NEW MEXICO ENVIRONMENT DEPARTMENT

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

April 15, 2015

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RE: DISAPPROVAL
FORT WINGATE DEPOT ACTIVITY TNT LEACHING BED SOIL BORING TEST RESULTS AND DEVELOPMENT OF SITE-SPECIFIC DILUTION ATTENUATION FACTORS
FORT WINGATE DEPOT ACTIVITY, NEW MEXICO
EPA ID# NM6213820974
FWDA-14-008

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) has reviewed the Department of the Army's (Permittee) *TNT Leaching Bed Soil Boring Test Results and Development of Site-Specific Dilution Attenuation Factors,* (Supplemental Report), dated October 2014. Based on the information presented, NMED hereby issues this Disapproval with the following comments.

GENERAL COMMENTS:

1. General Comment. It is not clear whether adequate groundwater monitoring is in place or will be proposed near the TNT leaching beds. Since there is subsurface contamination, groundwater monitoring must be considered. Revise Section 1 of the Report to include a summary of the current groundwater monitoring network specific to the TNT beds and state if monitoring is conducted directly below and down-gradient of the site.

2. Permittee Statement: Section 2. Analytical Chemistry Results from the Geoprobe™ Sampling Effort, page 1-3. "Results of chemical analysis of samples collected from the Geoprobe™ investigation were compared to the New Mexico Environment Department (NMED) SSLs (NMED 2012) or EPA Regional Screening Level (RSL). [..]. If a chemical constituent SSL was not found in the NMED Risk Assessment Guidance for Investigations and Remediation (updated 2012), USACE used the most current version of the U.S. Environmental Protection Agency (EPA) RSLs (USEPA 2014). Table 1 provides residential soil exposure SSLs (NMED 2012) and RSLs (USEPA 2014) for chemical constituents detected in soil samples collected during March/April 2014."

NMED Comment:
The New Mexico Environment Department (NMED) values are based on a carcinogenic target risk of 1E-05 and a hazard quotient of 1 while the RSLs are based on a carcinogenic target risk of 1E-06 and a hazard quotient of 0.1. It is not clear that the screening criteria from the two cited sources are presented consistently. A cursory review of the RSLs listed in Table 1 indicates some values appear to have been adjusted to a hazard quotient of 1 while others ae based on a hazard quotient of 0.1. Revise the screening criteria listed in Table 1 so that both the 2012 NMED values and the US EPA RSLs are presented consistently and ensure each value is based on a target carcinogenic risk of 1E-05 and/or a hazard quotient of 1.

It is noted that the applied RSLs are based on revised exposure parameter values recommended by US EPA in the *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120,* dated February 2014. As such, exposure assumptions in the RSLs compared to the NMED screening levels are not consistent and in fact, the RSLs are slightly less conservative. However, the NMED screening levels have been updated and the 2014 values incorporate the revised exposure factors. Since the intent of this report is for estimating soil removal volumes, modifying the RSLs for consistency with the NMED screening levels will likely not result in significant changes to the volume estimates.

3. Permittee Statement: Section 4. Interpretation of Chemical Analytical Results, page 8, Section 6. Conclusion and Recommendation, page 16. "The quantities listed above do not account for cumulative risk. Cumulative risk factors may increase the quantity of excavated material. Cumulative risk will be evaluated by the contractor selected to execute this Interim Measure in accordance with the New Mexico Environment Department, Risk Assessment Guidance for Site Investigations and Remediation (NMED 2012)."

"USACE has contracted with Zapata, Inc. to excavate the TNT Leaching Beds to a depth that will eliminate the residential risk pathway. This will be done by excavating the leaching beds until 1) explosive constituent concentrations are below the NMED SSLs or USEPA RSLs (which ever applies), 2) remaining soil does not present a cumulative health risk, or 3) remove soil to a depth of 10-ft bgs. At least 19, 073 cubic yards of soil will be excavated to meet this objective."

NMED Comment:
NMED agrees that cumulative risk must be evaluated during the course of the removal action to ensure that any unacceptable cumulative risk is eliminated. However, it is unclear whether the soil-to-groundwater migration pathway evaluation is being considered. If it is determined that subsurface soil below 10 ft bgs includes concentrations of explosives that pose a threat to groundwater, the removal action must be modified. Revise the text to clarify whether the soil-to-groundwater migration pathway evaluation will be considered in addition to cumulative risk.

4. Permittee Statement. Section 5. Site-Specific Dilution Attenuation Factors for Groundwater Protection, page 15 and 16. "Several assumptions are made in order to use the dilution attenuation factor (DAF) model. Two of these were determined not to apply for the TNT Leaching Beds. These are: 1) the chemical source is infinite and a constant concentration maintained for the duration of the exposure period, and 2) contamination is uniformly distributed from the surface to the water table. Primarily, we have determined through rigorous sampling that contamination is not uniformly distributed throughout the TNT Leaching Beds."

"The DAF model assumes that there is uniformly distributed contamination. It is not, and the DAF model cannot be applied to calculate a reliable SSL [soil screening level] for protection of groundwater." Further, the report states that other methods and models "will be proposed to NMED before the execution of the Interim Measures (IM)."

NMED Comment:
Review of Sections 4.1 and 4.2 of the Risk Assessment Guidance for Investigations and Remediation, Volume I dated 2012 indicates that the assumptions cited by Fort Wingate Depot Activity (FWDA) apply to the SSL model. For clarity, the Report text must be modified to refer to the SSL model rather than the DAF model.

Note that the SSL model presented in the 2012 NMED document is based on the soil-to-groundwater methodology in US EPA's Soil Screening Guidance: Technical Background Document dated 1996 and the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites dated 2002. While the two assumptions regarding the SSL model noted by FWDA do not strictly agree with conditions at the TNT Leaching Beds, the NMED SSL model represents a conservative approach for estimating an initial SSL for groundwater protection. As stated in the 1996 Soil Screening Guidance: Technical Background Document, "[a]lthough simplified, the SSL methodology... is theoretically and operationally consistent with the more sophisticated investigation and modeling efforts that are conducted to develop soil cleanup goals and cleanup levels for protection of ground water at...sites. The early use of the methodology at a site will help focus further subsurface investigations on areas of true concern with respect to ground water quality and will provide information on soil characteristics, aquifer characteristics, and chemical properties that can be built upon as a site evaluation progresses." As such, NMED supports the SSL model as the appropriate choice for the initial assessment of the soil-to-groundwater migration pathway at the TNT Leaching Beds.

For clarity, revise the Report to refer to the SSL model rather than the DAF model. In addition, revise the text as appropriate to indicate the site-specific dilution factors developed for the TNT Leaching Beds presented in Section 5 will be used to estimate unit-specific SSLs and develop the SSLs. List the resulting SSLs for the TNT Leaching Beds in a table similar to Table 7 in Section 5. These SSLs should be used in the subsequent initial evaluation of protection of groundwater at the leaching beds to determine if a need for further evaluation of the protection of groundwater pathway exists.

5. Permittee Statement: Section 5. Site-Specific Dilution Attenuation Factors for Groundwater Protection, page 12. "Two methods were used. For most of FWDA, USACE relied on the Chloride Mass Balance (CMB) method. [..]." "ERDC and USACE used the USFS data to estimate an average annual recharge rate for topographically flat areas of FWDA (Zakikhani 2014).

NMEDs Comment:
Two DAF calculations are presented in this Report: one for the TNT leaching beds and another for topographic flat areas that do not collect water. The DAF for the TNT leaching beds was intended to be utilized for a soil-to-groundwater evaluation for the TNT leaching beds. However, it is not clear what the intended application is for the topographic flat areas DAF and SSLs. Clarify what the intended application is for the DAF and corresponding SSLs for topographic flat areas. Provide a figure that delineates the areas where the two site-specific DAFs apply.

6. Permittee Statement: Section 5. Site-Specific Dilution Attenuation Factors for Groundwater Protection, page 13. "[s]ite-specific DAF for Topographical Flat Areas (areas that do not collect and pond water). The resulting Site-Specific DAF = 529.03." "[s]ite-specific DAF for the TNT Leaching Bed (northern bed). The resulting Site-Specific DAF = 14.02 to 16.78."

NMED Comment:
The two DAFs presented in this report are significantly different. It was noted that the recharge rates for the TNT leaching beds estimated by the Hydrus model (Appendix B) were significantly different than the recharge rates for topographic flat areas measured by utilizing the chloride mass balance approach (Appendix D). Provide a discussion on the possible uncertainties related to these different methods for estimating recharge rates. The discussion must present the reasons for the differences in the DAFs and indicate how closely the calculated DAFs resemble site conditions.

7. Permittee Statement - Conclusions and Recommendation, page 16 and Appendix E, Borehole Soil Log. "Geotechnical data, historical atmospheric data, and historical operations information for FWDA were used to estimate an annual average recharge rate through the TNT leaching Beds."

NMED Comment:
Lithological data provided in Appendix E demonstrates that indirect field methods were utilized during the geologic investigations. For example, soil drill cuttings were used in classifying the 2012 lithological data. Indirect methods of geologic investigation such as geophysical studies may be used to plan and augment direct field methods, but should not be used as a substitute for soil classification. In addition, boreholes must be spaced closely enough so that accurate cross-section(s) can be constructed.

Samples must be collected from boreholes at all observed or suspected changes in lithology. The deepest borehole drilled at the site must be continuously sampled. For boreholes that will be completed as monitoring wells, at least one sample must be collected from the interval that will correspond to the screened interval or open (uncased) interval. All borehole samples must be collected with a Shelby tube, split barrel sampler, rock corer, or other appropriate device. In addition, geotechnical data for historical samples and the standard Atterberg limits for soil classification appear to be limited. Provide any geotechnical data for the historical borings that was used in these analyses.

Specific Comments

8. Permittee Statement – Section 2, Table 1, Residential Soil Exposure SSLs and RSLs for Detected Chemical Constituents, page 3. 1, 3, 5-trinitrobenzene (2.2E+2 milligrams per kilogram, mg/kg) and 1, 3-dinitrobenzene (6.1E-1 mg/kg).

NMED Comment:
The residential soil screening levels (SSLs) listed for 1, 3, 5-trinitrobenzene (2.2E+2 milligrams per kilogram, mg/kg) and 1, 3-dinitrobenzene (6.1E-1 mg/kg) are inconsistent with the US EPA's May 2014 Regional Screening Levels (RSL) of 2.2E+3 mg/kg and 6.2 mg/kg, respectively. Revise, Table 1 to display the correct values for 1, 3, 5-trinitrobenzene and 1, 3-dinitrobenzene. The discrepancy may be a result of RSLs based on a target hazard quotient of 0.1 rather than 1. Review all entries in Table 1 and ensure all values are expressed on a consistent basis, including target risk, target hazard quotient, and exposure parameter values. (See Comment 2)

9. Permittee Statement – Section 3. Hollow-Stem Auger Sampling, page 5, "Samples collected from the Hollow Stem Auger (HSA) were also tested for geotechnical and physical parameters. Parameter tests included total organic carbon (TOC), grain size distribution, and soil moisture. The average grain size distribution is that of a loamy soil. Gravimetric soil moisture content averaged 10.7%. The TOC averaged 8404 mg/Kg. A summary of these results are in Table 4."

NMED Comment:
Appendix D includes Atterberg Limits data for the HSA boreholes. The Atterberg Test was completed but left out of the explanation of test conducted for the HSA samples. Revise Section 3 of the Report to include the Atterberg Test in the description.

10. Permittee Statement - Appendix B. 2-D Hydrus Model Report. "The SSL for each Constituent of Potential Concern (COPC) must be determined using the New Mexico

Environment Department (NMED) – Hazardous Waste Bureau (HWB) method for estimating groundwater contamination from leaching through the vadose zone (NMED 2006)."

NMED Comment:
The 2006 version of NMED's *Risk Assessment Guidance for Site Investigations and Remediation* was referenced in Appendix B. The Permittee must use the most recent 2012 version available at the time this report was written. The equations referenced in Appendix B are the same as those listed in 2012 NMED document and results would not be affected. However, update the document reference in Appendix B to the more recent 2012 version of the guidance.

11. Permittee Statement - Section 5. Site-Specific Dilution Attenuation Factors for Groundwater Protection, page 12. "For the purpose of this report infiltration is equal to the recharge rate cited in the CMB report, and equation 1 (page 13) was used to develop a site-specific DAF."

NMED Comment:
Provide further justification for the use of the recharge rate as the input value for the infiltration rate. This justification must include references to documents supporting this assumption (e.g., *Soil Screening Guidance: Technical Background Document*). Explain why the assumption that the recharge rate is equivalent to the infiltration rate is appropriate for the site.

12. Permittee Statement - Section 5. Site-Specific Dilution Attenuation Factors for Groundwater Protection, page 13. "The following are site-specific DAFs.
Site-Specific DAF for Topographical Flat Areas (areas that do not collect and pond water)
K = 0.0225 meters/day (m/d); = Silty Clay = 8.2125 m/year
i = 0.014377 (based on groundwater monitoring data)
I = 0.00001778 m/yr
L = 115 m (measured in Google Earth - length of the northern TNT leaching beds)
Da = 9.114 m (about 30 ft from the water table to the basal confining unit)
D(m) = 12.199963;
The resulting Site-Specific DAF = 529.03"

"Site-Specific DAF for the TNT Leaching Bed (northern bed)
K = 0.25 (m/d); = loam = 91.25 (m/yr)
i = 0.014377 (based on groundwater monitoring data)
I = 0.0066 to 0.0080 m/yr
L = 115 m (measured in Google Earth - length of the northern TNT leaching beds)
Da = 9.114 m (about 30 ft from the water table to the basal confining unit)
D(m) = 12.7319397
The resulting Site-Specific DAF = 14.02 to 16.78"

NMED Comment:
The calculated DAF values for topographically flat areas and the TNT leaching beds could not be duplicated utilizing the values and equations provided. Provide the calculation spreadsheets utilized to calculate the site-specific DAFs as appendices in the revised Report.

13. Permittee Statement - Section 5, Table 6. Site-Specific SSL Parameter Input for Groundwater, page 15 and Appendix B. Discussion. "This table only presents parameter input data for silty clay soil, Source: NMED 2012."

"The loam soil texture, which is by far the most important site descriptor affecting recharge rate, is well known for the former leaching beds since multiple soil core borings were sampled for grain size distribution yielding soil texture."

NMED Comment:
The calculation of the SSL for protection of groundwater assumed a soil type of loam as discussed in Appendix B. However, it was noted that the soil quality parameters listed in Table 6 (such as water-filled soil porosity, air-filled soil porosity, total soil porosity, soil particle density, and dry soil bulk density) are based on a soil type of silty clay. Revise the Report to include a table similar to Table 6 of the soil quality parameters for the soil type (loam) used in calculating the SSLs for protection of groundwater at the TNT leaching beds.

14. Permittee Statement - Section 5, Table 7. Example Site-Specific SSLs for Groundwater Protection, page 16. Table 7 lists: RDX, Nitrate, 2, 4-DNT, HMX, NB and TNT.

NMED Comment:
Table 7 lists the SSLs for groundwater protection for topographically flat areas. The table only lists SSLs for 6 of the 12 constituents identified in Table 2. Modify Table 7 to include SSLs for all 12 constituents evaluated for topographically flat areas. In addition, include, the calculated SSLs based on the site-specific dilution factors developed for the TNT leaching beds.

15. Permittee Statement - Section 5. Site-Specific Dilution Attenuation Factors for Groundwater Protection, page 15. "The results of these samples show constituent concentrations are not laterally or vertically uniform." [...] "The boreholes containing elevated RDX, TNT, and/or explosive constituents, have concentrations decrease with depth. There are only a small number of boreholes that do not fit this pattern."

NMED Comment:
Provide additional information on the boreholes which do not have concentrations that decrease with depth. Provide a discussion on potential infiltration pathways and whether the vertical extent of contamination is defined.

16. Permittee Statement: Section 5. Site-Specific Dilution Attenuation Factors for Groundwater Protection, page 14. "Site-specific parameters were used in equation 2 and are

based on FWDA drilling log soil descriptions; including USGS investigations (refer to the CMB report in Appendix D). The majority of subsurface soils are fine grained and were classified as silty clay for determining site-specific SSLs for groundwater."

NMED Comment:
The CMB report was located in Appendix C electric copy. The order listed on the electric copy is Appendices A, B, C, C, E. Correct the references. Also, it appears that the samples referenced were analyzed for grain size and TOC. Soil Classification is normally conducted by analyzing the sample for grain size and Atterberg Limits. Provide an explanation for only using grain size analysis for soil classification for cohesive soils. (See General Comment 7).

The Permittee must submit a revised Report to address all comments contained in this Disapproval. In addition, the Permittee must include a response letter that details where each comment was addressed, cross-referencing NMED's numbered comments. The Permittee must also submit an electronic redline-strikeout version of the revised Plan. The revised Plan must be submitted on or before **June 29, 2015**.

If you have any questions regarding this letter, please contact Vicky Baca at (505) 476-6059.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: Dave Cobrain, NMED, HWB
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