Certified Mail - Return Receipt Requested

November 30, 2022

Colonel Jason F. Vattioni
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117

Ms. Melissa Clark
Civil Engineer Office
377 Civil Engineer Division
2050 Wyoming Blvd SE, Suite 116
Kirtland AFB, NM 87117

RE: REQUEST FOR CLARIFICATION REGARDING NMED REQUEST FOR SOIL VAPOR MONITORING WORK PLAN
BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID# NM6213820974
HWB-KAFB-22-004

Dear Colonel Vattioni and Ms. Clark:

The New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) received the Kirtland Air Force Base (Permittee) letter requesting clarification regarding NMED's September 16, 2022 *Request for Soil Vapor Monitoring Work Plan* (Request) on November 3, 2022. NMED's letter requires modifications to the Permittee's sampling procedures to ensure that representative samples are collected in compliance with the KAFB RCRA Permit. The Permittee requests clarification on several of the required modifications.

In the request letter, the Permittee states that NMED's requirements are not consistent with an EPA SOP for soil gas sampling. Following a review of the KAFB's SOP provided, it is evident that the SOP is specific to soil gas sampling using small driven sampling probes at shallow depths, which is not consistent with soil vapor sampling at the Bulk Fuels Facility Spill site. In addition, an SOP provided for a specific sampling method for a specific type of monitoring probe and installation is not considered EPA guidance unless using the specific type of monitoring probe and installation, which has not been used at the Bulk Fuels Facility Spill (BFFS). Therefore, this SOP is not applicable to the BFFS site soil vapor monitoring except for instances where the Permittee can demonstrate that the probes and installation methods used for a particular sampling port were consistent with the SOP.

Most soil vapor monitoring wells at the BFFS site were installed and constructed in the same manner as groundwater monitoring wells and are not similar to the small probes referenced in the EPA SOP. Many of the BFFS site soil vapor monitoring wells were constructed with ten-foot

length screened intervals with a 12 to 20+ feet length of filter pack. Soil vapor is a fluid in the same way that groundwater is a fluid, and soil vapor is subject to the physics of fluid dynamics in the same way as groundwater. In order to collect a sample that is representative of the subsurface, not the filter pack, which is the purpose of the soil vapor monitoring, all dead space in the well must be purged in order to pull in soil vapor from the formation. In the same manner that a representative groundwater sample must be collected following purging of all dead space within the well and sample train, soil vapor, behaving in the same manner as water per fluid dynamics, must be collected in the same manner.

The 2015 NMED-approved work plan was not reviewed by NMED Hazardous Waste Bureau (HWB) technical staff, who would not have approved the changes in methodology that have produced nonrepresentative samples for the past eight years. The new information acquired by the HWB indicates that the Permittee misrepresented as EPA guidance the methods they proposed changing, and nontechnical NMED staff relied on the statements provided by the Permittee to approve work plans without technical review. The work plans should not have been approved as submitted.

As recently as the September 9, 2021 meeting between NMED and the Permittee, representatives of the Permittee claimed that their methods followed EPA guidance. Upon NMED's request for this guidance, the Permittee presented three documents, none of which were EPA guidance. When this fact was pointed out, the Permittee provided no defense and attempted to circumvent HWB within NMED to acquire approval to continue collecting nonrepresentative samples. With this Request, the Permittee has presented an EPA SOP as EPA guidance for sampling scenarios that are not related to the sampling being conducted at the BFFS site. Misrepresentation of EPA guidance is not acceptable.

Regarding Items 1 and 2, the statement that "[t]he Air force and EPA ORD were unable to identify any EPA guidance..." does not demonstrate that guidance does not exist, nor that "NMED reference to well volumes is applicable to groundwater monitoring but is not applicable to soil vapor monitoring." As stated above, soil vapor and groundwater are both fluids and follow the laws of fluid dynamics; therefore, similar sampling methodologies are appropriate. EPA provided three letters/emails to NMED supporting NMED's requirements for changes to the Permittee's sampling procedures. The letters/emails from EPA are attached to this letter.

Regarding the requirement for a minimum of three purge volumes, the EPA specifically states, *"[t]hree purge volumes of the sampling train are both recommended by EPA and state agencies. It is considered to be an industry standard."* The letter goes on to quote specific EPA, ASTM, and state guidance:

EPA Region 4. 2010. Soil Gas Sampling Operating Procedure states "it is necessary to remove all stagnant or ambient air from the sample string. This volume, equal to approximately three times the volume of the sample string, should be estimated or calculated" ...

ASTM. 2012. Standard Practice for Active Soil Gas Sampling in the Vadose Zone for Vapor Intrusion Evaluations, D7663-12 (Reapproved 2018) defines "*dead volume, n*—the total air-filled internal volume of the sampling system; *purge volume, n*—the amount of air removed from the sampling system prior to the start of sample collection. This is usually referred to in number of dead volumes." Regarding dead volume it states "It is recommended that a minimum of three (3) dead volumes be purged from the sampling system immediately prior to sample collection."

CalEPA. 2015. Advisory – Active Soil Gas Investigations states "The purpose of purging is to remove stagnant air from the sampling system so that representative samples can be collected from the subsurface. A default of three purge volumes should be used. Purge volume testing is no longer recommended."

In addition to these three references provided by EPA, the Interstate Technology & Regulatory Council's 2007 Technical and Regulatory Guidance Vapor Intrusion Pathway: A Practical Guide states, "[s]tagnant air inside soil gas probes and sampling trains must be purged prior to sample collection. Three to four system purge volumes are recommended as a minimum value."

The Permittee must follow EPA, state, and industry standards and purge a minimum of three accurately calculated purge volumes prior to collecting soil vapor samples. While reviewing the data submitted with the Request, an error was found in the Well Volume Calculations provided as an attachment. In Equation 3 on page 48, the porosity must be multiplied by the filter pack volume after the volume of the blank casings are subtracted, not before. This error results in a calculation of less than one purge volume and must be corrected.

In regard to Item 3 and the requirement to purge at an appropriate flow rate, the Permittee appears to be presenting the "worst case scenario" for a sampling event timeline, while not acknowledging that sample multiple teams are in place and could acquire more than one purge pump during sampling events. In addition, the excessive flow rate currently used for soil vapor sampling has not been approved by NMED.

Requirements for the collection of representative samples are not governed by a Permittee's self-imposed restrictions. The KAFB Permit requires the collection of representative soil vapor samples and collection of these samples requires appropriate purging per EPA guidance. Groundwater wells are regularly purged for extended time periods prior to sample collection when necessary. Also, laminar flow within the well casing is not appropriate criteria for determination of appropriate flow rates for soil vapor sampling; rather, laminar flow through the pore spaces of the media being sampled would be more appropriate.

There are many available options for optimizing sample collection efficiency at the BFFS site. For example, multiple sampling teams could be employed, each team setting up at a particular wellhead, such as KAFB-106111, which contains 6 sampling ports, where they could connect one pump to each sample port connection and run all 6 pumps, so that purging of subsequent higher purge volume well casings is commencing while sample collection from smaller purge volume well casings is conducted.

NMED has recently further reviewed EPA's recommended soil vapor sampling flow rate recommendations and determined that the 200 - 500 mL/min flow rate was determined based on studies that utilized a 1-inch probe and ¼ inch tubing (mimicking well casing) in shallow wells. Based on the study limitation, NMED has extrapolated appropriate soil vapor sampling flow rate ranges for the soil vapor sampling well diameters present at the BFFS site. The following table presents the required flow rate ranges for purging soil vapor monitoring wells at the BFFS site.

Table 1: Soil Vapor Sampling Purge Flow Rates based on Well Casing Diameter

Nominal Casing Diameter, inch	Min Flow Rate, ml/min	Min Flow Rate, cfm	Max Flow Rate, ml/min	Max Flow Rate, cfm
0.25	200	0.007	500	0.02
0.5	860	0.03	2149	0.08
0.75	1509	0.05	3772	0.13
2	9494	0.34	23736	0.84
3	20917	0.74	52292	1.8

Regarding Item 5 and the requirement for analytical laboratory analysis for petroleum hydrocarbons, NMED's 2022 *Risk Assessment Guidance for Site Investigations and Remediation, Volume I*, contains Vapor Intrusion Screening Levels (VISLs) for several ranges of petroleum hydrocarbons, including C5 to C8 aliphatics, C9 to C12 aliphatics, C9-C18 aliphatics, and C9-C10 aromatics. Based on the last representative soil vapor samples collected in 2014, many BFFS site soil vapor sampling ports exhibited exceedances of the current C5 to C8 aliphatics, C9 to C12 aliphatics, and C9-C10 aromatics VISLs. The Permittee historically analyzed for these constituent groups and must include analysis of the C5 to C8 aliphatic, C9 to C12 aliphatic, and C9-C10 aromatic hydrocarbons in all future soil vapor sampling events. These TPH fraction results must be included in future risk assessment calculations for the BFFS site. NMED does not concur with only sampling for TPH gasoline fraction.

Regarding Item 6, which requires the Permittee to follow the requirements of their RCRA Permit and monitor and record field parameters prior to sample collection, the Permittee is required to follow the Permit requirement. The Permittee has failed to follow this Permit requirement since 2014. Continued failure to follow the Permit requirement constitutes noncompliance and is subject to Section 1.2 of the Permit. Once the Permittee has established an ability to collect representative soil vapor samples without the need for field parameter

monitoring, they have the option to submit a permit modification request to modify the requirement from the Permit. Also, the letter misrepresents current field monitoring by proposing to "continue to monitor purge gas with a photoionization detector during purging..."; this statement is inaccurate as the photoionization detector is only used to monitor the pump exhaust for health and safety reasons, not purge gas. This is evidenced by the statement on the KAFB Soil Vapor Purge and Sampling Log that states, "[e]ffluent monitoring is performed for health and safety purposes only and does not correspond to concentrations being removed from the well."

HWB staff observed the soil vapor sampling methods performed at the BFFS site on October 3 and October 7, 2022. These observations revealed that the Air Force has failed to implement the changes required by NMED for collection of representative samples. As has been previously demonstrated, the current sample collection methods do not provide soil vapor samples that are representative of the subsurface at the BFFS site.

Data validity is determined by the methods used to collect and analyze samples. It has been determined that the Air Force methods of sample collection currently in use are not producing samples representative of the subsurface at the BFFS site. Soil vapor data that was collected in a manner inconsistent with the collection of representative samples is not considered valid and cannot be used for decision making purposes, including remedy selection.

As noted previously, there are multiple issues with the sampling methods being utilized, including:

1. Failure to purge a minimum of three purge volumes per EPA guidance and industry standard;
2. Failure to calculate accurate purge volumes based on the actual well construction details;
3. Failure to follow Permit Section 6.5.16, though recent Air Force correspondence references it, which requires continued monitoring of field parameters for stabilization during purging prior to collection of soil vapor samples;
4. Failure to purge and sample at an appropriate flow rate per EPA guidance; and
5. Failure to perform leak testing at each sample port per EPA guidance.

KAFB has stated it's executing soil sampling activities pursuant the 2017 Work Plan. Per the Soil Vapor Purge and Sample Log for KAFB-106111-025 recorded 10/7/22, the precalculated purge volume and the volume that was purged is 1.73 ft3. Per the 2017 Work Plan, the purge volume for KAFB-106111-025 is 2.336 ft3. This issue applies to all ports in the 25 and 50 foot bgs range for wells KAFB-106108 – KAFB-106142 during the 2021 4th quarter sampling event. While the purge volumes in the 2017 work plan are significantly underestimated, failure to follow the Work Plan invalidates all data collected from 70 ports for the past five years, as this issue has persisted since the 2017 work plan was approved. In addition, all ports except the deepest one in both KAFB-106141 and KAFB-106142 were purged less than the purge volume listed in the 2017 Work Plan. This represents another 10 ports whose data is invalid for the past five years based on this issue

The site visit revealed that the Permittee is not monitoring the flow rate during sample collection. EPA recommends approximately 20 minutes for collection of a 6L Summa canister sample. The Permittee must maintain, monitor, and record the flow rate into the sample container during the sample process and ensure appropriate fill times based on EPA recommendations.

The site visit also revealed that while the sample train is apparently leak tested separately from the wellheads. EPA-recommended leak testing requires a leak test at each sample port during sampling, which was not observed. During the site visit when questioned about the leak testing, NMED was told that most leaks happen at the wellhead connection. However, no leak testing involving the wellhead connection was observed by NMED. Per EPA guidance, leak testing must be performed at each sampling port once the entire sample train is connected to the wellhead. Sample port leak testing protocols must be included in the required Soil Vapor Monitoring Work Plan due to be submitted to NMED on March 1, 2023.

As documented above, KAFB has continued to collect soil vapor data that is not representative of subsurface conditions at the BFFS site. Failure to collect representative soil vapor samples by following NMED's directions could suggest unwillingness to comply with the RCRA Permit. Failure to comply with the Permit is subject to Section 1.2 of the KAFB RCRA Permit.

Going forward, the Permittee must follow NMED direction for all future sampling events and must include all of the required modifications from NMED's September 16, 2022 *Request for Soil Vapor Monitoring Work Plan*, as well as the modifications required in this letter.

Should you have any questions, please contact Ben Wear of my staff at (505) 690-6662.

Sincerely,

Rick Shean Digitally signed by Rick Shean Date: 2022.11.30 08:51:02 -07'00'

Rick Shean
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
B. Wear, NMED HWB
L. Andress, NMED HWB
L. King, EPA Region 6 (6LCRRC)
L. McKinney, EPA Region 6 (6LCRRC)
S. Kottkamp, KAFB
R. Wortman, KAFB
K. Bronson, ABCWUA
A. Tafoya, VA

File: KAFB 2022 SWMU ST-106/SS-111 Bulk Fuels Facility Spill and Reading

Attachment:
Three sets of EPA Comments
Regarding BFFS Soil Vapor Sampling

WORK PLAN FOR SHALLOW SOIL VAPOR SAMPLING, BULK FUELS FACILITY, SOLID WASTE MANAGEMENT UNITS ST-106/SS-111, NOVEMBER 2019
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID# NM9570024423

General Comments:

1) **EPA concurs with NMEDs recommendation that KAFB develop a VI Conceptual Site Model (CSM) to guide further evaluation of the VI pathway. EPA recommends completing the CSM before making final risk management decisions for any given site.**

Vapor migration in the subsurface, through building foundations, and within buildings is complex and influenced by many natural and human-caused factors. These factors include climate (e.g., temperature, pressure, precipitation), building conditions (e.g., foundation type and status, age, size), and heating, ventilation, and air conditioning (HVAC) operation. The combination of these factors can result in significant spatial and temporal variability in subsurface and indoor air vapor concentrations. EPA considers the development of a robust CSM (updated as new information becomes available) essential to understanding and evaluating the VI pathway and should be used to guide the collection of additional data, i.e. multiple-lines-of-evidence (MLE) needed to determine if the pathway is incomplete or complete. MLE are particularly important for supporting "no-further-action" decisions regarding the VI pathway (i.e., pathway incomplete determinations) to reduce the chance of reaching a false-negative conclusion (i.e., concluding vapor intrusion does not pose unacceptable human health risk, when it actually poses an unacceptable human health risk). Collecting and weighing MLE can also help avoid reaching a false-positive conclusion (i.e., concluding vapor intrusion poses an unacceptable human health risk, when it does not).

Subsurface vapors can be drawn into indoor air principally through two routes: 1) vapors can migrate through the soil and enter buildings through openings in the foundation or 2) vapors can migrate through subsurface preferential pathways to openings in the foundation and into indoor air.

The conventional/basic CSM that has most commonly been used at VI sites involves the transport of VOCs from the subsurface source through soil toward the building, vapor entry into the building, and contaminant mixing with indoor air. Overall, vapor transport in the subsurface is controlled by contaminant partitioning, diffusion (transport from high to low concentration), and advection (transport from high to low pressure) (USEPA, 2012a). Diffusion typically dominates the transport of vapor phase contaminants from the subsurface source toward a building or ground surface. Vapors near the building can be transported by both diffusion and advection into indoor air via cracks or other openings. Advection resulting from negative indoor air pressure relative to the subsurface immediately adjacent to the building typically dominates transport of vapors into indoor air (USEPA, 2015a). Building heating, ventilation, and air conditioning (HVAC) operations (e.g., stack effects from heating/air conditioning) and weather conditions (e.g., barometric pressure, wind, and temperature) can affect the pressurization of a building. EPA typically recommends initial concentration- or distance-based screening to evaluate whether VI may be a concern, supported by an MLE investigation approach for sites that do not screen out. MLEs should be used to reduce the considerable uncertainty associated with the spatial and

temporal variability of COCs in groundwater, soil gas, and indoor air to provide a more comprehensive understanding of the VI pathway and to increase confidence in making site management decisions regarding VI. Lines of evidence may be weighted differently for each site and building, depending on their characteristics and quality. Distance-based screening is generally applied under this CSM based on the lateral or vertical distance between the edge of the subsurface VOC source and the bottom of the building foundation. If the building is closer to the source than the screening distance, then further evaluation of VI is recommended. A distance of 100 feet is typically used for both lateral and vertical screening and is supported by modeling and observations at other VI sites when significant surface covers are not present, under the assumption that preferential vapor migration routes are absent. Concentration based screening is also used under this CSM where the maximum VOC concentrations in groundwater or soil gas are compared to VI screening levels (VISLs) to determine if further evaluation is needed. Screening concentrations have been developed by regulatory authorities using an attenuation factor (AF) approach (USEPA, 2015a). The AF is an inverse measure of the overall decrease in concentration due to attenuation mechanisms that occur as vapors migrate from the subsurface into a building. The greater the attenuation, the smaller the value of the AF (USEPA, 2012b; USEPA, 2015a). Concentrations of VOCs in subslab soil gas, exterior soil gas, or deeper soil gas or groundwater can be used to estimate indoor air concentrations.

The conventional/basic CSM, however, does not account for VOC migration through preferential pathways, which may occur over much greater distances. This scenario also may result in higher vapor concentrations inside the building or structure than would be expected based on advection or diffusion of vapors into the structure. EPA recommends that buildings with significant preferential migration routes be evaluated closely. AFs in such situations typically do not apply.

The VI preferential pathway CSM evaluates pathways for VI via specific migration routes that support higher contaminant transport, into a building compared to transport through bulk soil. EPA and others define a preferential pathway for VI investigations as all high-capacity transport pathways for vapors from the subsurface source to the building foundation or into the building (USEPA, 2015a). Examples of preferential pathways are bedrock fractures, sand lenses, dry wells, rodent tunnels, vapor pathways inside conduits (e.g., sanitary sewers, storm drains, utility tunnels-corridors, fiber optic cable housing, etc.), and engineered backfill material along conduits. More specifically, a utility tunnel-corridor (also referred to as a services tunnel, services trench, services vault, or cable vault) is a passage built underground or above ground to carry utility lines such as electricity, water, and sewer pipes. Utility tunnels are often installed at large military facilities, industrial plants and other large institutions such as universities, hospitals, research labs, etc. Vapor conduits such as these provide little to no resistance to vapor flow. For example, vapors can flow through the pipes of the sanitary sewer, utility conduits, or other drains or conduits and if they penetrate the building foundation, the preferential pathway can also serve as a potential vapor entry point. Sewer VI is a term used when vapor-forming chemicals enter sewer pipes that run through contaminated soil or groundwater. Once inside a sewer, vapors can move through the pipes and escape through cracks or openings, under or inside a building. Some of the traditional ways to test for vapor intrusion could potentially miss vapor-forming chemicals moving through sewer pipes. Public and facility records may be useful sources of information about utility and sewer locations, which may provide maps, "as built diagrams," or construction specifications. Depending upon the CSM, sampling of vapors within the utility corridor (or within a sewer, if present) may be

warranted to characterize vapor migration in the subsurface.

2) **Shallow soil gas sampling should be conducted adjacent to the VA hospital and at certain homes in the Siesta Hills subdivision before the pathway should be excluded from further consideration.**

The document Conceptual Model Scenarios for the Vapor Intrusion Pathway (EPA 2012b) provides simplified simulation examples to show graphically how several of the subsurface and building-specific factors work together to determine the distribution of VOCs in the subsurface and the indoor air concentration relative to a source concentration. It provides a theoretical framework with which to draw inferences about and better understand the complex vapor fate and transport conditions typically encountered at actual, non-idealized contaminated sites. Following are several of the general observations made from these simplified simulation examples, and may be useful when considering the VI pathway at the site:

- The horizontal and vertical distance over which vapors may migrate in the subsurface depends on the source concentration, source depth, soil matrix properties (e.g., porosity and moisture content), and time since the contaminant release to the environment occurred.

- Vapor concentrations, including oxygen, in the vadose zone (i.e., soil gas concentrations) may not be uniform in sub-slab soil gas or in soil gas at similar depths exterior to the building of interest. Therefore, soil gas concentrations at exterior locations (i.e., outside a building's footprint) may be substantially different from the concentration underneath the building (e.g., the sub-slab concentration), depending on site-specific conditions and the location and depth of the exterior soil gas sample.

- Simulations assuming an idealized, constructed ground cover suggest that shallow soil gas concentrations can be greater under low-permeability ground covers (e.g., asphalt) than under soil open to the atmosphere.

EPA generally recommends that soil gas surveys collect soil gas samples at multiple locations and depth intervals between the vapor source and building(s) (potential "receptors"). As a result, the soil gas survey may include samples collected immediately outside the building ("exterior soil gas") at various depths or several depth intervals, as well as immediately beneath it (e.g., sub-slab soil gas sampling). If any shallow soil gas samples are collected, EPA recommends they be collected as close as possible to the building and at depths below the respective building foundation and no less than five feet below ground surface, depending on site-specific conditions. The goal is to locate the soil gas concentrations outside the building footprint that best represent conditions immediately below the building. Less attenuation is expected beneath buildings with a slab (e.g., slab-on-grade or basement) due to the slab capping effect, which is a result of a concrete slab acting as a barrier or cap limiting the downward flow of ambient air and the upward venting of contaminated soil gas. Where crawl spaces are present, crawl space air sampling may also be conducted.

To ensure that the sampling data will meet the site-specific data quality needs, EPA recommends that the sampling and analytical methods selected be capable of obtaining reliable analytical detections of concentrations less than project-appropriate, risk-based screening levels (e.g., VISLs). Towards that end, EPA recommends that, as part of establishing site-specific data quality objectives (DQOs), the planning and data collection team(s) consult with a laboratory skilled in the analysis of air and soil gas samples and choose sampling and analytical methods capable of routinely attaining the desired detection sensitivity for each medium. Several rounds of sampling are recommended to develop an understanding of temporal variability to ensure that final risk management decisions are based upon a consideration of a reasonable maximum vapor intrusion condition.

From: Ehrhart, Richard <ehrhart.richard@epa.gov>
Sent: Wednesday, February 10, 2021 1:07 PM
To: Pierard, Kevin, NMENV <Kevin.Pierard@state.nm.us>
Cc: Smith, Melissa <Smith.Melissa@epa.gov>; King, Laurie <king.laurie@epa.gov>
Subject: [EXT] RE: KAFB BFFS shallow soil vapor work plan and comments

Hello Kevin,

I have looked at KAFB's revised conceptual shallow soil gas sampling proposal by Noblis, dated February 1, 2021, and maintain that our previous comments are still applicable to the investigation of the potential VI pathway north of the base. In summary, we recommended the following:

1. KAFB develop a VI Conceptual Site Model (CSM) to guide further evaluation of the VI pathway and completing the CSM before making final risk management decisions, and
2. Collect shallow soil gas samples adjacent to the VA hospital and near certain homes in the Siesta Hills subdivision before excluding the pathway from further consideration.

Historical soil gas data has shown that there was a soil gas plume present near the VA hospital and the Siesta Hills neighborhood, so it is not implausible that soil gas could migrate to those areas through preferential pathways. Studies have shown that VOC migration through preferential pathways may occur over much greater distances and may also result in higher vapor concentrations inside buildings than would be expected based on advection or diffusion forces alone. Our guidance recommends a careful evaluation of potentially impacted buildings if such conduits exist. We agree that collecting soil gas samples over utility lines north of the base would provide another useful line of evidence to add to the CSM, but it shouldn't preclude the collection of soil gas samples near the VA hospital and Siesta Hills residential area.

Thanks
Rick

Rick Ehrhart
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6

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Transmitted via email

November 22, 2021

Mr. Ben Wear

Environmental Scientist Supervisor

Hazardous Waste Bureau

New Mexico Environmental Department

2905 Rodeo Park Drive East, Building 1

Santa Fe, NM 87505-6313

(505) 690-6662

RE: *Work Plan for Shallow Soil Vapor Sampling, Bulk Fuels Facility, Solid Waste Management Units ST-106/SS-111, May 2021*
Kirtland Air Force Base, New Mexico
EPA ID #NM9570024423

Dear Mr. Wear:

The United States Environmental Protection Agency (EPA) has reviewed the *Work Plan for Shallow Soil Vapor Sampling, Bulk Fuels Facility, Solid Waste Management Units ST-106/SS-111)*, that I received on October 26, 2021, via an attachment to your email. This Work Plan describes the investigative approach to assess the current nature and extent of shallow soil vapor off-base.

General Comments:

1. EPA provided general comments December 30, 2020 on the November 2019 Kirtland AFB (KAFB) Soil Vapor Sampling Work Plan, KAFB's revised Conceptual Shallow Soil Gas Sampling Proposal by Noblis, dated February 2021, and KAFB's May 2021 Soil Vapor Sampling Work Plan. These comments are still applicable to the investigation of the potential VI pathway north of the base.

2. EPA has also reviewed NMEDs comments on the May 2021 Draft Work Plan and concur with their conclusions and recommendations.

3. EPA considers a comprehensive CSM essential to response action development, selection, and implementation. The CSM is a primary project planning and management tool, and as such, the CSM should incorporate all that is known about the site's current and potential future environmental conditions and uses, noting that it will evolve and mature over the project's life cycle. A realistic CSM accurately portrays critical conditions that affect the success of response actions, and at a scale that addresses heterogeneity. It is expected that this Vapor Intrusion CSM will build on the previous CSMs and present known and potential source areas, transport mechanisms, pathways, and exposure routes and receptors.

Specific Comments:

1. Three purge volumes of the sampling train are both recommended by EPA and state agencies. It is considered to be an industry standard.

   EPA Region 4. 2010. Soil Gas Sampling Operating Procedure states "it is necessary to remove all stagnant or ambient air from the sample string. This volume, equal to approximately three times the volume of the sample string, should be estimated or calculated" …

   ASTM. 2012. Standard Practice for Active Soil Gas Sampling in the Vadose Zone for Vapor Intrusion Evaluations, D7663-12 (Reapproved 2018) defines "*dead volume, n*—the total air-filled internal volume of the sampling system; *purge volume, n*—the amount of air removed from the sampling system prior to the start of sample collection. This is usually referred to in number of dead volumes." Regarding dead volume it states "It is recommended that a minimum of three (3) dead volumes be purged from the sampling system immediately prior to sample collection."

   CalEPA. 2015. Advisory – Active Soil Gas Investigations states "The purpose of purging is to remove stagnant air from the sampling system so that representative samples can be collected from the subsurface. A default of three purge volumes should be used. Purge volume testing is no longer recommended."

2. The proper flow/purge rate recommended by EPA is 200 to 500 ml/min, but no more than 1,500 ml/min. EPA agrees with Comment 21, made by NMED, that the proposed purge rate of 0.75 cubic feet per minute is too high.

   EPA ORD. July 2007. Final Project Report for the Development of an Active Soil Gas Sampling Method provides three experiments investigating the relationship between purge rate and measured VOC concentrations. Purge rates of the three experiments ranged from 100 to 2,000 ml/min. The findings of the report state "Based on the data from this investigation, it appears that purge rates of 200 to 500 ml/min should be recommended."

   EPA ERT SOP 2042. June 1996. Soil Gas Sampling recommends "The approximate sampling time for a 6-liter canister is 20 minutes." Which equates out to around 300 ml/min.

3. EPA recommends conducting leak testing each time a soil gas sample is taken from each individual SVMP.

   EPA Region 5. March 2020. Vapor Intrusion Handbook states EPA "recommends leak testing to assess the integrity of the sampling assembly by providing quantitative proof that breakthrough of air is not occuring into the sub-slab sampling port, sampling train, or sampling medium… samplers should conduct leak testing each time a soil gas or sub-slab sample is collected. The acceptable range of leakage should be documented in the SAP and communicated to field staff prior to site activities."

If you have any questions regarding this comment letter, please contact me via telephone at 214-665-7124, or via e-mail at mckinney.lucas@epa.gov.

Sincerely,

Lucas McKinney

Lucas McKinney

Project Manager

cc: Dave Cobrain, NMED

Laurie King, EPA

Rick Ehrhart, EPA