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NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

February 2, 2021

Brian D. Knight
Chief, Environmental Division
U.S. Army Garrison, White Sands
(Building 163)
White Sands Missile Range, New Mexico 88002-5000

RE: DISAPPROVAL
CORRECTIVE MEASURES EVALUATION
SWMU 197, HELSTF TSA GASOLINE SPILL SITE
WHITE SANDS MISSILE RANGE, NEW MEXICO
EPA ID # NM 2750211235
HWB-WSMR-20-001

Dear Mr. Knight:

The New Mexico Environment Department (NMED) has reviewed the *Corrective Measures Evaluation SWMU 197, HELSTF TSA Gasoline Spill Site* (Report), dated January 2020 and submitted on behalf of the U.S. Army White Sands Missile Range (Permittee). NMED hereby issues this Disapproval with the attached comments.

The attached comments are related to general and technical inadequacies and inaccuracies. For instance, the Permittee only evaluated in-situ enhanced bioremediation (ISEB) as a corrective measure for the perched aquifer; no other alternatives were evaluated. Some inadequacies and inaccuracies identified in the Report prompted a requirement for the Permittee to submit a separate work plan to address the issues (see Comments 2, 27, and 28). The CME Report will have to be modified based on the results of the additional investigations.

The Permittee must address all comments in this Disapproval and submit a revised Report. Two bound hard copies and two electronic versions must be submitted to NMED. In addition, include a red-line strikeout version of the Report in electronic format showing where all revisions to the Report have been made. The revised Report must be accompanied with a response letter that details where revisions have been made, cross-referencing NMED's numbered comments. The work plan required by Comments 2, 27, and 28 must be submitted to NMED no later than **July 31, 2021**. The revised Report must be submitted to NMED no later than **August 31, 2022**.

If you have questions regarding this letter, please contact Michiya Suzuki of my staff at 505-476-6046.

Sincerely,

Kevin Pierard

Digitally signed by Kevin Pierard
Date: 2021.02.02 12:26:20 -07'00'

Kevin M. Pierard, Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
R. Murphy, NMED HWB
M. Suzuki, NMED HWB
B. Avalos, WSMR
L. King, EPA Region 6 (6LCRRC)

File: WSMR 2021 and Reading
HWB-WSMR-20-001

Attachment

Comment 1

In the Abstract, the Permittee states, "[f]or perched groundwater contaminated with BTEX, MTBE, and naphthalene, source removal using two different groundwater amendments are evaluated, BOS-200® and PetroFix™." Two biostimulation/bioaugmentation amendments were proposed for remediation of the perched aquifer. These alternatives belong to the same category of in-situ enhanced bioremediation (ISEB). Other categories of remedial technologies were not evaluated in the Report. Comment 11 in NMED's *Disapproval Interim Measures Report SWMU 197 HELSTF TSA Gasoline Spill Site SVE System,* dated April 12, 2019, states, "Table 9, *LNAPL Thickness,* indicates that LNAPL was still present in the perched aquifer (HVW-03 and HSVW-1) when the SVE system was dismantled on June 29, 2018. The Permittee must address the issue of LNAPL in the perched aquifer in the CME... If injection of water is combined with extraction, LNAPL recoverability may potentially improve. Evaluate the remedial option in the CME." ISEB is likely not the most effective in-situ technology to abate LNAPL. ISEB may be more appropriate for the polishing stage of groundwater remediation. In-situ remediation technologies, such as air sparging (AS)/dual phase extraction (DPE), freshwater flushing/DPE, surfactant enhanced subsurface remediation (SESR), electrical resistance heating (ERH), smoldering technology, and in-situ chemical oxidation (ISCO) must also be evaluated for remediation of the perched aquifer. Revise the Report to evaluate other remedial alternatives.

Comment 2

In the Abstract, the Permittee states, "[t]he preferred remedial alternative [for regional aquifer remediation] is to plug and abandon this well [HMW-52] and install a replacement well and sample for eight quarters to confirm that the source of contamination is from a leaking well casing." The proposed method is not a remedial alternative. Rather, it is the proposed investigation of the integrity of the well. The rationale for the need to investigate a potential leak is well documented in Section 6.3, *Regional Groundwater.* However, the Permittee may not abandon well HMW-52 at this time. Installation of a well adjacent to well HMW-52 is more appropriate to verify whether or not MTBE detections in HMW-52 were caused by leak from the casing. Replacement well HMW-72 is proposed to be installed approximately 25 feet downgradient of well HMW-52. Although well HMW-72 does not replace well HMW-52, well HMW-72 would be appropriate for use as a sentinel well to monitor potential downgradient migration. Submit a work plan to install (1) a well adjacent to HMW-52 to verify whether MTBE detections in well HMW-52 were caused by a leak, and (2) a sentinel well to monitor potential downgradient MTBE migration. Since remediation of the regional aquifer may or may not be necessary based on the results of the investigation, the corrective measures evaluation for MTBE in the regional aquifer may be affected by the results of the investigation. Include a discussion of the potential outcome of the investigation as it is related to corrective measures evaluation for the regional aquifer in the revised Report.

Comment 3

In Section 2.1, *Site Description,* page 2-1, the Permittee states, "Figure 2 shows the site plan of the former TSA [petroleum/oil/lubricants (POL)] Station and surrounding area." Figure 2,

SWMU 197 Site Plan, does not identify the former TSA POL Station. Identify the station in the revised figure. Additionally, Table 1, *Historical Soil Results, July 2016,* lists analytical results collected from boring SB024. However, Figure 2 does not present the location of boring SB024. Include all relevant information in Figure 2 and revise the figure accordingly.

Comment 4

In Section 2.3.3, *2004 Soil and Groundwater Investigation (BAE 2004)*, page 2-4, the Permittee states, "[t]wo regional groundwater monitoring wells were planned for installation; however, the boring for HMW-51, which was to be installed in the source area, was abandoned during drilling to prevent potential cross-contamination from the upper saturated zones to the regional groundwater. Therefore, well HMW-51 was not installed." When an appropriate well installation method is used, cross-contamination is unlikely to occur. Currently, there are no regional groundwater monitoring wells in the source area. Additionally, all 14 existing perched groundwater monitoring wells advanced in the source area are proposed to be abandoned as a result of soil excavation. Regardless, both regional and perched groundwater monitoring wells are required in the source area to monitor groundwater conditions after soil remediation activities are complete. In the revised Report, include a provision to install regional and perched groundwater monitoring wells in the source area to monitor groundwater quality in both the regional and perched aquifers once soil remediation activities are complete.

Comment 5

In Section 2.3.4, *HELSTF Status Report Sampling, March 2011*, page 2-5, the Permittee states, "[h]ydraulic testing was conducted to further develop the understanding of the hydrogeologic conditions. Results from the tests indicated that little or no hydraulic connectivity exists between wells screened in the shallow saturated soil, further supporting the conclusion that lateral groundwater flow within the perched groundwater zone is very limited. Therefore, elevated MTBE results in well HMW-52 may be due to a leaking well casing." According to the April 2009 slug test results, when slugs were placed in the wells screened to the regional aquifer, no response was observed in any of wells screened to the regional or perched aquifer. Similarly, when slugs were placed in the wells screened to the perched aquifer, with one exception, no response was observed in any of the wells. A very slight response was observed in well HVW-10 when the slug was placed in well HVW-05, which was only five feet away.

The screened intervals of the regional groundwater wells ranged from 85 to 105 feet below ground surface (bgs) while the screened intervals of the perched groundwater wells were set above 50 feet bgs. These intervals are vertically set too far apart to observe any potential response; therefore, the test would not be appropriate for verification of subtle hydraulic connectivity between the aquifers. The Permittee must not draw any conclusions regarding hydraulic connectivity based on the results of the tests. Remove the entire discussion related to corrective measures evaluation for the regional aquifer from the revised Report (see Comment 2).

Comment 6

In Section 2.3.5, *2019 Interim Measures Report (WSMR 2019)*, page 2-6, the Permittee states, "[o]f the 20 wells gauged semiannually, LNAPL was observed in two wells (HVW-03 and HVW-05) between February 2016 and June 2018 at thicknesses ranging from 0.38 ft to 0.01 ft in HVW-05 and from 0.23 ft to 0.1 ft in well HVW-03. None of the other 18 wells contained LNAPL during this time period, and LNAPL has not been observed in any regional aquifer well since well gauging began in 2002." According to Table 4, *Historical Monitoring Well Gauging Data,* LNAPL was previously observed in wells HSVW-04, HVW-01, 04, 08, and 10. Revise the statement for accuracy.

Comment 7

In Section 2.3.5.2, *Interim Measure Soil Vapor Extraction – August 2016 to June 2018*, page 2-7, the Permittee states, "[t]he SVE system began operation on 16 August 2016 and ended in June 2018. TPH-GRO concentrations in SVE influent decreased from 8,600 µg/L to 200 µg/L during this time frame— a 97.6 percent reduction. BTEX concentrations in SVE influent decreased from 509.3 µg/L in August 2016 to 2.4 µg/L in June 2018, a 99.5 percent reduction." NMED notes that the SVE influent concentrations were reported in micrograms per liter, which is not appropriate for air/gaseous media. Although the statement is true, it is misleading. Comment 11 in NMED's April 12, 2019 *Disapproval* states, "Table 9, *LNAPL Thickness*, indicates that LNAPL was still present in the perched aquifer (HVW-03 and HSVW-1) when the SVE system was dismantled on June 29, 2018." The SVE system did not fully abate LNAPL at the site and contamination still remains. Note that the presence of residual contamination prompted the Permittee to evaluate corrective measures for the site. Revise the statement for clarity.

Comment 8

In Section 2.3.5.2, *Interim Measure Soil Vapor Extraction – August 2016 to June 2018*, page 2-7, the Permittee states, "[t]he coarse-grained soil in the upper 20 ft was successfully remediated by the SVE system operated in 2000, while soil vapor levels increased in the 30 to 35 ft range." According to Table 1, *Historical Soil Results, July 2016,* the TPH-GRO concentration in the soil sample collected from boring HSVW-01 at a depth between 21.5 and 22 feet bgs is recorded as 1,500,000 µg/kg, exceeding applicable screening level of 100,000 µg/kg. No soil samples were collected from boring HSVW-01 at depths between seven and 21.5 feet bgs. The presence or absence of contamination was not investigated at that depth interval; therefore, a data gap exists. Revise the statement for accuracy.

Comment 9

In Section 2.3.5.2, *Interim Measure Soil Vapor Extraction – August 2016 to June 2018*, page 2-7, the Permittee states, "[b]ecause the upper 10 ft of affected soil (the depth considered for direct human exposure) has already been remediated to concentrations below cleanup levels, no further SVE has been deemed warranted. On 29 June 2018, the SVE system was dismantled, removed, and shipped to a storage facility in Albuquerque, New Mexico." The statement is misleading. The SVE system, dismantled in June 2018, was not implemented to remediate the

upper 10 feet of affected soil. It was implemented to remediate elevated contaminant levels in the 30 to 35 feet bgs range. It was dismantled without the concurrence of NMED before the contamination was adequately remediated. Revise the statement for accuracy.

Comment 10
In Section 3.2.1.1, *Regional Aquifer*, page 3-1, the Permittee states, "[g]roundwater studies conducted at HELSTF have documented the regional aquifer at approximately 70 ft bgs." According to Table 4, depths to groundwater measured in the wells advanced to the regional aquifers are recorded at approximately 90 feet bgs. Correct the discrepancy in the revised Report.

Comment 11
Section 3.2.1.2, *Perched Aquifer*, pages 3-1 and 3-2, does not discuss the source of groundwater in the perched aquifer. Describe the source of the recharge. Provide the discussion in the revised Report.

Comment 12
In Section 4, *Potential Receptors,* page 4-1, the Permittee states, "[i]t was determined that the site complies with exclusion requirements following New Mexico soil screening guidance for ecological risk assessment (Appendix B of NMED 2017); therefore, no ecological risk assessment was necessary." The rationale for compliance with the ecological exclusion criteria must be discussed in the revised Report. In addition, the potential for further migration of contaminants from soil to the regional aquifer remains at the site. Whether or not the groundwater is used for irrigation or as a drinking water source, the regional aquifer must meet the cleanup levels required by the Permit. Clarify that the regional aquifer is the receptor to be protected in the revised Report.

Comment 13
In Section 4.2, *Pathways and Receptors,* page 4-2, the Permittee states, "[a]dditionally, groundwater is also a potential source for vapors that may intrude into indoor air through vapor intrusion." Explain whether indoor air quality and/or vapor intrusion was previously investigated at the site in the revised Report. If previously investigated, discuss the results of the investigation in the revised Report.

Comment 14
In Section 5, *Regulatory Criteria,* page 5-1, the Permittee states, "[n]ote that no soil or groundwater use [sic] criteria exist for GRO. See Tables 6 and 7." Table 6, *Soil Monitoring Regulatory Criteria,* presents applicable soil screening level for TPH-GRO as 100 mg/kg. Table 7, *Groundwater Monitoring Regulatory Criteria,* presents applicable groundwater screening level for TPH-GRO as 10.1 ug/L. These TPH-GRO screening levels are referenced from NMED's *Risk Assessment Guidance for Site Investigations and Remediation* (Guidance), dated February 2019.

The Permittee must cite the screening levels from the Guidance. These TPH-GRO screening levels must be used in all future investigations at the site. Revise the Report accordingly.

Comment 15
In Section 6.1.1, *[Soil Remedies] Soil Excavation and Landfarming,* page 6-1, the Permittee states, "[t]he proposed soil excavation extent is shown in Figure 15a." The figure shows the proposed excavation extent; however, the data and discussion that justify the extent is not included in the Report. Revise the Report to include the discussion.

Comment 16
In Section 6.1.1, *[Soil Remedies] Soil Excavation and Landfarming,* page 6-1, the Permittee states, "[g]eologic cross-sections showing the lithology beneath the site in the area of the proposed excavation are shown in Figures 15b through 15d." The boring logs used to generate the figures were not included in the Report. Include the boring logs that were used to generate the figures in an appendix of the revised Report.

Comment 17
In Section 6.1.1, *[Soil Remedies] Soil Excavation and Landfarming,* page 6-1, the Permittee states, "[a]n estimated volume of 4,200 cubic yards of contaminated soil will be removed if this alternative is selected." Provide an explanation for how the estimated excavation volume is calculated. Also, indicate the area(s) where maximum excavation depth (30 feet bgs) is anticipated in a new figure or revised Figure 15a. In order to reach the maximum excavation depth, presumably excavation needs to be staged in sequence. In the revised Report, provide figures that present various stages of excavation and information regarding the frequency and locations of confirmation sampling.

Comment 18
In Section 6.1.1, *[Soil Remedies] Soil Excavation and Landfarming,* page 6-1, the Permittee states, "[t]he lined surface will consist of 30-millimeter polyethylene sheeting and will be constructed such that rainfall runoff can be collected and pumped to an onsite storage container for characterization and disposal." The soils contained in polyethylene sheeting may contain a high level of gasoline constituents. Therefore, the proposed sheeting material may not be compatible for landfarming purposes. A composite liner (polar and non-polar materials) may be more appropriate to prevent gasoline constituents from diffusing through it. Provide a justification regarding the compatibility of polyethylene sheeting and gasoline constituents or propose to use a composite liner to address the issue in the revised Report.

Comment 19
In Section 6.1.3, *[Soil Remedies] Soil Electrical Resistance Heating,* pages 6-1 and 6-2, the Permittee states, "[t]he third and final proposed treatment option for corrective measures evaluation is Electrical Resistance Heating," and "[s]team and contaminant vapors produced by this heating are captured by subsurface vapor extraction and treatment systems and are

conveyed to the surface and treated for permitted discharge." Provide information regarding the lateral and vertical extent of influence (e.g., treatment boundary) where electrical resistance heating (ERH) and subsurface vapor extraction systems are used to remediate soils and groundwater in the revised Report. Provide a figure that depicts the extent in the revised Report.

Comment 20

Section 6.1, *Soil Remedies,* pages 6-1 and 6-2, evaluates two remedial alternatives (excavation and electrical resistance heating) for proposed soil remediation. In addition to the proposed alternatives, evaluate the viability of in-situ thermal technology based on smoldering combustion. The smoldering combustion technology may be capable of treating contamination in both the perched aquifer and the soils above. It may be comparable to ERH. Include a discussion in the revised Report.

Comment 21

In Section 7.2.1, *[Technical Practicability] Soil Remedy,* page 7-2, the Permittee states, "[a]s the excavation nears its endpoint, confirmation soil testing can occur onsite through field measurement of soil vapor (i.e., PID data) or through field testing of soil samples for petroleum hydrocarbons." The PID may be used as a method for field screening; however, the results obtained from the field screening cannot be used as confirmation sampling results. Discrete confirmation samples must be collected for laboratory analysis where the highest PID readings (or other field screening evidence) are recorded. In addition, frequency of confirmation sample collection (e.g., number of samples per unit area) must be discussed. Revise the Report accordingly.

Comment 22

In Section 7.2.1, *[Technical Practicability] Soil Remedy,* page 7-2, the Permittee states, "[p]rohibiting entry of site personnel into the open excavation after 4 ft of depth will ensure that safety is maintained." The maximum depth to be excavated is proposed as 30 feet bgs. In the revised Report, explain how confirmation samples are collected from depths of more than four feet without personnel entering the excavation. Propose to use a less steep slope for the sides of excavation in order for personnel to be able to enter and collect confirmation samples, if necessary.

Comment 23

In Section 7.3.2, *[Effectiveness] Perched Groundwater Remedies,* page 7-4, the Permittee states, "it is estimated that at least 2 years of groundwater monitoring will be required post-application in order to determine the efficacy of this treatment." The proposed treatment requires installation of 110 and 960 injection points for BOS-200® and PetroFix™, respectively. The Permittee states that it takes at least two years of groundwater monitoring to evaluate the efficacy of the treatment despite enormous efforts involved with the implementation of the technology. The proposed ISEB does not appear to be as effective as other potential

alternatives (see Comment 1). Alternative technologies for the perched aquifer remediation must thoroughly be evaluated in the revised Report.

Comment 24
Section 9, *Design Criteria to Meet Cleanup Objectives,* starts with page number 9-2. If there is a missing page (page 9-1), include the page in the revised Report; otherwise, correct the typographical error in the revised Report.

Comment 25
In Section 9.1, *[Design Criteria to Meet Cleanup Objectives] Soil Remedy,* page 9-2, the Permittee states, "[i]t is estimated that approximately 1 month will be necessary to set up onsite, which will consist of placement of 35 borings for electrode placement throughout the site." Provide a figure showing the locations where the 35 borings for electrodes are proposed to be installed and indicate the proposed depths of the borings in the revised Report.

Comment 26
Table 7, *Groundwater Monitoring Regulatory Criteria,* contains a typographical error. The analytical parameter listed as TPH-GRO Soil is incorrect. The correct analytical parameter is TPH-GRO Groundwater. Revise the table for correction.

Comment 27
Figure 11, *Estimated Extent of Benzene in Perched Groundwater – October 2019,* depicts benzene isoconcentration contours. Based on the benzene levels shown on Figure 11, the areas where biological amendments are injected were estimated and presented in Figure 16, *BOS-200 Amendment Locations*, and Figure 17, *PetroFix™, Amendment Locations*. However, the accuracy of the benzene isoconcentration contours is questionable because there are not sufficient wells to determine distribution of benzene in perched groundwater. Since the areas of injection are determined based on the contours, the contours must be accurate enough to achieve an effective remedy. The contours appear to be drawn in the absence of pertinent perched wells (west and north of well HMW-67). The plume could extend farther to the west based on the groundwater flow direction, as presented in Figure 9, *Potentiometric Surface Elevations, Perched Groundwater September 2019*. Propose to submit a work plan to advance perched groundwater monitoring wells west and north of well HMW-67 in order to investigate the extent of benzene contamination.

Comment 28
Figure 12, *Estimated Extent of MTBE in Perched Groundwater – October 2019,* depicts MTBE isoconcentration contours. The contours appear to be drawn in the absence of pertinent perched groundwater monitoring wells (south of HMW-70). Propose to submit a work plan to install a perched groundwater monitoring well south of well HMW-70 in order to investigate the extent of MTBE contamination.

Comment 29

Appendix B, *Feasibility Study Report – Electrical Resistance Heating,* indicates that the proposed treatment volume is 2,587 cubic yards using electrical resistance heating (ERH), which is notably smaller than that of excavation (4,200 cubic yards). Provide an explanation for the discrepancy in the revised Report. Additionally, since ERH is capable of remediating the perched aquifer including LNAPL, ERH must also be evaluated for remediation of both the perched aquifer and the overlying soils. Include the evaluation in the revised Report (see Comment 1).