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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 19, 2016

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Michael T. Brandt
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U1601602

RE: DISAPPROVAL
INTERIM MEASURES PROGRESS REPORT FOR SOIL-VAPOR EXTRACTION OF VOLATILE ORGANIC COMPOUNDS FROM MATERIAL DISPOSAL AREA L, TECHNICAL AREA 54
LOS ALAMOS NATIONAL LABORATORY
EPA ID #NM0890010515
HWB-LANL-16-026

Dear Messrs. Hintze and Brandt:

The New Mexico Environment Department (NMED) has received the United States Department of Energy (DOE) and the Los Alamos National Security, LLC (LANS) (collectively, the Permittees) *Interim Measures Progress Report for Soil-Vapor Extraction of Volatile Organic Compounds from Material Disposal Area L, Technical Area 54* (Report) dated May 2016 and referenced by LA-UR-16-23065/EP2016-0054. NMED has reviewed the Report and hereby provides this Disapproval. The Permittees must address the following comments.

1. **Section 2.2.1, Effluent Gas from SVE Units, p 3**

   Permittees' Statement: "The SUMMA vacuum is audible and when the sound associated with the canister stops, the SUMMA valve is closed."

   NMED's Comment: The Permittees' standard operating procedure SOP 5074 specifically states, "[w]hen SUMMA canister pressure valve equals zero, close the SUMMA valve and the regulator valve." Based on SOP 5074, audible sound from the filling of the canister is not an appropriate criterion for determining if the SUMMA canister is adequately filled. Correct this protocol to follow the appropriate method in SOP 5074 for all future pore-gas sample collection.

2. **Section 2.2.3, Subsurface Pore-Gas Sampling, p 3**

   Permittees' Statement: "At the beginning of purge, the ambient surface air concentrations of CH4, O2, VOC, and CO2 are recorded on a purge form. After 10 min, CH4, O2, VOC, and CO2 readings are taken and recorded every minute for 3 min."

   NMED's Comment: The Purge/Screening forms provided for well 54-24399 do not contain recordings of any parameters at the beginning of the purge for any of the sampling events. Ensure that procedures performed in the field adhere to the sampling protocol.

3. **Section 3.0, Summary of Subsurface Pore-Gas Baseline Results, p 6**

   Permittees' Statement: "The mass of 1,1,1-TCA and TCE was calculated using three-dimensional (3-D) data-interpolation techniques described more fully by Weston Solutions, Inc. (Weston 2015, 600886). Assumptions in this technique include fixed subsurface water saturation within each geological unit, fixed Henry's Law partitioning into subsurface pore water, fixed sorption parameters, and a small component (0.05%) of organic carbon within the subsurface. Given these assumptions, the baseline 1,1,1-TCA plume mass in September 2014 was estimated to be 740 kg (1628 lb), while the TCE plume mass was estimated to be 343 kg (755 lb)."

   NMED's Comment: The assumption that is not included in the list above is that there is no further source of volatile organic compound (VOC) contamination in the subsurface at the site. The Permittees are aware that this assumption is not valid; therefore, any attempt to estimate plume mass is not valid and is only an indication of one moment in time. The mass of VOCs contained in drums or other containers within the shafts at MDA L likely greatly exceeds the mass that was calculated. While the Permittees have estimated that they removed approximately a third of the mass calculated above, it is likely that a mass calculation based on sample analyses following contaminant concentration rebound in the subsurface would yield results very close to those cited above. Since there is no accurate method to account for periodic container failure over time within the MDA L shafts, remove any attempts to calculate the subsurface contaminant mass.

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4. Section 4.3.2, Effectiveness of SVE at Selected Boreholes, SVE-East, p 9

Permittees' Statement: "The deepest borehole at MDA L, 54-24399, lies very close to borehole 54-24241; however, this well is cased from the surface to a depth of 565.5 ft bgs. Samples from this well are shown in Figure 4.3-11, with concentrations of all analytes dropping significantly from the pre-SVE baseline. The large drop in concentrations at this depth is not expected based on the conceptual model of flow and transport at the site, where the pressure perturbation from the SVE units is not expected to propagate to depths much below 250 ft bgs."

NMED's Comment: The data are not comparable. The conclusion that there was a large drop in concentration is not correct. The Permittees have compared samples obtained from a one foot (ft) long interval to samples collected from an interval that is over 40-ft in length. This comparison is not appropriate. Remove all statements, figures, etc. from the Report that are based on this inaccurate comparison of data.

5. Section 4.3.2, Effectiveness of SVE at Selected Boreholes, SVE-East, p 9

Permittees' Statement: "The original plan to collect data from a 1-ft interval at the top of the uncased section (568–569 ft bgs) using a dual-packer system was abandoned after the April 2015 sampling event after the lower packer was shredded when it came in contact with vesicular basalt. Subsequently, video logs of the open hole were generated showing a short section of massive basalt near the top of the uncased section followed by vesicular basalt, some having large voids and very sharp rock formations (Appendix F on DVD)."

NMED's Comment: Contrary to the above statement, data from the July 2015 sampling event indicates that the dual-packer system was utilized for collecting samples. Also, concentrations from the April 2015 sampling event appear to indicate that the dual-packer system was operating as designed, while concentrations from the July 2015 sampling event appear to indicate that the dual-packer system was not performing properly. Correct the sampling event date (i.e., from April to July) in the statement regarding discontinuation of usage of the dual-packer system and qualify the dual-packer sampled data for the July 2015 sampling event as invalid.

In addition, the statement above refers to a video log being generated following the shredding of the packer. The video provided on the Appendix F DVD was generated in 2008 or earlier. Provide the video log that was generated in 2015 or revise the Report to state the date that the video was generated.

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6. Section 4.3.2, Effectiveness of SVE at Selected Boreholes, SVE-East, p 10

Permittees' Statement: "The depth to the bottom of the casing was also revised from 568 ft to 565.5 ft bgs after further review of the original drilling log (LANL 2005, 092591)."

NMED's Comment:
a) For many years, the bottom of the casing depth was stated to be 550 ft below ground surface (bgs). Between the May 2014 version of the *Interim Measures Work Plan for Soil-Vapor Extraction of Volatile Organic Compounds from Material Disposal Area L, Technical Area 54* (IMWP) and the September 2014 revision of the IMWP, the stated bottom of the casing depth was changed from 550 ft bgs to 568 ft bgs. Provide justification for changing the bottom of the casing depth. In addition, the full citation for the document cited in the above quote was not found in the Reference section. Include this reference in the revised Report.

b) During the 2011 fourth quarter sampling event, the Permittees collected a sample from the well for the first time with a dual-packer system. The packer system was installed to create a sampling interval from 550 ft bgs to 551 ft bgs. This sampling protocol resulted in a TCE concentration that exceeded the Tier 1 pore gas screening level as described in Appendix B of the Permittees' October 2010 *Corrective Measures Evaluation Report for Material Disposal Area L, Solid Waste Management Unit 54-006, at Technical Area 54, Revision 1.* Following the submittal of the revised IMWP, where the bottom of the casing depth was changed to 568 ft, NMED posed the question of how a sample was collected from an interval between 550 and 551 ft bgs that was sealed off by the packers within the casing, which would have made collecting a sample impossible. No explanation has been provided to date. Provide a response to NMED's question.

c) Vapor monitoring well 54-24399 has had multiple issues over time. One of the issues with this well is that the total depth of the open borehole is in question. The driller's log of the boring indicates the total depth (TD) of the borehole to be 660 ft bgs. The Permittee has been stating for many years that 608 ft bgs is the TD of the open borehole. While the Report states that the depths indicated on the video are inaccurate, it appears that the open borehole depth exceeds the Permittees' stated 608 ft bgs.

The video log of well 54-24399 shows large cavernous voids throughout the open borehole below the casing. Purge logs for sampling of the open borehole between the bottom of the casing and 608 ft bgs indicate a purge volume of approximately 300 liters. It is unclear how this value was calculated. NMED's calculation of the volume of the borehole based on the boring log, which states that a 5.5-inch bit was used from 568 to 598 ft bgs, then a 5.25-inch bit was used from 598 to 660 ft bgs, results in a value of 404 liters, not including the volume of the sample line. The actual purge volume of the open borehole including all of the voids, as well as the extra 52 ft of open borehole not accounted for in the 608 ft bgs TD value, is likely to be at least an order of magnitude higher than the calculated value and possibly more. Results from samples collected in an unpurged borehole are likely not representative of the concentrations actually present in the formation.

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The borehole video log provided in Appendix F shows that the casing terminates at the top of an approximate three ft thick void area. Following the small void area, the borehole runs through an approximately 12 ft thick competent formation. For all future sampling at well 54-24399, the Permittees must utilize a dual-packer system, positioning the upper packer near the bottom of the casing and the lower packer close to the top of the approximate 12 ft section of competent formation that directly underlies the three ft void section.

Further sampling of this well using methods similar to those used in the past and the derivation of conclusions based on inaccurate details of the well will likely cause more confusion over time. Therefore, based on all of the issues detailed above, all data collected from this well since its installation must be revisited to determine its acceptability and the well must be re-characterized.

The Permittees must submit a work plan to accurately characterize well 54-24399. This characterization must include production of a new video log with accurate depth readings in order to finalize the total casing depth, as well as the total borehole depth. In addition, the Permittees must include a plan for characterizing contamination within the different void-bearing zones in the open borehole. Data previously collected from well 54-24399 indicate that the upper void area near the bottom of the casing is in contact with the contaminated vapor plume at MDA L and that TCE concentrations in that zone exceed Tier 1 screening levels. The Permittees must utilize a dual-packer system to isolate the different zones in the open borehole to collect samples for contaminant analysis. Based on the borehole video log provided, there are at least four separate void-bearing zones in the open borehole that must be isolated and samples collected. Purge volumes for these zones must be sufficient to remove all stagnant and/or mixed pore-gas in order to provide representative samples from the formation surrounding the open borehole.

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7. Section 4.3.2, Effectiveness of SVE at Selected Boreholes, SVE-East, p 10

Permittees' Statements: "Boreholes 54-02089 and 54-24238 are approximately 70 ft and 100 ft from the SVE-East extraction well and are fairly close to the eastern disposal shafts (Figure 1.1-1). Many of the ports in these wells show increased concentrations for all analytes, particularly at the deepest 89 ft ports (Figures 4.3-13 and 4.3-14). Only in the shallowest ports are concentrations reduced and only for certain analytes (TCA in both holes, and all four analytes shown in 54-02089). The Laboratory continues to analyze these data and has not determined the cause for the increases in concentration."

NMED's Comment: In this and other sections of the Report, the Permittees state that contaminant concentrations increased in certain wells and ports, but offer no explanation as to why concentrations have increased. For wells near the disposal shafts, an obvious cause of increased contaminant concentrations is container failure within the shafts. Provide a discussion of the potential for container failure to be the cause of increased contaminant concentrations at MDA L.

8. Section 6.3, Deep Borehole Dual-Packer Failure, p 14

Permittees' Statements: "During the April 2015 sampling event, the dual packer sampling system used to isolate a 1-ft interval (568–569 ft bgs) directly beneath the casing of borehole 54-24399 was badly damaged. The lower packer was shredded when it came in contact with very sharp basalt. The sharp nature of the vesicular basalt can be observed in the video log of borehole 54-24399 (Appendix F). The video log shows a limited region of massive basalt directly below the casing (less than 2 ft), followed by a large void area. To avoid further problems with packer destruction, the decision was made to stop using the dual-packer in the open borehole. The single packer will continue to be placed at the bottom of the casing (561.5 to 565.5 ft bgs) to collect pore-gas samples in the open portion of the borehole."

NMED's Comment: The Permittees' decision to stop using the dual-packer sampling in the open borehole was not appropriate. It appears that no sample collected within the open borehole has been properly attained and the validity of the subsequent analytical data is questionable. Review of the video log prior to using the dual-packer system, as well as accurate depth data within the well, likely could have prevented the packer damage. To avoid further problems with packer damage, the Permittees must re-characterize well 54-24399 as outlined in Comment 6. Continue to utilize the dual-packer system for all future pore-gas sample collection from well 54-24399.

9. Section 8.0, Recommendations, p 15

Permittees' Statements: "Develop cleanup goals to support the corrective measures implementation phase of site closure."

NMED's Comment: Cleanup goals at MDA L may not lead to site closure for some time since the MDA L shafts contain an ongoing source of contamination. Modeling by the Permittees has indicated that container failure within the shafts will likely continue for the foreseeable future. Long term monitoring will likely require re-starting of the soil vapor extraction system at various times if container failure occurs and pore-gas contaminant concentrations subsequently increase.

10. Section 8.2, Tracer Study, p 15

NMED's Comment: NMED recommends that the proposed tracer study be incorporated into the work plan for re-characterization of well 54-24399. Injection of tracers into isolated sections of the open borehole may yield higher quality data than one injection into the entire approximate 95 ft of open borehole that crosses multiple void and fracture zones within the basalt. NMED is concerned that the lack of any observation wells in the tracer study will limit the usefulness of the data.

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11. Figure 4.3-11, 1,1,1-TCA, TCE, PCE, and 1,2-DCA concentration data for borehole 54-24399, p 38

NMED's Comment: Points on the graphs do not match data provided in the Tables. For instance, in the first graph for TCA, the November 2015 sampled value was 130-ppbv per the sample data tables in Appendix B, but the graph indicates a value closer to approximately 25-ppbv. Ensure that all figures accurately depict the analytical data. Also see Comment 4.

NMED would be happy to meet with the Permittees to discuss any or all of the comments above. The Permittees must address all comments in the revised Report. All submittals must be in the form of two paper copies and one electronic copy in accordance with Section XI.A of the Order. In addition, the Permittee must include a response letter that details where each comment was addressed, cross-referencing NMED's numbered comments. The Permittee must also submit an electronic redline-strikeout version of the revised Report. The revised Report must be submitted on or before **October 31, 2016.**

Please contact Ben Wear of my staff, at (505) 476-6041, should you have any questions or concerns.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
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File: Reading and LANL 2016, MDA L, LANL-16-026

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