek Valley Site 7c

August 8, 2017

BACKGROUND

The lack of site-specific characterization for the Department of Energy (DOE) proposed Environmental Management Disposal Facility (EMDF), particularly for the Central Bear Creek Valley (CBCV) Site (Site 7c), is one of the primary reasons that the Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) cannot approve DOE's draft Remedial Investigation/Feasibility Study (RI/FS) report. Site-specific geologic/hydrologic data are needed to determine the long-term protection of human health and the environment from future release.

As part of the formal dispute resolution process, the Senior Executive Committee (SEC) met on July 27, 2017, and tasked EPA and TDEC personnel with developing this statement of work (SOW) to describe the minimum site-specific geologic and hydrologic characterization data that DOE must collect to evaluate the suitability of CBCV Site 7c with respect to siting criteria applicable or relevant and appropriate requirements (ARARs). As required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), DOE's RI/FS must demonstrate that the proposed EMDF will meet the threshold criteria of protecting human health and the environment and complying with—or justifying site-specific waivers of—federal and state ARARs. Specifically, DOE must demonstrate compliance with or justify waivers for the following ARARs, which are identified in the July 24, 2017, letter from EPA and TDEC.

- TDEC 0400-20-11-.17(1)(h) provides that the hydrogeologic unit used for disposal shall not discharge groundwater to the surface within the disposal site.
- Toxic Substances Control Act (TSCA) 40 CFR 761.75(b)(5) provides that the landfill shall be located in an area of low to moderate relief to minimize erosion and to help prevent landslides or slumping.
- TSCA 40 CFR 761.75(b)(3) provides that the bottom of the landfill liner system or natural in-place soil barrier shall be at least 50 feet above the historical high water table, and there shall be no hydraulic connection between the site and standing or flowing surface water¹.

The work described herein balances the data collection needed to evaluate ARAR compliance and/or waiver requests with DOE's desire to expedite approval of a tri-party CERCLA RI/FS and Proposed Plan. Additionally, this document provides an outline for data collection, analysis, reporting, and scheduling that should allow DOE to expedite characterization of CBCV Site 7c; provide modeling input values; and produce a CERCLA Proposed Plan for public review and comment in Fiscal Year (FY) 2018. This investigation's purpose is to determine whether several ARARs are met and to provide site-specific data to develop and evaluate an ARAR waiver(s). DOE will need to collect additional data to complete the design of a protective mixed-waste landfill in Bear Creek Valley.

DATA NEEDS

Modeling to assess the protectiveness of the proposed mixed-waste landfill must be supported by site-specific information. Consideration of the necessary field work specified in this SOW is based on DOE's draft Field Sampling Plan map dated July 20, 2017, that was distributed at the project team meeting on July 26, 2017. This map shows the proposed outside berm perimeter at CBCV Site 7c and is

¹ This siting requirement must also be consistent with EPA/540/G-90/007 (Guidance on Remedial Actions for Superfund Sites with PCB Contamination, August 1990) and any waiver justification.

based on data quality objectives that DOE scoped collaboratively with EPA and TDEC. TDEC annotated the attached copy of the map to illustrate the groundwater SOW described herein.

Collaborative scoping efforts defined a process for using field measurements to determine the water table depths/elevations and to support evaluation of potential changes in the water table configuration following placement of the landfill liner. Field measurements must also provide for determination of whether DOE would propose the use of an underdrain or other drainage feature to lower the water table. Scoping discussions focused on installation of pairs of piezometers to understand groundwater levels and vertical hydraulic gradients between shallow and deep intervals. Specifically, at the scoping meeting DOE proposed that the shallow interval is not expected to dry up after placement of the liner at locations where an upward hydraulic gradient exists or there is no dry zone between the screened intervals of the shallow and deep intervals.

In order to obtain data on water level fluctuations through one wet season and to use that data to estimate historical high water table fluctuations pursuant to 40 CFR 761.75(b)(3), DOE must 1) perform continuous water-level monitoring at CBCV Site 7c piezometers, 2) identify appropriate monitoring wells/piezometers from similar locations in Bear Creek Valley that DOE will use to correlate with the CBCV Site 7c to establish historic high water levels, 3) demonstrate these wells are comparable to CBCV Site 7c piezometers, and 4) estimate historical high water table fluctuations. DOE shall document precipitation recorded at stations monitored by operations personnel at the Environmental Management Waste Management Facility (EMWMF).

In an effort to understand groundwater levels and vertical gradients across CBCV Site 7c, DOE must install at least a subset of the previously scoped piezometer pairs (identified in Attachment figure) to develop a profile across the site. Data will be collected during drilling and after piezometer installation to understand hydraulic properties (e.g., hydraulic conductivity) relative to the lithology and water bearing/transmission zones within the soil and rock underlying the site. Data must be sufficient to demonstrate how groundwater moves through the site and discharges to the ground surface and surface water, including geotechnical characteristics of natural materials at the site (e.g., horizontal and vertical hydraulic conductivity values).

DOE shall perform the following characterization during drilling the boreholes for piezometer installation to better understand properties at the site and to support modeling. This type of data is also needed for remedial design. It is DOE's option as to whether DOE collects remedial design data with these borings or installs additional future borings to collect data for remedial design. DOE shall detail this Phase 1 investigation in the Field Sampling Plan and shall clearly state whether DOE elects to collect this information as part of this investigation or in the future during a remedial design investigation. During drilling of the borings for piezometer installation, DOE shall collect standard penetration test (SPT) data and use split spoons and Shelby tubes (or equivalent equipment) to log and sample soils and saprolite continuously throughout the deepest boring at each paired piezometer location. A geologist, soil scientist or engineer must describe the material with sufficient detail to identify lithology, chert lenses, fractures, relic bedding, moisture and other features that may bear or transmit water. Appropriate intervals for geotechnical samples shall be based on observed characteristics. If bedrock is drilled, the bedrock shall also be cored with detailed observations to identify, quantify, and describe areas of fracturing, bedding, dissolution and other features that may transmit water.

Piezometers shall be screened at depths that contain groundwater, based on information and observations made during drilling. Following piezometer installation, the horizontal position and ground

surface at each location shall be surveyed within 0.1 foot, and the top-of-casing elevation shall be surveyed within 0.01 foot. DOE shall instrument each piezometer to record hydraulic head (water level), temperature, conductivity, and pH at intervals of at least every 30 minutes.

At a minimum DOE must collect the data described above from seven (7) of the approximately 24 locations planned as illustrated on the attached July 20th map. These locations are listed below from the uphill end of the proposed site to the downhill end.

Piezometers	Rationale	Comment
GW-978/ GW-979	Upgradient edge of site in saddle that partially separates the site from Pine Ridge	Edge of proposed perimeter berm
GW-982/ GW-983	Atop a knob (hill) that may have high groundwater levels, per the D5 RI/FS report	D5 Figure 7-1 indicates the pre-construction water table may intersect the facility
GW-986/ GW-987	Within a valley that partially bisects the knob within the heart of the site	
GW-988/ GW-989	Atop the knob that may have high groundwater levels, as suggested in the D5 RI/FS report	Setting is similar to GW-982/GW-983, but this location is further away from Pine Ridge
GW-994/ GW-995	At downhill end of the knob within the heart of the site	
GW-998/ GW-999	Near the downhill end of the site	Map suggests this location lies within the Nolichucky Shale less than 100 feet from its contact with the karstic Maynardville Limestone
GW-992/ GW-993	Along stream D-10W where field observations suggest potential groundwater discharge	Off the cross-section near D-10W

The July 20th map (attached) does not identify the boundary of the buffer zone required for monitoring and potential future corrective action. DOE must estimate the buffer zone boundary which shall not overlie the karstic Maynardville Limestone or its contact with the Nolichucky Shale². DOE shall measure the flow of surface water using standard flumes or weirs where any stream (e.g., NT-10, D-10W, and NT-11) enters and leaves the buffer zone. For streams originating within the site/buffer area, spring discharge or stream flow shall be measured as close as possible to the spring/seep zone. In order to measure the entire flow, each device must be constructed deep enough in the channel to minimize the flow of water under or around it. The downstream locations must be on the Nolichucky Shale, not the Maynardville Limestone. DOE shall instrument each stream gaging station to record discharge (flow), temperature, conductivity, and pH at intervals of at least every 30 minutes.

DOE must engage a Qualified Hydrologic Professional in accordance with TDEC 0400-40-17 to walk the site area, including the buffer zone, during the wet season and identify locations of springs and seeps. For any spring or seep where it is practical, DOE must measure flow, temperature, conductivity, and pH.

DOE must evaluate NT-10, D-10W, and NT-11 at intervals of 50 feet or less within the disposal site including buffer zone by describing stream sections, including any observed springs or seeps, and measuring temperature, conductivity, and pH. This evaluation should be performed twice during the wet

² DOE must identify the Nolichucky-Maynardville contact based on field observations that do not rely on regional geologic maps. It is particularly important to identify locations where the contact underlies any portion of the site, including locations where the contact crosses streams that flow through the site/buffer.

season and twice during the dry season. Dry season evaluation may be performed during the fall of 2017 to prevent extending the schedule.

This SOW assumes that neither the disposal area nor the associated buffer zone overlies the Maynardville Limestone or the Maynardville-Nolichucky contact. If any portion of the disposal area or buffer zone overlies the Maynardville Limestone or its contact with the Nolichucky shale, additional site characterization will be required to demonstrate compliance with additional ARARs complicated by groundwater movement in a karst environment.

DOE shall perform the field work consistent with EPA guidance, including the Uniform Policy for Quality Assurance Project Plans (Office of Solid Waste and Emergency Response [OSWER] Directive 9272.0-17, dated June 7, 2005).

DATA EVALUATION

Site-specific data must be integrated into modeling used to support ARAR waiver requests, develop waste acceptance criteria, and assess long-term protectiveness of human health and the environment—a CERCLA threshold criterion. For example, the determination of protectiveness and waste acceptance criteria development would incorporate site-specific data in the evaluation of 1) future risks to the public and downstream water resources and users, including fishing and people consuming fish and 2) the cumulative dose, risk, and toxicity (non-carcinogenic effects) impacts of the proposed EMDF (including all underdrains or drainage features) with existing/future sources of contamination in Bear Creek Valley.

If DOE collects any additional characterization or design information beyond the minimum effort identified in this SOW, DOE must also include those data in the evaluation.

The SEC agreed that DOE will perform modeling for CBCV Site 7c and that TDEC will independently verify that CERCLA requirements are met. Such independent verification will be completed for any modeling conducted by DOE which is used to make EMDF decisions pursuant to CERCLA. EPA and TDEC encourage DOE to schedule tri-party consultations as needed to resolve questions and data gaps that may arise during data evaluation and modeling.

REPORTING

DOE shall prepare and submit a report of findings to EPA and TDEC following the wet season. This information will be used to demonstrate in the RI/FS that CBCV Site 7c is a viable location for the EMDF disposal facility (i.e., that CBCV Site 7c meets ARARs or there is reasonable expectation for waivers for ARARs that the site does not meet). The report of findings shall identify any ARAR(s) that site characterization indicates would not be met and provide justification for any needed waiver(s).

Upon approval by EPA and TDEC, the report of findings, resolving any EPA and TDEC comments, will be appended to the D5 RI/FS along with the amended ARARs table and any demonstration or process needed to support ARAR waiver requests. Upon regulatory approval of the amended D5 RI/FS, DOE, EPA, and TDEC will collectively present the public with a Proposed Plan that includes, and is not limited to: 1) wet season site conditions, 2) site-specific groundwater elevation/fluctuation information including comparison with other areas to estimate historical high water table, 3) justification for ARAR waivers, 4) site-specific data to inform waste acceptance criteria modeling, and 5) the process and schedule for developing waste acceptance criteria and compliance processes including additional public participation on what is proposed to be disposed.

Following submittal of the report of findings and approval of the amended RI/FS report, EPA and TDEC expect that DOE will continue collecting groundwater data continuously throughout all seasons and that DOE will include data collected over at least one year in the remedial design report. The additional data will establish a longer-term trend of groundwater elevation fluctuation and better define the required position of the geologic buffer. It may also be used to refine the model(s) used to develop protective waste acceptance criteria. Site-specific remedial design characterization (not addressed by this document) can then proceed following approval of the Record of Decision.

SCHEDULE

DOE shall provide a Field Sampling Plan consistent with this Statement of Work for EPA and TDEC review and shall resolve EPA and TDEC comments. The Field Sampling Plan shall include a schedule of activities necessary to collect groundwater data during the January-April portion of the FY2018 wet season and anticipated dates for the delivery of the report of findings to EPA and TDEC for regulatory review. As stated above, upon approval by EPA and TDEC, the report of findings, resolving any EPA and TDEC comments, will be appended to the D5 RI/FS along with the amended ARARs table and any demonstration or process needed to support ARAR waiver requests. Upon regulatory approval of the appended D5 RI/FS, DOE will submit a draft Proposed Plan to EPA/TDEC and the DOE, EPA, and TDEC will collectively present the public with a Proposed Plan.

