



DEPARTMENT OF THE ARMY  
FORT WINGATE DEPOT ACTIVITY  
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December 22, 2017

Mr. John Kieling  
Chief, Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, New Mexico 87505-6303

RE: Response to March 29, 2017 Disapproval Letter  
Final Permittee-Initiated Interim Measures Report, Parcel 16  
Fort Wingate Depot Activity, McKinley County, NM  
EPA #NM6213820974  
HWB-FWDA-16-010

Dear Mr. Kieling:

This letter presents our response to your comments presented in the Disapproval Letter dated March 29, 2017 regarding the Final *Permittee-Initiated Interim Measures Report, Parcel 16* for the Fort Wingate Depot Activity (FWDA) under RCRA Permit USEPA ID No. NM6213820974 (October 5, 2016). The report has been revised to address each comment as described below and is being submitted under separate cover as *Final Permittee-Initiated Interim Measures Report, Parcel 16, Revision 1.0*, December 22, 2017. The revised report describes the removal activities at Parcel 16 FWDA, McKinley County, New Mexico and is being submitted concurrently for tribal and regulatory review.

In responding to the disapproval comments, email correspondence between the Army and the NMED occurred on several occasions. Copies of the correspondence between the Army and NMED, the disapproval letter and a copy of this response letter are included within Appendix A of the revised report.

**NMED Comment 1: Section 4.8 Risk Evaluation, p 4-3**

The risk evaluation for Area of Concern (AOC) 41 - Igloo Block K does not address potential ecological risk. While an evaluation may not be required for this site, the Permittee must provide a discussion of ecological risk and justification that an ecological risk assessment is not required, if so determined. Revise the Report to include this discussion.

***Army Response:***

*The report was revised to include a discussion of ecological risk. The text of Section 4.8 was revised to indicate that an ecological risk evaluation was conducted, and new Section 4.8.1, called "Preliminary Exposure Pathway Analysis" was added to provide a place to present the rationale for not further evaluating ecological receptors at AOC 41 (Igloo Block K).*

*New text in Section 4.8 reads as follows: "The ecological risk evaluation, also as described in Section 2.2, considers the potential for adverse effects to representative categories of ecological receptors exposed to COPECs in soil through direct contact, as specified in NMED risk guidance (July 2015) in effect at the time of the field data collection effort (September and October 2015).*

The cleanup levels presented are consistent with the requirements of Attachment 7 of the FWDA RCRA Permit USEPA ID No. NM6213820974 (December 2005, Revised February 2015). The Permit requires that cleanup levels be used that are consistent with NMED's methodology for establishing ecological screening levels. In 2015, the NMED risk guidance included a volume specific to ecological risk evaluation and the screening levels published by NMED in this guidance were selected:

- NMED Ecological Risk ESLs presented in Volume II of Risk Assessment Guidance for Site Investigations and Remediation (July 2015).

The risk threshold used to evaluate cumulative risks to ecological receptors, as stated in NMED guidance (NMED, July 2015 – Volume 2, Section 3.5) is a cumulative HI of greater than 1.0. If the HI for any representative receptor category is above this target risk level, then there is a potential for adverse effects on ecological receptors and additional evaluation following the Tier 2 SLERA process is required.

A preliminary exposure pathway analysis is presented in the next section to identify those receptors with potentially complete exposure pathways to COPCs/COPECs in soils for which additional evaluation of potential risks was warranted. The remainder of the risk evaluation focuses on the receptors and exposure pathways where additional evaluation was warranted.”

New Section 4.8.1 text for the ecological receptor pathway analysis reads as follows: “The ecological exposure pathway analysis begins by evaluating six groups of representative receptors identified in NMED risk guidance (July 2015): (1) plants, (2) deer mouse, (3) horned lark; (4) kit fox, (5) red-tailed hawk, (6) prong-horned antelope. The exposure pathway analysis serves to focus the evaluation on only those receptors for which the pathway is potentially complete. For these representative receptors, such factors as: (a) the small size of the contaminated areas requiring removal action, and (b) the spatial separation of these areas are the major lines-of-evidence to support no further evaluation of a particular ecological receptor group.

At AOC 41 - Igloo Block K, each igloo drain removal encompassed approximately 0.0000459 acres (2 square feet maximum), each igloo drain is non-contiguous with any other igloo drain, and each area is viewed as a separate exposure point. Based upon these parameters, the three large home range receptors can be eliminated from further evaluation: (1) kit fox (only for sites greater than 267 acres), (2) red-tailed hawk (only for sites greater than 177 acres), and (3) prong-horned antelope (only for site greater than 342 acres).

NMED guidance requires shallow-rooted plants, the deer mouse and the horned lark to be evaluated in the 0-1 foot soil horizon, and deep-rooted plants in the 0-10 feet soil horizon at all sites. It also states that species of plants will not be evaluated separately but that the plant community will be evaluated as a whole.

The home range for the deer mouse (Equation 13, NMED July 2015) is 0.3 acres (13,068 square feet) and for the horned lark (Equation 14, NMED July 2015) is 4.0 acres (174,240 square feet). NMED risk guidance assumes that risks are negligible from exposure to COPECs at sites that are less than 10% of a receptor's home range. Since the contaminated areas comprise only 0.0153% of the deer mouse home range, and only 0.0011% of the horned lark home range the exposure pathway analysis shows that no further ecological risk evaluation is required for AOC 41 - Igloo Block K for the deer mouse and horned lark. Similarly, evaluation of plants is at the community level and not the individual plant level (NMED July 2015), so an impacted area of 2 square feet allows for no further evaluation of plants.”

**NMED Comment 2: Section 5.1, Previous Investigations, p 5-1**

The NMED SSL for 2,4,6-TNT is 36 mg/kg. Correct this error in the revised Report.

***Army Response***

*The value of 39.1 mg/kg was the NMED Residential SSL in effect at the time the RFI data were evaluated, and is used correctly the Previous Investigation section of this report. All confirmation sampling as part of the Permittee-Initiated Interim Removal Action were evaluated against the NMED 2015 Residential SSL of 36 mg/kg.*

**NMED Comment 3: Section 5.6, Risk Evaluation, p 5-3**

Ecological risks were not addressed for Solid Waste Management Unit (SWMU) 16 - ZI35-4 Open Storage Pad. Photos and diagrams of the area where removals were conducted indicate that the area of impact was approximately 0.17 acres and could be potential habitat for small game receptors. Per the NMED Soil Screening guidance, Tier 1 ecological screening is required for plants, a deer mouse, and a homed lark. Revise the Report to address ecological risks for this site.

***Army Response***

*The report was revised to include a discussion of ecological risk. The text of Section 5.6 was revised to indicate that an ecological risk evaluation was conducted, and new Section 5.6.1, called "Preliminary Exposure Pathway Analysis" was added to provide a place to present the Army's assessment of ecological exposure pathways, and the quantitative evaluation of plants, to minimize the need for changes to the remainder of the section.*

*New text in Section 5.6 reads as follows:* "The ecological risk evaluation, also as described in Section 2.2, considers the potential for adverse effects to representative categories of ecological receptors exposed to COPECs in soil through direct contact, as specified in NMED risk guidance in effect at the time of the field data collection effort (September and October 2015). The cleanup levels presented are consistent with the requirements of Attachment 7 of the FWDA RCRA Permit USEPA ID No. NM6213820974 (December 2005, Revised February 2015). The Permit requires that cleanup levels be used that are consistent with NMED's methodology for establishing ecological screening levels. In 2015, the NMED risk guidance included a volume specific to ecological risk evaluation and the screening levels published by NMED in this guidance were selected:

- *NMED Ecological Risk ESLs presented in Volume II of Risk Assessment Guidance for Site Investigations and Remediation (July 2015).*

*The risk threshold used to evaluate cumulative risks to ecological receptors, as stated in NMED guidance (NMED, July 2015 – Volume 2, Section 3.5) is a cumulative HI of less than 1.0. If the HI for any representative receptor category is above this target risk level, then there is a potential for adverse effects on ecological receptors and additional evaluation following the Tier 2 SLERA process is required.*

*A preliminary exposure pathway analysis is presented in the next section to identify those receptors with potentially complete exposure pathways to COPCs/COPECs in soils for which additional evaluation of potential risks was warranted. The remainder of the risk evaluation focuses on the receptors and exposure pathways where additional evaluation was warranted."*

*New Section 5.6.1 text for the ecological receptor pathway analysis reads as follows:*

*"The ecological exposure pathway analysis begins by considering six groups of representative receptors identified in NMED risk guidance (July 2015): (1) plants, (2) deer mouse, (3) horned lark; (4) kit fox, (5) red-tailed hawk, (6) prong-horned antelope. The exposure pathway analysis serves to focus the evaluation on only those receptors for which the pathway is potentially complete. For these representative receptors, such factors as: (a) the small size of the contaminated areas requiring removal action (b) the spatial separation of these areas, and (c) removal actions already completed are the major lines-of-evidence to support no further evaluation of a particular ecological receptor.*

*The contaminated area of SWMU 16 - Z135-4 Open Storage Pad is approximately 7,500 square feet. Based upon this area, three large home range receptors can be eliminated from further evaluation: (1) kit fox (only for sites greater than 267 acres), (2) red-tailed hawk (only for sites greater than 177 acres), and (3) prong-horned antelope (only for sites greater than 342 acres). NMED guidance requires plants (shallow rooted), the deer mouse and the horned lark to be evaluated for the 0-1 foot horizon at all sites, regardless of size, and deep rooted plants be evaluated for the 0-10 feet horizon at all sites. However, it also states that species of plants will not be evaluated separately but that the plant community will be evaluated as a whole.*

*The segment of the storage pad where the exceedance was noted is approximately 7,500 square feet (50 feet by 150 feet). The impacted area underwent surficial soil removal down to a depth of 1.5 feet and was restored to grade with clean fill. This removal and subsequent regrading establishes a clean exposure horizon for shallow-rooted plants, the deer mouse and the horned lark, leaving only deep-rooted plants as a potential receptor requiring further evaluation in native soils from 1.0 to 10 feet.*

*To evaluate potential adverse effects to plants, the analyte detections from 14 sidewall confirmation samples (collected at approximately 1 foot bgs) and from 8 bottom confirmation samples (collected from the base of the excavation between approximately 1.5 and 2 feet bgs) were reviewed and tabulated for screening against NMED Plant Tier 1 toxicity reference values (TRVs)/ecological screening levels (ESLs). Only one sidewall confirmation sample 1616Z135-4EC-09D-SO contained detectable concentrations of explosives. Table 5-1 presents the concentrations of TNT, 4-amino-2,6-dinitrotoluene and 2-amino-4,6-dinitrotoluene that were detected in sample 1616Z135-4EC-09D-SO. Explosives were not detected in 13 other sidewall samples, nor in any of the eight bottom samples collected below the base of the excavation. The Tier 1 Hazard Index (HI) was calculated by summing the Screening Level Quotients (SLHQs) for the three detected analytes. As Table 5-2 demonstrates, the overall HI for plants was  $3.8 \times 10^{-3}$ , which is less than the NMED risk threshold of 1.0. The confirmation samples demonstrate that source removal was successful, the nature and extent of explosives remaining in soil is defined, and that deeper sampling is not required to assess the exposure horizon for deep-rooted plants. No adverse effects on the plant community are predicted, and therefore, no further evaluation of plants is required at SWMU-16 - Z135-4."*

**NMED Comment 4 - Section 5.6, Risk Evaluation, p 5-3**

The Report does not address the soil-to-groundwater migration pathway. Given the minimal detects, it appears that sufficient soil has been removed and that there is no longer a source that could impact groundwater in the future. Regardless, the Permittee must address the soil-to-groundwater migration pathway and provide justification that an evaluation is not required. Revise the Report to address the soil-to-groundwater migration pathway.

## **Army Response**

The report was revised to include a discussion of the soil-to-groundwater pathway. The revisions incorporate subsequent conversations with NMED regarding justification for unlikely vertical migration that incorporate the soil types encountered at the site and the associated relatively low vertical hydraulic conductivity. NMED noted that another line of evidence that should be added is that the COPCs present at the site are relatively immobile based on their physical-chemical properties, and, combined with the lack of a liquid source (historical or present), would suggest that migration of residual levels of contamination is not anticipated.

NMED also suggested that FWDA should remove statements 1 and 3 (regarding mass removal and evaluation of residential contamination against human health risk thresholds) from the soil to groundwater pathway response because the human health risk SSLs are not related to soil to groundwater pathway evaluation. The Army disagrees that mass removal and the evaluation of residual contamination against human health risk thresholds does not contribute to the lines-of-evidence analysis for the soil-to-groundwater pathway. While not directly related, these facts provide insight into the success of the mass removal and residual contamination present that could potentially impact the soil to groundwater exposure pathway. These lines-of-evidence contribute to the overall conclusion and therefore remain in the responses and report.

Discussion of the soil-to-groundwater pathway is presented in new Section 5.6.1, called "Preliminary Exposure Pathway Analysis". In this section, the Army provides the lines of evidence to support that the soil-to-groundwater pathway is not complete.

The new text is as follows: "NMED risk guidance (July 2015) identifies three receptor types: (1) residential receptors, (2) commercial/industrial workers, and (3) construction workers. All three receptors have the potential to be present at SWMU 16 - Z135-4 Open Storage Pad, but none currently are present. The media of concern is soil and the COPCs include explosives. Potential exposure routes include dermal contact, incidental ingestion, inhalation of particulates/volatiles from soil, and the soil-to-groundwater pathway. This report documents a soil removal action, and the risk evaluation approach is based upon the source of contamination having been removed. The human health risk evaluation assesses direct contact with COPCs remaining in soil following the soil removal action for all three receptor types, but the Army does not believe the soil-to-groundwater pathway is complete, based upon the following lines-of-evidence:

1. *Contamination is Surficial:* Past activities at the SWMU 16 - Z135-4 Open Storage Pad were restricted to temporary storage of munitions and materials handling. The Open Storage Pad did not have any subsurface structures or conduits (e.g. piping, water supply, septic system/lagoon or other disposal mechanisms) that could contribute to the presence of analytes in deeper soil horizons. Sampling results have demonstrated that only surficial soils (3-12 inches) in a 50 feet by 150 feet area were impacted in open pad segment Z135-4. These soils were removed to a depth of 1.5 feet bgs and replaced to grade by clean soil
2. *Mass Removal:* The primary goal of the Permittee-Initiated Interim Measure (PIIM) work was to remove impacted soils and the primary source at SWMU 16 - Z135-4 Open Storage Pad to levels that demonstrate that risk thresholds for cancer risks (cumulative cancer risk less than  $1 \times 10^{-5}$ ) and non-cancer hazards (HI less than 1.0) are not exceeded. The source removal was accomplished such that explosives were not detected in confirmation samples from the bottom and sidewalls of the excavation, except at one sidewall sample location where three explosive analytes were detected at low, estimated (i.e. J-qualified), concentrations between the limit of quantitation and limit of detection. This demonstrates the source was removed and the cumulative cancer and non-cancer target thresholds were met.

3. *Lack of Liquid Source: The presence of a liquid source, natural or man-made is required to mobilize analytes. The lack of such a liquid source, either historical or current supports a conclusion that transport of low level residual analytes is not anticipated.*

4. *Lack of Vertical Migration: Vertical migration of low level residual concentrations is not anticipated due to:*

(a) *Confirmation Sampling Results: Explosives, RCRA 8 metals, perchlorate and semi-volatile organic compounds (SVOCs) were sampled for in the RFI (Toeroek, 2013). Analyses of soil during the RFI investigation showed 1 detection of TNT (720 mg/kg) in 1 incremental sample from 1 pad (Z135-4) above the SSL in effect at the time of the RFI investigation (39 mg/kg, NMED, 2012) in the 6-12 inch soil horizon. Since past use of this area could have included the storage of bulk propellants or explosives, this TNT exceedance in the incremental sample collected at Z135-4 in the 0-12 inch soil horizon has been attributed to a piece of TNT in the sample which became a disproportionate amount of the homogenous material analyzed as the outcome of the incremental grinding/sieving and handling process. Confirmation samples after completion of 18 inches of soil removal at SWMU-16-Z135B Open Storage Pad in 2015, showed only trace amounts of three COCs (2,4,6-trinitrotoluene (TNT), 2-amino-4,6-dinitrotoluene, and 4-amino-2,6-dinitrotoluene (all "J" qualified, Table 5-1) at one sidewall confirmation sampling location. The NMED residential SSL used at the time of this interim measure removal action (NMED, 2015) and the "J" qualified concentrations were:*

- *2,4,6-trinitrotoluene (TNT): SSL = 36 mg/kg, Reported Conc = 0.48 (J) mg/kg*
- *2-amino-4,6-dinitrotoluene: SSL= 150 mg/kg, Reported Conc = 0.024 mg/kg (J), and*
- *4-amino-2,6-dinitrotoluene: SSL = 150 mg/kg, Reported Conc = 0.042 mg/kg (J)*

*With only trace levels remaining, it is highly unlikely that any further vertical migration will occur.*

(b) *Mobility of COCs in Native Soils: Residual concentrations at the bottom of the excavation are in native silty clay loam soils (Toeroek, 2013), which show slow to moderately slow hydraulic conductivity (Natural Resources Conservation Service, 2005; Rawls et. al., 1982; Saxton and Rawls, 2006) supporting a lack of vertical migration.*

(c) *Prevailing Weather Patterns: Site conditions of low average precipitation, high evaporation rates and the depth to groundwater being 50-70 bgs further supports that analytes reaching groundwater is extremely unlikely.*

*Based upon these lines-of-evidence, the Army believes that the body of evidence supports that the soil-to-groundwater pathway is incomplete and no further evaluation of this pathway is required.*

*The residential receptor is the most sensitive receptor (i.e. has the lowest SSLs) for the media and COPCs at SWMU 16 - Z135-4 Open Storage Pad, and therefore the human health risk evaluation will focus on evaluation of potential health risks to residential receptors from exposure to COPCs in soil, consistent with the approach outlined in the NMED-approved Work Plan (Amec Foster Wheeler, 2015a)."*

**NMED Comment 5 - Section 5.6.8, Risk Evaluation Results, p 5-7**

Table 5-3 was not provided in the report and there appears to be no Table 5-2. Revise the report to ensure that Table 5-3 is included and clarify whether Table 5.2 is missing. In addition, the numerical values for the residual cancer risk and Hazard Index listed in the report could not be duplicated. Revise the Report to include the cumulative risk/hazard calculations and verify the calculations for accuracy.

**Army Response**

*The TOC and text were reviewed and revised to accurately list all tables in Section 5, which now include the following tables:*

1. *Table 5-1: Permittee-Initiated Interim Measures Excavation Confirmation Sampling Results (all results), Parcel 16, Permittee-Initiated Interim Measures, SWMU 16 (Z135-4 Open Storage Pad)*
2. *Table 5-2: Cumulative Hazard Calculations for Detected Analytes - Ecological Receptors, Parcel 16, Permittee-Initiated Interim Measures, SWMU 16 (Z135-4 Open Storage Pad) Tier I Plant Screening Assessment*
3. *Table 5-3: Cumulative Risk/Hazard Calculations for Detected Analytes, Parcel 16, Permittee-Initiated Interim Measures, SWMU 16 (Z135-4 Open Storage Pad), Residential Receptor*

*Table 5-3 has been reviewed, clarified and is included in the revised report.*

*To assist in verification of the risk calculations, example calculations for both cancer risk and non-cancer hazard have been added to the bottom of Table 5-3. This example calculation presents the generic NMED equation and then illustrates the calculation with the actual data set from the table, so that the risk equation, input data, as well as the calculations, can be verified.*

If you have questions or require further information, please call me at (330) 358-7312.

Sincerely,

SMITH.STEVEN.  
W.1231038520

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SMITH.STEVEN.W.1231038520  
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