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October 22, 2021

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RE: DISAPPROVAL
WORK PLAN FOR SHALLOW SOIL VAPOR SAMPLING
BULK FUELS FACILITY SPILL SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID# NM6213820974
HWB-FWDA-21-004

Colonel Miller and Lt. Colonel Acosta:

The New Mexico Environment Department (NMED) is in receipt of the Kirtland Air Force Base (Permittee) *Work Plan for Shallow Soil Vapor Sampling Bulk Fuels Facility Spill Solid Waste Management Units ST-106/SS-111* (Work Plan), dated May 2021. NMED has reviewed the Work Plan, and hereby issues this Disapproval with the following comments.

GENERAL COMMENTS

1. Data Collection and Subsequent Data Quality Issues

NMED Comment: A significant issue regarding soil vapor data at the BFFS site is that in 2015, the Permittee reduced the sample purge volumes for collection of soil vapor samples from ten well/sampling string volumes to less than one. There is no mention of this change in procedures in the Work Plan. Industry standard for purge volumes is a minimum of three. EPA's 2010 *Region 4 Soil Gas Sampling Operating Procedure* states "[t]his volume, equal to approximately three times the volume of the sample string, should be estimated or calculated...". In addition, 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." No justification was

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provided for this change to the sampling procedures, based on the NMED Hazardous Waste Bureau administrative record.

In a January 6, 2021 meeting between NMED and the Permittee, Kate Lynnes, representing the Permittee, stated that sampling procedures were altered in 2015 because the Permittee determined that they were pulling higher concentrations from deeper intervals that were not representative. This explanation is not supported by the data, which clearly show decreasing soil vapor concentrations with depth prior to the change in collection procedures (see Figure 1).

In a September 9, 2021 meeting between NMED and the Permittee, NMED were told by Mr. Ryan Wortman and Mr. Chris Segura, representing the Permittee, that "EPA Guidance" states that one purge volume is more accurate than three and they promised to provide that guidance. In addition, a September 10, 2021 email references attached EPA guidance documents. The documents attached to the email and presented as EPA Guidance were not, in fact, EPA Guidance, and did not relate to the work being conducted at KAFB.

The Permittee's calculations for purge volumes are flawed and underestimate purge volumes by up to over 60%. The Permittee's calculation for a single purge volume at each sample port failed to include: 1) the entire length of the filter pack at each port; 2) the additional volume of filter pack in the shallower, larger diameter borehole ports; and 3) the volume within the above ground sampling train connected to the Summa canister (at least 5 ft of hose prior to the sample collection port based on information from a field technician). In addition, the Permittee used a non-conservative estimate for the porosity of the filter pack. Based on these multiple errors in calculation, the Permittee has been purging less than one purge volume for all soil vapor sampling conducted since the beginning of 2015. The Permittee reduced its margin of error to zero, then introduced multiple errors.

If those errors were not sufficient to nullify all data since the beginning of 2015, the current work plan that KAFB is operating under, approved by NMED in February 2018, contains the Air Force (AF) Standard Operating Procedure (SOP) for soil vapor sampling in Appendix D. Table 1 of that Appendix contains calculated purge volumes. Although all purge volumes in this table are undercalculated, the purge volumes for the shallower wells where two different boring diameters were present, as discussed earlier, were increased from previous work plan calculations. It appears there may have been some accounting for the two diameters. However, these calculations still only use 10 feet for the length of the filter pack, while a few sampling ports that were reviewed contained 15-20.5 feet of filter pack, and all failed to include the above ground sample train volume or a conservative estimate for filter pack porosity. Further, even though there was some adjustment in the work plan, there was no adjustment in the field, and inadequate purge volumes, even according to the approved work plan, continue to be collected through the most recent reported sampling event. For example, Table 1 below shows NMED's calculated purge volume, the AF's calculated purge volume, and the volume actually purged for well 106138 in 4th quarter 2020.

Table 1: Well 106138 Purge Volume Comparison

Well-Port	NMED-Calculated Purge Volume based on Well Construction Diagram, ft3	KAFB Purge Volume listed in 2017 (most recent) Approved Work Plan	Volume Actually Purged by AF per Q4 2020 Report, ft3
KAFB-106138-025	4.213	2.336	1.713
KAFB-106138-050	4.584	2.412	1.79
KAFB-106138-150	3.147	1.978	2.097
KAFB-106138-250	3.832	2.284	2.404
KAFB-106138-350	3.888	2.591	2.711
KAFB-106138-450	25.824	23.607	23.728

This change in procedures resulted in immediate reductions in analyzed sampled contaminant concentrations by two to three orders of magnitude. Detections previous to 2015 have been reported as non-detect (ND) since, which indicates that the current sampling procedure is not representative of concentrations within the subsurface (see Figure 2). It is apparent that the Permittee has been collecting samples diluted by stagnant air in the well, the filter pack, and the sampling train since 2015. All data collected using the insufficient purge volume are not considered to be representative of conditions in the subsurface. All soil vapor data presented by the Permittee since 2015 has likely been biased low, is not representative of the subsurface conditions, and, therefore, is not acceptable for comparison to NMED Vapor Intrusion Screening Levels (VISLs) for compliance or decision-making purposes, such as locating the wells proposed in this Work Plan.

Provide the history of this change to the sampling procedure in the background section of the revised Work Plan, and a detailed justification explaining why this procedure, which is purging less than one purge volume prior to sample collection, provides more representative samples than the industry standard of three purge volumes or the pre-2015 practice of 10 purge volumes or acknowledge that the data are not reliable.

2. Permittee's Failure to Investigate Appropriate Areas

NMED Comment: The Permittee neglected to address NMED's requirement to investigate residual soil vapor contamination under homes, buildings, and paved areas. NMED has repeatedly directed the Permittee to investigate historical vapor contamination near the VA campus and the Siesta Hills neighborhood. The proposed soil vapor monitoring wells are not sited in locations that could demonstrate that vapor intrusion into buildings and homes does not pose an unacceptable risk to human health.

NMED's February 25, 2019 letter requiring this Work Plan specifically directed the Permittee to conduct sampling "in the residential area north of Ridgecrest or amid buildings on the VA hospital campus". In addition, the EPA VI Guidance states, "EPA recommends that soil gas

samples be taken as close to the areas of interest as possible and preferably from directly beneath the building structure."

NMED's May 26, 2020 Disapproval letter again required the Permittee to site soil vapor sampling wells as directed previously and in accordance with EPA guidance. Several meetings were conducted between the Permittee and NMED in 2020 and 2021, where the same direction was repeated. NMED's comments on the Permittee's February 1, 2021 "conceptual outline" reiterated the need for appropriate placement of soil gas monitoring wells. NMED continues to require siting of soil vapor sampling wells below or directly adjacent to the VA buildings, in the Siesta Hills subdivision, below large paved areas, and within or directly adjacent to utility corridors in close proximity to these areas. The Work Plan failed to address NMED direction and provides no new information to justify reconsideration of that direction.

Following the Permittee's continued insistence that no further sampling was required near off-base residences and buildings where historical soil vapor concentrations have exceeded NMED screening levels by several orders of magnitude, NMED provided the US EPA with the Permittee's November 2019 work plan and the resulting May 26, 2020 Disapproval letter for their review. The EPA provided four pages of comments which are attached to this Disapproval. In summary, the EPA provided two comments with the following headings (bolding from EPA):

1. **EPA concurs with NMEDs recommendation that KAFB develop a VI [vapor intrusion] 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.**

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 Permittee has not addressed either of these issues in their Work Plan. The Permittee's February 1, 2021 "conceptual outline" was also provided to EPA for review. EPA provided a response on February 10, 2021, which stated that EPA, "maintain(s) that our previous comments are still applicable to the investigation of the potential VI pathway north of the base" and reiterated the two recommendations listed above. In addition, EPA stated, "[w]e 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."

Following further objections by the Permittee, NMED contracted with Daniel B. Stephens and Associates (DBS&A) for an outside assessment of the need for an off-site vapor intrusion investigation at the BFFS. On March 26, 2021, DBS&A provided a Memorandum to

NMED with the subject, Kirtland AFB Vapor Intrusion Evaluation. The Memo is attached to this Disapproval.

In Summary, DBS&A's conclusions were:

- Off-Site vapor intrusion investigation is warranted based on anomalies in the existing soil-vapor data dependent on the sampling methodology (purge volume), high concentrations observed prior to 2015, possibility for higher VOC concentrations beneath buildings as compared to the vapor data collected to-date, and given that the EDB and TPH groundwater plumes historically extended further north than existing soil-vapor sampling.
- Prior to 2015, shallow off-Site soil vapor concentrations were elevated compared to risk standards. Beginning in 2015, observed concentrations decreased dramatically and have generally stayed relatively low since that time. This decrease beginning in 2015 may be due to the reduction from 10-purge volumes to 1-purge volume evacuated prior to sampling. NMED may consider moving to a standard of 3 purge-volumes moving forward. A purge-volume test (monitoring concentrations as a function of the number of purge volumes) may also be considered. Any newly installed soil-vapor monitoring probes may be constructed as to minimize dead-space in the sampling apparatus and the concomitant necessary purge volume.
- TPH concentrations were elevated in shallow off-Site soil vapor sampling from 2011 to 2014 at concentrations greater than estimated vapor intrusion risk values calculated with methods in NMED (2017) and has not been analyzed for since 2015. Moving forward NMED may consider requiring that TPH be analyzed for in shallow soil vapor at the Site, and NMED may also consider adopting VISLs for the TPH fractions.
- The off-Site vapor intrusion investigation may begin with shallow soil-vapor monitoring (5 to 15 ft bgs) in the direct vicinity (within 10 ft) of buildings at the VA Hospital and neighborhoods north of Ridgecrest Dr.

The Permittee has repeatedly ignored NMED's direction regarding the soil vapor intrusion investigation and their "conceptual outline" that this Work Plan is based on. Failure to follow NMED direction constitutes noncompliance and may result in enforcement action. The Permittee must propose vapor monitoring well locations that address the purpose of the investigation and the comments above in the revised Work Plan.

SPECIFIC COMMENTS

3. Transmittal Letter Statement

Permittee Statements: "This proposed scope of work would use a phased, step-out investigative approach to assess the current nature and extent of shallow soil vapor. The first phase, presented in this enclosed work plan, focuses on vapor sampling at locations most likely to have detectable vapor concentrations. In the event that data collected during

the initial phase identifies any vapor concentrations that indicate additional sampling is needed to '*demonstrate that [sic] there is not risk to off-site receptors located north of the Base*,' the Air Force would work with NMED to develop an additional work plan that would extend sampling beyond Bullhead Memorial Park."

NMED Comment: This investigation is far beyond a step-out approach. As clearly indicated on Figure 3, Historical Soil Vapor Concentrations near the VA Hospital and Siesta Hills Neighborhood, high contaminant concentrations have already reached the wells closest to the VA Hospital and Siesta Hills. In addition, there is no valid data (See Comment 1) that demonstrates that concentrations do not remain above the NMED residential VISLs at these locations.

NMED does not agree that half of the proposed wells located directly adjacent to the former SVE system, which ran for 12 years, are in "locations most likely to have detectable vapor concentrations." This statement is demonstrably false. Figure 3 clearly demonstrates that the hydrocarbon (HC) concentrations within the two wells closest to the VA Hospital and the Siesta Hills neighborhood were approximately two orders of magnitude higher than those detected in seven of eight of the locations proposed by the Permittee. Also, Figure 4, the Permittee's Figure 4-4, Benzene Vapor Plume Footprints by Elevation December 2012, from their Fourth Quarter 2012 Quarterly Report demonstrates that there are high concentration areas that were likely cut off from the source plume by the SVE system below the VA Hospital and crossing Ridgecrest Drive into Siesta Hills (note that while the white on the map indicates 0-1 ppmv, NMED's residential VISL is 0.037 ppmv...also note that the first elevation presented is 50 ft bgs while the benzene concentration at 25 ft bgs was ~38% higher and not presented on the figure). No well was proposed at or near the VA Hospital, where the highest historical concentrations were located. The VA and the Siesta Hills neighborhoods were not influenced by the soil vapor extraction system likely due to proximity to the system and to the open surface of the park, which may account for the concentration differences. As Figures 3 and 4 clearly demonstrate, neither the proposed well locations in the park, nor those in the utility corridor immediately north of the site are the "locations most likely to have detectable vapors".

In addition, the sampling locations proposed do not provide information relevant to the purpose of the investigation, which is to investigate the potential for soil vapor intrusion in the homes in the Siesta Hills neighborhood and buildings in the VA Hospital complex. As stated repeatedly by NMED, and as supported by EPA guidance, EPA's comments directly addressing the site, and an independent assessment by DBS&A, the sampling locations must be below or directly adjacent to (within 10 feet) the VA buildings, in the Siesta Hills subdivision, below large paved areas, and within or directly adjacent to utility corridors in close proximity to these areas. The Work Plan fails to address these locations.

As evidenced by NMED's stated position over the past two and a half years, EPA's guidance and site-specific comments, and the independent evaluation of KAFB's proposed plan, there

is no instance where data collected from the proposed locations would replace the requirement for data collection below or directly adjacent to the VA buildings, in the Siesta Hills subdivision, below large, paved areas, or within or directly adjacent to utility corridors in close proximity to these areas. The Permittee's continued failure to follow NMED direction constitutes noncompliance and may result in an enforcement action.

4. **Section 3.1, Site Description, page 3-1**

Permittee Statements: "It is important to note there are currently no residential or industrial buildings in the off-Base area proximal to the Site..."

NMED Comment: Proximal is a vague term which implies that the VA Hospital complex and the Siesta Hills neighborhood could not be affected by the BFFS spill. NMED's Figures 3 and 4 clearly demonstrate that these areas were affected by the BFFS spill. Remove misleading statements from the revised Work Plan.

5. **Section 3.2.1, Soil Vapor Interim Measure History, page 3-2**

Permittee Statements: "SVM data continue to be collected and to provide information for understanding the nature and extent of soil vapor contamination at near steady state conditions."

NMED Comment: The data collected from 2015 to the present utilized sampling techniques that have likely biased the data low (see Comment 1). While data continues to be collected, it is not considered valid by NMED and is not acceptable for comparison to NMED VISLs for compliance purposes, nor for making any decisions, including the siting of monitoring wells for this Work Plan. Remove all references to any soil vapor data collected after 2014.

6. **Section 3.2.2, Soil Vapor Monitoring History, page 3-2**

Permittee Statements: "In Q1 2015, updates to the soil vapor sampling apparatus included capping and sealing SVMPs to reduce the influence of barometric pressure fluctuations on soil vapor concentrations during SVM sampling and analysis. The points and wells were sealed by securing an air-tight cap onto the top of each SVMP and adding a pneumatic quick connect fitting to each well to serve as a sampling port for ease of access and to ensure that an air-tight seal was maintained."

NMED Comment: In this section detailing improvements to the soil vapor monitoring practices, there is no mention that the purge volume was reduced from ten to less than one in Q1 2015. This is an important omission. Provide an explanation for why this asserted improvement to the soil vapor sampling was omitted from this section in the response letter. See Comment 1.

7. Section 3.2.2, Soil Vapor Monitoring History, page 3-3

Permittee Statements: "These improvements demonstrate that the recent SVM data collected is the most representative of the current site conditions. The Q4 2020 Monitoring Report (KAFB, 2021a) presents the most recent and representative soil vapor data. The Q4 2020 soil vapor data set was evaluated for the development of this WP, and the off-Base soil vapor data is summarized in Section 3.3.3."

NMED Comment: The Permittee failed to mention reducing the pre-sampling purge volume to less than one as an additional change, which biased data low and demonstrates that this statement is misleading. All data collected since 2014 is not suitable for decision-making purposes. In addition, the Q4 2020 soil vapor data has not been, and will not be, approved by NMED. Remove all soil vapor data collected after 2014 from the Work Plan. The Permittee must use data collected prior to 2015 to develop the Work Plan.

8. Section 3.3.2, Utility Corridors, page 3-3

Permittee Statements: "As shown on Figure 3-2, the major utility corridor near the Site is located on-Base along Randolph Avenue. All utilities identified proximal to the Site are less than 12 ft bgs. One natural gas utility line leaves the Base near the Site and travels north to the VA Hospital. This line is 1.5 to 6 in. in diameter and approximately 18 to 24 in. deep."

NMED Comment: The purpose of the investigation, including the location of utility corridors, is to collect data that can rule out the potential for soil vapor intrusion into buildings on the VA Hospital complex and home in the Siesta Hills neighborhood. As Figure 3 demonstrates, soil vapor at concentrations over two orders of magnitude greater than NMED's Residential VISLs have already reached the immediate proximity of the VA and Siesta Hills. The purpose of the utility corridor maps is to assist in siting appropriate vapor monitoring well locations near the VA and Siesta Hills. Propose sampling locations that address the purpose of the investigation in the revised Work Plan. See Comment 2.

9. Section 3.3.3, Fourth Quarter 2020 Soil Vapor Monitoring Data Summary, page 3-3

NMED Comment: Remove all data that was collected after 2014 from this Work Plan; the data is not acceptable for decision-making purposes. This includes all figures, tables, and appendices. Data collected prior to 2015 must be used to develop the revised Work Plan.

10. Section 4, Investigative Approach, Rationale, and Guidance, page 4-1

Permittee Statements: "The proposed scope of work consists of a phased, step-out investigative approach to assess the current nature and extent of shallow soil vapor off-Base. The first phase would focus on vapor sampling at locations that are most likely to have detectable vapor concentrations."

NMED Comment: As stated in Comment 3, the step-out method does not apply to this investigation because historic data already indicates that high hydrocarbon concentrations exist in the area of the wells closest to the VA Hospital and Siesta Hills. There is no valid data to date that demonstrates that concentrations exceeding the NMED residential VISLs are not still present. As also stated in Comment 3, the proposed locations are clearly not those "most likely to have detectable vapor concentrations". The locations proposed by the Permittee cannot demonstrate that there is no soil vapor intrusion risk to the VA Hospital or Siesta Hills. The Permittee must propose soil vapor sampling locations that address the purpose of the investigation and the guidelines presented by EPA and DBS&A in Comment 2.

11. Section 4, Investigative Approach, Rationale, and Guidance, page 4-1

Permittee Statements: "This approach builds on the concepts detailed in EPA (2015, Sections 4.0, 6.2.1, and 6.3.1), which require investigations to delineate the areal extent of a subsurface vapor plume as well as preferential pathways."

NMED Comment: The Permittee has never delineated the areal extent of the subsurface vapor plume or preferential flow pathways. Figure 4, a map presented by the Permittee in the Q3 2012 Quarterly Report (note that while the white on the map indicates 0-1 ppmv, NMED's residential VISL is 0.037 ppmv) demonstrates that there are concentrations below the VA Hospital and crossing Ridgecrest Drive that exceed the NMED residential VISL by orders of magnitude. Should soil vapor concentrations exceeding the NMED residential VISLs be encountered in close proximity to the VA Hospital or Siesta Hills during this investigation or during sampling events conducted under the general soil vapor monitoring program, the Permittee will be required to delineate the areal extent of the soil vapor contamination.

12. Section 4, Investigative Approach, Rationale, and Guidance, page 4-1

Permittee Statements: "As indicated in EPA (2015), soil gas concentrations generally decrease with increasing distance from a subsurface vapor source, and eventually at some distance the concentrations become negligible. The distance at which soil gas concentrations become negligible is a function of the strength and dimensions of the vapor source, the type of vapor source, the soil types and layering in the vadose zone, the

presence of physical barriers (e.g., asphalt covers or ice) at the ground surface, and the presence of preferential pathways (utility corridors)."

NMED Comment: While this information is correct in most cases, the conditions present at the KAFB BFFS site differ from a standardized example in that investigation has been conducted at this site for approximately 20 years. As has been clearly demonstrated in Comment 2 and on Figures 3 and 4, the twelve years of SVE operations reduced concentrations closer to the base to levels that were two orders of magnitude less than the concentrations near the VA and Siesta Hills. Remove statements that are not pertinent to the actual site in the revised Work Plan.

13. Section 4, Investigative Approach, Rationale, and Guidance, page 4-1

Permittee Statements: "The SVMPs in Bullhead Memorial Park are directly between the release point on Kirtland AFB and the Siesta Hills community. These vapor monitoring points serve as an early warning system for any potential vapor migration towards the Siesta Hills community both vertically and laterally."

NMED Comment: While this would be correct for a new spill, the KAFB BFFS site is well past this approach. As has been repeatedly demonstrated, high concentrations of hydrocarbons have already migrated to the VA and Siesta Hills. The purpose of the investigation is to determine if vapor intrusion potential is present at the VA and Siesta Hills, where the highest soil vapor concentrations existed prior to utilization of the biased sampling method, not to assess current vapor migration from the source area.

14. Section 4, Investigative Approach, Rationale, and Guidance, page 4-1

Permittee Statements: "If additional step outs are required, additional permanent SVM locations may be needed."

NMED Comment: NMED, EPA, and DBS&A independently concluded that additional permanent SVM locations are needed in the immediate vicinity of the VA and Siesta Hills homes. Propose appropriate sampling locations in the revised Work Plan.

15. Section 4, Investigative Approach, Rationale, and Guidance, page 4-1

Permittee Statements: "Therefore, the information collected from this investigation and combined with the most current semiannual sampling events will be used to confirm the conclusions of the Risk Assessment Report, Bulk Fuels Facility Spill; Solid Waste Management Unit ST-106/SS-111, dated July 15, 2017, to "demonstrate that [sic]there is no risk to off-site receptors located north of the Base.""

NMED Comment: The KAFB 2017 *Risk Assessment Report* vapor intrusion conclusion was based on the data collected in 2016 by inadequate methods that also included reporting limits for EDB that were all above the NMED residential VISL, at levels up to 4200 times higher than the VISL. The Permittee incorrectly concluded that there is no unacceptable risk to off-based receptors based on this data.

Section 6.5.18, Laboratory Analyses Requirements for all Environmental Media, of the KAFB RCRA Permit requires that,

> "[t]he analyte detection limit for each analytical method shall be less than applicable background or regulatory cleanup level as applicable. Analyses conducted with detection limits that are greater than applicable background or regulatory cleanup levels as applicable shall be considered data quality exceptions, and the reasons for use of the elevated detection limits shall be reported to the Department; results based on these data quality exceptions may not be accepted by the Department...The Department will not accept J-coded (estimated) results for samples requiring dilution prior to laboratory analysis."

In addition, EPA's Guidance Section 5.5.1, Evaluate Sampling Data Reliability and Quality, clearly states,

> "Were the reporting limits sufficiently low for comparison with vapor intrusion screening criteria? EPA recommends use of pre-existing data with non-detect results only when they can be considered reliable on this basis."

All data collected after purging less than one purge volume (2015 to present) are considered to be biased low, not representative of the subsurface conditions, and therefore not acceptable for comparison to NMED VISLs. In addition, all EDB data that was used by the Permittee to conclude that there is "no risk to off-site receptors" is disqualified under both the Permit requirement and EPA guidance listed above; therefore, the data are not acceptable for comparison to NMED VISLs for compliance or any decision making. Remove all references to data collected after 2014 and to the flawed 2017 Risk Assessment Report.

16. Section 4, Investigative Approach, Rationale, and Guidance, page 4-2

Permittee Statements: "As the EPA (2015) states, the vapor intrusion pathway is referred to as "complete" for a building or collection of buildings when five conditions are met under current conditions: (1) a subsurface source of vapor-forming chemicals is present underneath or near the building(s); (2) vapors form and have a route along which to migrate (be transported) toward the building(s); (3) the building(s) is (or are) susceptible to soil gas entry, which means openings exist for the vapors to enter the building(s), and driving forces exist to draw the vapors from the subsurface into the building(s); (4) one or more vapor-forming chemicals comprising the subsurface vapor source(s) is (or are) present in the

indoor environment; and (5) the building(s) is (or are) occupied by one or more individuals when the vapor-forming chemical(s) is (or are) present indoors. If any one of the criteria above is not satisfied, the vapor intrusion pathway is considered incomplete."

NMED Comment: As with previous quoted guidance, this applies to sites that have not been previously fully characterized and demonstrated to have high hydrocarbon concentrations in the soil vapor. See Comment 2 and Figures 3 and 4.

In addition, NMED required the Air Force to test indoor air in 3 industrial buildings on-Base in 2012. Benzene was detected in all 3 buildings, with two buildings exceeding the respective NMED residential risked-based VISL. This testing was conducted while the SVE system was operating in the immediate vicinity, which likely reduced concentrations at the time of the sampling event. Figure 5 indicates the results of the indoor air testing.

Figures 3 and 4 shows historic vapor contamination in the off-base area of concern. As can be seen in the figure, vapor concentrations were over 100 times greater near the VA hospital than in areas proposed for monitoring by the Air Force; currently, no soil vapor monitoring is proposed for the area that contained the highest historic vapor concentrations. If the Permittee's indoor air results were extrapolated to the VA Hospital based on soil vapor concentrations, the indoor air benzene concentration in 2012 would have potentially been approximately 700 ug/m^3, almost 200 times the NMED indoor air VISL of 3.6 ug/m^3.

Remove references to irrelevant guidance that does not apply to the BFFS site and propose appropriate sampling locations in the revised Work Plan.

17. Section 5, Sampling Locations, page 5-1

Permittee Statements: "SVM locations have been selected within the residential area north of Ridgecrest, the VA Medical Center campus, and in the utility easement south of Gibson Boulevard Southeast."

NMED Comment: This statement is misleading. There are no SVM locations within the residential area, nor are there any within the VA Medical Center campus, nor are there any within 1400 ft of Gibson Boulevard Southeast. While one well is located in a more recently constructed parking lot that may belong to the VA, this proposed SVM location is over 1100-ft away from the highest contaminant concentration location in front of the VA Hospital (See Figure 3). Remove the misleading statement from the Work Plan and propose sampling locations within the residential area and VA Medical Center campus in the revised Work Plan.

18. Section 5.1, Soil Vapor Monitoring Locations, page 5-1

Permittee Statements: "Four SVM locations, SVMW-16 through SVMW-19, are proposed for installation just south of the boundary between Kirtland AFB and Bullhead Memorial Park. These locations are proposed to monitor contaminant migration along the northern base boundary and to evaluate utility corridors in the area."

NMED Comment: Four of the eight total proposed wells are located immediately adjacent to the source area where the SVE system operated for 12 years. While one well in this location may provide useful information, this location does not negate the need for soil vapor monitoring wells in close proximity to the buildings on the VA campus and the homes in the Siesta Hills neighborhood. As detailed in Comment 2, EPA expressed that, "[w]e 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." Valid data suggests the presence of high contaminant concentrations below the VA Hospital (See Figures 3 and 4). Reduce these four well locations to one in the revised Work Plan.

19. Section 5.1, Soil Vapor Monitoring Locations, page 5-1

Permittee Statements: "Three proposed SVM locations, SVMW-20 through SVMW-22, are located in the parking lot of Bullhead Memorial Park. Paved areas were chosen because vapors may accumulate under low permeability surfaces such as asphalt or concrete."

NMED Comment: Three of the eight total proposed wells are located in one parking lot completely surrounded by the open ground of Bullhead Park. While paved areas do concentrate vapors, they do so much more readily when not completely surrounded by open ground surfaces. The Permittee must propose samples under asphalt or concrete in parking lots that were installed prior to 2010, in locations directly adjacent to buildings, and in locations where the largest expanses of complete paved coverage exist (i.e., not in or directly adjacent to open surface medians).

Valid data has shown that contaminant concentrations in this area where these wells are proposed were approximately 100 times lower than concentrations near the VA Hospital. The closest proposed well, SVMW-20, is nearly 900 feet away from the VA Hospital. NMED requires siting of soil vapor sampling wells below or directly adjacent to the VA buildings, in the Siesta Hills subdivision, below large, paved areas near the VA and Siesta Hills, and within or directly adjacent to utility corridors in close proximity to these areas. Propose appropriate soil vapor monitoring well locations in the revised Work Plan.

20. Section 8.1, Soil Vapor Sample Collection and Analysis, page 8-2

Permittee Statements: "An isolation valve positioned between the vacuum pump/field sensors and the SUMMA® canister will also be utilized as a secondary isolation point during sample collection but will be open during purging to allow for monitoring of purge vapors. The three-way valve and the isolation valve will ensure that vapor taken into the SUMMA® canister does not flow backwards through the vacuum pump or field sensors."

NMED Comment: This extra isolation valve seems unwarranted based on use of the 3-way valve and is not depicted on Figure 8-1. Reassess the sampling train design and resolve the discrepancy in the revised Work Plan.

In addition, discuss how upstream components of the sampling train will be decontaminated between sampling ports. Revise the Work Plan to include this information.

21. Section 8.1, Soil Vapor Sample Collection and Analysis, page 8-2

Permittee Statements: "Based upon the calculated volume of the tubing set and sampling train (15 ft x 1/4 in. diameter) and the flow rate of the proposed vacuum pump (0.75 cubic feet per minute), the time required to fully purge one bore volume of the tubing is less than one minute. A purge volume of one to three tubing volumes is adequate."

NMED Comment: The proposed flow rate is too high for the ¼" diameter of the tubing. The Permittee must utilize a purge rate of 0.05 cubic feet per minute for ¼" tubing. In addition, one purge volume is not sufficient. The Permittee must purge a minimum of three purge volumes.

The purge volume estimation calculations must be revised. For all purge volume calculations, the Permittee must use the full filter pack dimensions for each individual sampling port, must use the actual boring diameters for each individual sampling port, and must use 0.4 as an estimate for porosity for the filter pack. In addition, the AF must include the volume of the above-ground tubing in the sample train prior to the sample collection point.

The Permittee must also follow the guidelines of Permit Part 6.5.16, Requirements for Soil-Vapor Monitoring. The field log sheets must include logging of % O_2, % CO_2, and VOC concentrations with at least three measurements at least a minute or more apart demonstrating stability of these values and that a representative sample is collected. For clarity, a minimum of three purge volumes must be purged and stability of the field parameters must be demonstrated prior to sample collection. For the shallowest ports at 5-ft bgs, where there is concern regarding infiltration of surface ambient air into the port during sampling, purge flow rates must be reduced and the maximum number of purge volumes to be purged prior to sample collection is five and shall not exceed ten purge volumes for deeper wells. Revise the Work Plan to address these issues.

22. Section 8.1, Soil Vapor Sample Collection and Analysis, page 8-3

Permittee Statements: "Close the isolation valve between the SUMMA® canister and the vacuum pump and turn off the vacuum pump. Open the valve on the SUMMA® canister and allow the soil vapor stream to enter the SUMMA® canister for two minutes."

NMED Comment: Figure 8-1 indicates that a three-way valve will be utilized, but the instruction indicates a separate isolation valve. It appears that this section was amended to include the three-way valve, but the full description of operations was not revised. In addition, provide direction that prior to opening the valve on the Summa canister, any pressurization of the well should be allowed to settle. Resolve the discrepancy and provide adequate direction for field operations in the revised Work Plan.

23. Section 8.2, Quality Assurance/Quality Control (QA/QC) Samples, page 8-3

Permittee Statements: "Two blind field duplicate samples will be taken during the sampling event to identify potential sampling or laboratory error or contamination...Two trip blanks will be submitted to the laboratory for analysis for the sampling event."

NMED Comment: The Permittee is required to collect a minimum of 10% duplicate samples and at least one per sampling day. In addition, trip blanks must be included in each cooler shipped to the lab. The Permittee must also provide an equipment blank collected at the end of the day each day that samples are collected.

24. Section 8.3, Laboratory Analysis, page 8-3

Permittee Statements: "Samples will be analyzed for VOCs by method TO-15."

NMED Comment: In addition to VOCs by method TO-15, the Permittee must include analyses for TPH fractions via Method MA_APH as was conducted prior to 2015 for comparison to historical data. This requirement is also in anticipation of upcoming updates to NMED's Risk Assessment Guidance that will include added VISLs for TPH fractions, as well as the recent addition of these analytes back to the analytical suite for the existing BFFS soil vapor monitoring program.

25. Section 8.3, Laboratory Analysis, page 8-4

Permittee Statements: "In the unlikely event that high-level VOCs are present, a secondary dilution may be required, which would result in elevated LOQ for the sample. Where possible, laboratory processes will be used to minimize dilution for any non-COPC analytes so that the COPC maintain the lowest possible LOQs."

NMED Comment: All results from analyses with reporting limits (RLs or LOQs) greater than the screening level for that contaminant in that media are considered data quality exceptions and are not acceptable for comparison to the screening levels, for decision making purposes, or for presentation in tables and reports as "ND" to avoid misrepresentation of the data. All data with reporting limits greater than applicable screening levels must be flagged in all tables and figures. All data with reporting limits greater than applicable screening levels must be reported numerically as "<[RL]" instead of "ND" in all tables and figures. See Comment 15 above and Section 6.5.18 of the KAFB RCRA Permit. State that these data will be flagged and reported as directed in the revised Work Plan.

26. Section 8.4, Reporting, page 8-4

Permittee Statements: "As part of the phased, step-out investigative approach, this meeting will lead to either a Final Investigation Report or an Interim Investigation Report that requires additional investigation. A Final Investigation Report will be submitted only if the final validated data support the Risk Assessment conclusions that there is no vapor intrusion risk to off-base receptors. If the final validated show areas with elevated soil vapor contamination, then an Interim Investigation Report will be submitted summarizing the data and indicating the areas that warrant additional investigation. Subsequently, an additional WP describing the installation and sampling of step-out shallow SVM locations will be submitted to NMED."

NMED Comment: This reporting approach is not appropriate. The Permittee must propose to submit an Investigation Report by the date established by NMED in its correspondence approving this Work Plan. See Comment 3.

27. Section 8.4, Reporting, page 8-4

Permittee Statements: "The Investigation Report will be prepared and submitted in accordance with the requirements of RCRA Permit Section 6.2.4.3 for Investigative Reports. Data validation and summary tables will be prepared for ease of data review. A summary of field activities and screening data will be included in the investigation report. An electronic copy of the validated analytical data will be included."

NMED Comment: The Investigation Report, as well as the Work Plan, must be prepared in accordance not only with the Permit, but also with the requirements of NMED's September 2, 2020 letter titled *Reporting Requirements for All Document Submittals*. Revise the Work Plan to reference this requirement.

28. Table 9-1, Field Sampling Schedule, page 1 of 1

Permittee Statements: "If sampling is to be completed in 2021 as proposed in this schedule, the Air Force will need comments by July 30, 2021."

NMED Comment: This statement is not appropriate. Remove all such statements from the Work Plan.

29. Table 9-1, Field Sampling Schedule, page 1 of 1

Permittee Statements: "Meeting with NMED to Discuss Results of Investigation"

NMED Comment: Remove any reference to pre-planned meetings with NMED. NMED will meet with the Permittee, if needed, following its review of the Investigation Report.

30. Figure 3-2, Known Utility Locations

NMED Comment: The figure highlights utilities on-Base vs. off-Base, where the investigation is required. The Siesta Hills neighborhood is not visible in the figure. Contamination has already reached the VA Hospital and Siesta Hills, as demonstrated by historic data shown in Figures 3 and 4. Revise the figure to depict the utilities present in the pertinent areas of this investigation, including the VA Hospital and Siesta Hills neighborhood.

31. Figure 5-1, Proposed Soil Vapor Monitoring Locations

NMED Comment: No soil vapor monitoring well is proposed near the VA Hospital and Well 106138, where the highest historic off-base soil vapor contamination concentrations existed. Revise the Work Plan to propose appropriate soil vapor monitoring locations as previously directed. Failure to follow NMED direction constitutes non-compliance and may result in an enforcement action.

The Permittee must address all comments in this letter and submit two hard copies and two electronic copies of the revised Work Plan, a response letter that indicates where all comments were addressed in the revised Work Plan including a table that cross-references where all comments were addressed, and a redline strikeout electronic version of the revised Work Plan indicating where all changes were made no later than **January 31, 2022**.

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

Sincerely,

Ricardo Maestas, Acting Chief
Hazardous Waste Bureau

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