Response to the Disapproval for the Supplemental Investigation Report for Upper Sandia Canyon Aggregate Area, Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-13-042, Dated April 14, 2015

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. The comments are divided into general and specific categories, as presented in the notice of disapproval. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment. This response contains data on radioactive materials, including source, special nuclear, and byproduct material. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with U.S. Department of Energy policy.

GENERAL COMMENTS

NMED Comment

1. *Many of the sites evaluated at Upper Sandia Canyon Aggregate Area (for example, Solid Waste Management Units [SWMUs] 03-014(k,l,m,n), 03-045(a), 03-015, 03-052(f), 03-047(g), 03-051(c), 61-002, and Area of Concern [AOC] 03-053) contained concentrations of polycyclic aromatic hydrocarbons (PAHs) in soil that resulted in calculated human health risks being greater than the NMED target risk level of $1E^{-5}$ for the industrial and/or residential land use scenarios. Total petroleum hydrocarbon (TPH) contamination is also present at many of these sites and as such, there is not sufficient evidence to conclude that PAH concentrations are solely related to asphalt paving and/or laboratory infrastructure. If the PAH concentrations in soils within the Upper Sandia Canyon Aggregate Area are indeed related to laboratory infrastructure, then the Permittees may propose to develop site-specific background comparison values for PAHs in soil where sources of PAHs have not been identified. If there are anthropogenic levels of PAHs at some of the Los Alamos National Laboratory (LANL) sites where the history does not indicate a specific source of PAHs, then site-specific background comparison values may be proposed in order to determine the extent of site related contamination versus ambient levels of PAHs at that site. In lieu of establishing background levels, justification must be provided on a site-by-site basis to demonstrate the PAHs are not present as a result of past LANL activities. Evidence could include, but is not limited to, a discussion of past activities/operations and photographs showing site use and also showing how storm water runoff/run on could occur. If it is determined that sufficient lines of evidence are provided to demonstrate that the PAHs are not attributed to LANL, the risks from the PAHs must still be evaluated and included in the uncertainty section of the risk assessment.*

   It should be noted that even if an off-site source of PAHs is identified, cleanup may still be necessary, in which case it would be the Permittees decision whether or not to seek financial relief from the responsible party that the Permittees identifies as the source of the contamination. If a responsible party cannot be identified then it is the Permittees' responsibility to achieve the applicable cleanup levels.

LANL Response

1. Of the sites listed in the comment, Solid Waste Management Units (SWMUs) 03-045(a), 03-015, and 61-002 and Area of Concern (AOC) 03-053 are recommended for corrective action complete with controls because they pose no potential unacceptable risks to human health under the industrial and construction worker scenarios and to ecological receptors. No discussion of polycyclic aromatic hydrocarbons (PAHs) not being site-related is presented anywhere in the report for these sites. Although the target risk level of 1×10^{-5} was exceeded for the industrial scenario for SWMUs 03-045(a) and 03-015 and AOC 03-053 from PAHs, the uncertainty discussions for these sites revolve around the overestimation of risks when the maximum detected concentrations are used as exposure point concentrations (EPCs). The uncertainty discussion does not address the source of the PAHs. No revision to the report is necessary for these sites.

   AOCs 03-047(g) and 03-051(c) also pose no potential unacceptable risks to human health under the industrial and construction worker scenarios and to ecological receptors but do pose potential unacceptable risks under the residential scenario based on the maximum detected concentrations of PAHs. Total petroleum hydrocarbons (TPH) diesel range organics (DRO) were not detected at AOC 03-047(g) and were detected at low concentrations (maximum of 62.9 mg/kg) at AOC 03-051(c). Low concentrations of TPH, including TPH-DRO, are often present even if the source of the PAHs is asphalt (i.e., asphalt contains petroleum hydrocarbons). The binder bitumen, also known simply as asphalt, is the residual portion left over from the refining process of crude petroleum. The refining process separates the bitumen from lighter oils and fuel oils, including kerosene, diesel oil, butanes, and components to gasoline. The ratio of the TPH-DRO maximum detected concentration to the NMED industrial and residential screening guidelines for diesel No. 2 were 0.05 and 0.09, respectively. The low TPH-DRO concentrations support the lack of a petroleum-based oil release at these sites.

   AOC 03-047(g) is a paved area on the north side of building 03-141 at Technical Area 03 (TA-03) where drums of acetone, vacuum pump oil, and ethylene glycol were stored. AOC 03-051(c) consists of two former areas of stained asphalt at TA-03 attributed to operational leaks of the vacuum pump oil previously stored at AOC 03-047(g), which was cleaned up during a 1995 voluntary corrective action (VCA). Based on interviews with individuals who worked in building 03-141 when the vacuum pumps were in use, the Laboratory has established that only basic light nonpetroleum mineral oil was used. Although Comment 21 of NMED's notice of disapproval calls into question their accuracy, interviews with current and former workers are the main, if not often the only, sources of site information for the site descriptions and operational histories presented in these reports as well as historical operable unit (OU) work plans, historical investigation reports, and investigation work plans. The information provided in these interviews is very reliable and often replaces or clarifies available written documentation found in other sources (e.g., the SWMU report). Corrections to site descriptions and operations are often based on the observations of workers at a facility. As noted in a draft of the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) work plan for OU 1114, Addendum 1, the oil used in the vacuum pump is nonhazardous mineral oil (LANL 1995, 062241, p. 5-18-1) (see page from draft work plan in Attachment 1). The material safety data sheet (MSDS) referenced in the approved RFI work plan for OU 1114, Addendum 1, documents the oil used was nonhazardous mineral oil (LANL 1995, 057590, p. 6-111). A copy of the MSDS is included in Attachment 2. Therefore, the Laboratory maintains that information gleaned from interviews is reliable and supports the conclusion that the PAHs detected are not from the established uses of the sites and are from the asphalt-paved areas within and around the AOCs under which the samples were collected (see response to Comment 21). The risks at these sites with PAHs included has been evaluated. The uncertainty discussions address the source of the PAHs and the basis for the PAHs

not being from the established use of the sites. Site photographs are included as Attachment 3 to this response and in Appendix I to support the conclusion that asphalt-paved areas are present at these sites. Text has also been added to the uncertainty discussion in Appendix I.

SWMUs 03-014(k,l,m,n) and 03-052(f) pose potential unacceptable risks to human health under the industrial and residential scenarios but do not pose a potential unacceptable risk to human health under the construction worker scenario and to ecological receptors. The potential unacceptable risks at these sites are solely from PAHs.

At SWMU 03-014(k,l,m,n), a total of 45 samples were collected in and around the sludge beds, of which 5 or 6 detected concentrations of PAHs were reported and only 1 of which was from a sample collected within the beds. The detected concentrations from the sample within the bed were 2 orders of magnitude higher than concentrations in samples outside the bed. The elevated PAH concentrations were detected only at the surface (0.0–0.17 ft below ground surface [bgs]) at this location, PAHs were not detected in the deeper samples (0.75–1.75 ft and deeper), and this location is the only one at which the full suite of PAH analytes was detected. The result supports the assumption that the PAH concentrations detected in the one sample collected within the beds were from asphalt and not from site-related contamination. The cancer risks are based on single elevated detected concentrations of PAHs from a single location. The industrial cancer risk was calculated using the maximum detected concentrations of benzo(a)anthracene; benzo(a)pyrene; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene because the detected concentrations were too few to calculate an upper confidence limit (UCL). This risk estimate is conservative and is not representative of the exposure because the cancer risk is biased by single elevated detected concentrations of PAHs from a single location (other detected concentrations were an order of magnitude or more below the maximum detected concentrations). The residential cancer risk was also biased by elevated detected concentrations of PAHs from a single location (the same PAHs were the primary contributors).

As noted in the site descriptions, a decaying 3-ft-high soil berm covered with 2 in. of weathered asphalt separates the beds. The asphalt is broken and cracked in various places, exposing the underlying soil-tuff and likely resulting in pieces of asphalt falling into the drying beds. The limited occurrence of elevated PAHs in the beds supports the conclusion that the sample contains a piece or pieces of asphalt rather than the detections being the result of residual contamination from site operations. Furthermore, the entire site [including Consolidated Unit 03-014(a)-99] was a former sanitary wastewater treatment plant, and it is unlikely PAHs were present in the wastewater other than at trace concentrations. PAHs were also not detected at the locations with elevated TPH-DRO, indicating the TPH constituents have degraded and all that is left are the longer-chained hydrocarbons as residue in a limited area and depth. These longer-chained hydrocarbons are persistent but are less toxic than the shorter-chained hydrocarbons. Photographs showing the weathered asphalt on the berms and the presence of asphalt within the sludge bed are included in Attachment 3 and have also been added to the revised report in Appendix I as part of the uncertainty discussion to provide additional evidence on the source of the PAHs.

At SWMU 03-052(f), the industrial risk was calculated using the maximum detected concentrations of the chemicals of potential concern (COPCs) because fewer than eight samples were collected from the depth interval of 0.0–1.0 ft. The primary COPCs contributing to the cancer risk were PAHs [benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene]. The risk estimate is conservative and is not representative of the exposure because the EPCs are biased by one elevated detected concentration for each COPC (other detected concentrations were an order of magnitude or more below the maximum detected

concentrations). In addition, the concentrations in the deeper sample (1.0–2.0 ft) at the location of the maximum concentrations are 2 orders of magnitude lower. The large difference between the maximum concentrations and the deeper concentrations indicates the presence of a piece(s) of asphalt in the sample(s), which would not result in risk to an individual.

SWMU 03-052(f) is a former National Pollutant Discharge Elimination System– (NPDES-) permitted outfall that received wastewater from floor drains [AOC 03-013(b)], sinks, water fountains, and a storm drain [SWMU 03-013(a)], which served building 03-38 until 1987 when the drains in building 03-38 were rerouted to the TA-03 sanitary sewer system. Stoddard solvents, dry acid, and caustic materials from the maintenance shop were discarded through sinks and floor drains to this outfall. Spent paint solvents and cutting oils contaminated with machined beryllium particles may also have been released to the floor drains during the 1960s and 1970s. Cooling water for welding torches was also discharged directly to the drains. In addition, three minor spills occurred that may have discharged to the outfall: 200 gal. of water-waste oil mixture, approximately 1 qt of compressor oil, and approximately 15 gal. of diesel fuel. The diesel-contaminated asphalt and soil were removed. The spills occurred approximately 27 yr ago and the other discharges occurred approximately 28 to 54 yr ago, and over time the related contaminants have been washed through the outfall and channel. This is supported by the low TPH-DRO hazard quotient (HQ) of 0.4 for the industrial scenario. Runoff from parking lots and the surrounding areas also discharge to the outfall and, as noted in the RFI report, concentrations of PAHs were attributed to runoff from the adjacent parking lot (LANL 1996, 052930). The area that drains to the outfall has been drastically modified since the RFI. As a result, what remains in the channel below the outfall is not related to site operations but rather is related to the runoff from the adjacent infrastructure. Photographs of the SWMU 03-052(f) site are included in Attachment 3 of this response and in Appendix I as part of the uncertainty discussion of the revised report to document site conditions and associated activity patterns.

At both of these areas [SWUMs 03-014(k,l,m,n) and SWMU 03-052(f)], there is currently little to no exposure to a worker or any other receptor because the areas are not used for operational or other activities. The former sludge beds are unoccupied and the former NPDES-permitted outfall area is not used for recreation or any Laboratory activity. The channel is approximately 365 ft long and runs through an area where paved sidewalks run north and south and parallel to the channel (the sidewalks are at least 50 ft from the channel) so a person would not be exposed to the water and soil, unless he or she deliberately walks off the sidewalk to get to the channel, which is impracticable. Therefore, evaluating potential risk using the generic industrial scenario is not representative of any hypothetical or actual exposure at these sites. The activity patterns that might be somewhat representative (other than no exposure) include groundskeeping and/or site maintenance/cleanup and occasional site visits if the sludge bed area is used to store equipment or materials. These types of activities entail much less exposure time and frequency than is currently used for the industrial scenario but may occur over a similar exposure duration. Conservatively, one might assume an exposure frequency of 12 d/yr or 24 d/yr (1 d/mo or 2 d/mo), an exposure time of 8 h/d, and an exposure duration of 25 yr to conduct the activities described above.

The industrial soil screening levels (SSLs) employ an exposure frequency assumption of 225 d/yr. Equation 12 of the NMED guidance shows that the pathway-specific ingestion, inhalation, and dermal exposure soil concentrations are each inversely proportional to the exposure frequency value (NMED 2012, 219971). The final SSL, which is calculated as the reciprocal of the reciprocal of the three pathway-specific concentrations, is therefore directly proportional to the exposure frequency. The industrial SSL of 2.34 mg/kg for benzo(a)pyrene can be multiplied by the ratios (225 d/yr / 12 d/yr and 225 d/yr / 24 d/yr) to calculate SSLs under the alternate exposure assumptions. The carcinogenic PAHs driving the total excess cancer risk at the sites are benzo(a)anthracene; benzo(a)pyrene;

benzo(b)fluoranthene; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene. The benzo(a)pyrene and dibenz(a,h)anthracene SSLs are multiplied by 10 to derive the SSLs for benzo(a)anthracene; benzo(b)fluoranthene; and indeno(1,2,3-cd)pyrene. Industrial SSLs using the exposure frequencies of 12 d/yr or 24 d/yr are 43.9 mg/kg and 21.9 mg/kg for benzo(a)pyrene and dibenz(a,h)anthracene, and 439 mg/kg and 219 mg/kg for benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene. In addition, 95% UCLs were calculated for SWMU 03-052(f) to be used as the EPCs (15.8 mg/kg, 14.8 mg/kg, 19 mg/kg, 0.605 mg/kg, and 3.51 mg/kg) rather than the maximum detected concentrations, while the same EPCs were used for SWMUs 03-014(k,l,m,n).

The previous industrial total excess cancer risks for the five PAHs listed are 5×10^{-5} and 1×10^{-4} for SWMUs 03-014(k,l,m,n) and 03-052(f), respectively (cancer risks for the other COPCs are 4×10^{-6} and 7×10^{-7}, respectively). If the modified SSLs above are used [along with the 95% UCLs for SWMU 03-052(f)], the total excess cancer risks for the five PAHs are 3×10^{-6} and 6×10^{-6} for 12 d/yr and 24 d/yr, respectively, at SWMUs 03-014(k,l,m,n) and 4×10^{-6} and 9×10^{-6} for 12 d/yr and 24 d/yr, respectively, at SWMU 03-052(f). Therefore, the total excess cancer risks for the industrial scenario using the modified SSLs are less than or equivalent to the NMED target risk level of 1×10^{-5}. The uncertainty section has been revised to include the modified industrial SSLs and the potential risks for these sites.

The Permittees cannot be required to clean up constituents from non-site-related sources. Neither the New Mexico Hazardous Waste Act nor RCRA provides authority to order cleanup of constituents that were not treated, stored, or disposed of by a regulated entity. Further, neither act provides a mechanism for actions for contribution or cost recovery against a third party. Finally, as is often the case with naturally occurring and anthropogenic background constituents, the responsible-party approach does not apply.

NMED Comment

2. *For the vapor intrusion risk and hazard calculations, it is not clear what criteria were used to determine whether a constituent was considered a volatile organic compound (VOC). NMED (2014) guidance states that a constituent is sufficiently volatile if it has a Henry's Law Constant greater than $1E^{-5}$ atm-m^3/mole and an atomic mass less than 200 g/mole. If these criteria are applied, then many VOCs were omitted from the vapor intrusion risk assessment calculations. Clarify the criteria that were used, and revise the assessments to include additional constituents to the vapor intrusion risk assessment calculations in accordance with NMED guidance referenced above.*

LANL Response

2. The criteria used to determine whether a constituent is considered a volatile organic compound (VOC) are a Henry's Law Constant greater than $1E^{-5}$ atm-m^3/mole and an atomic mass of less than 200 g/mole. The statement that many VOCs were omitted from the vapor-intrusion risk-assessment calculations is incorrect. As noted in the text in section I-4.3, the vapor-intrusion pathway was not evaluated if VOCs were not detected at a site or if the sites are not suitable for placement of a structure. Sites included in the latter category were SWMUs 03-045(a), 03-045(b), 03-045(c), 03-045(e), 03-045(f), 03-045(g), 60-006(a), and 61-002 and AOCs 03-014(b2) and 03-014(c2). The only chemicals added to the Johnson and Ettinger spreadsheets and the vapor-intrusion screening tables were 2-hexanone and 2-methylnaphthalene for some sites. Methylnaphthalene(2-) was added because the reference concentration for naphthalene could be used as a surrogate toxicity value. Other chemicals meeting the criteria and detected at sites in the Upper Sandia Canyon Aggregate Area included acenaphthene, anthracene, fluorene, phenanthrene, and pyrene. However, these

chemicals were not included in the vapor-intrusion screening because they have no inhalation toxicity values with which to calculate screening values and no surrogate toxicity data are available. Cyanide was also not included because the VOC designation assumes it is present as hydrogen cyanide in the soil, which is unlikely given the soil pH at the sites is neutral to slightly alkaline.

NMED Comment

3. In the provided Johnson and Ettinger spreadsheets, it appears that the toxicity data were not updated prior to the use of the models to calculate risk-based indoor air concentrations and that toxicity data supplied in the 2004 version of the Johnson and Ettinger model were applied. Update the vapor intrusion calculations to utilize current toxicity criteria where applicable.

LANL Response

3. The VLOOKUP page of the Johnson and Ettinger spreadsheets has been updated with current toxicity data, including those chemicals where unit risk factors and/or reference concentrations are not available. In addition, surrogate toxicity values are indicated in red and a column has been added to include the surrogate chemical. All the spreadsheet calculations for vapor intrusion have been updated based on this and other revisions.

NMED Comment

4. The industrial screening levels for TPH were applied for the construction worker scenario as construction worker TPH screening levels were not available. This is acceptable. However, it is likely that the industrial screening levels underestimate risk to a construction worker especially for the inhalation and dermal pathways. Revise the Report to provide a discussion of uncertainties in the risk assessment (Section I-4.4).

LANL Response

4. The following text has been added to section I-4.4.2 of the report.

> The industrial TPH-DRO screening guideline was used for the construction worker scenario to give some indication of whether the TPH-DRO concentrations might present a concern for a construction worker receptor. The differences in exposure parameter values between the scenarios can be used to assess the relative degree of under- or overestimation of risk for the construction worker. The construction worker scenario has a higher soil ingestion rate (330 mg/d versus 100 mg/d), a slightly higher soil adherence factor (0.3 versus 0.2), and a much higher particulate mass loading for the inhalation pathway. A comparison of construction worker and industrial SSLs for noncarcinogenic organic chemicals indicates that a construction worker scenario TPH-DRO screening guideline might be between three to five times more restrictive than the industrial screening guideline. In practice, the duration of construction projects is often less than 1 yr such that the exposure frequency of 250 d/yr may overestimate actual conditions. Chronic toxicity reference dose and reference concentration values are also used in developing screening values, and these values may be significantly more restrictive than values pertaining to the subchronic exposure period applicable to a construction worker scenario. However, it is difficult to determine the toxicity of weathered petroleum products in soil solely from TPH results. Much of the uncertainty introduced by using the industrial

screening guideline for TPH is addressed by evaluating individual petroleum-related contaminants using the construction worker SSLs.

NMED Comment

5. *An inconsistency in how the site attribution analyses were conducted was noted. If too few samples were collected to conduct a statistical comparison of site data to background, the maximum detected concentration from the site was compared to the range of background detections. However, following NMED guidance (NMED, 2012), if the maximum detected concentration from a site is greater than the background reference value and too few samples and/or positive detections are available to conduct a statistical comparison and additional data are not proposed, then the constituent should be retained as a constituent of potential concern (COPC). Comparison to the range of background is not sufficient grounds alone to eliminate a COPC. Step 3 of the NMED site attribution analysis does allow for additional lines of evidence to support elimination of a constituent as a COPC. Site history is listed as a line of evidence that may be used; however, sufficient site history must be available to justify why the constituent would not be present due to historical activities. Consistent with EPA guidance (US EPA, 1989), if there is historical evidence to suggest that the constituent could be present at the site, then the constituent must be retained as a COPC. NMED has updated its risk assessment guidance (NMED 2014) which includes clarification related to background evaluation. Refer to the updated guidance when reviewing this comment (5). Revise the SIR accordingly.*

LANL Response

5. The supplemental investigation report (SIR) has been revised. The number of samples per medium needed to conduct statistical comparisons to background has been changed to eight or more samples. Additional lines of evidence have been added to support the elimination of inorganic chemicals as COPCs. Based on the additional statistical comparisons and the lines of evidence provided, COPCs have been eliminated or added and nature and extent discussions have been deleted or added. The risk assessments have also been revised accordingly.

SPECIFIC COMMENTS

NMED Comment

6. Section 6.4.1.4, Site Contamination, pages 29-30:

The text states that the extent of contamination is defined at SWMU 03-009(a). However, concentrations of several organic chemicals increased with depth at locations 03-608182 and 03-608181. For example, the concentration of benzo(a)pyrene in the samples collected from 0.0-1.0 feet below ground surface (ft bgs) and 1.0-2.0 ft bgs was 0.0557 mg/kg and 0.166 mg/kg, respectively, which is above the NMED residential screening level of 0.148 mg/kg. It was also noted that the only historical sample collected between 2 ft bgs and 9 ft bgs (location 03-22537) may not be representative of current site conditions. While the depth of contamination appears defined at SWMU 03-009(a), contamination appears uncharacterized from 2 to 9 ft bgs. Given that the residential risk already exceeds target levels, additional sampling may reveal an increased risk for the construction worker and ecological receptors. Further sampling is required in order to characterize the extent of contamination and risks and hazards associated with exposure to soil 2-9 ft bgs at SWMU 03-009(a). The Permittees must propose to collect additional samples from 2-9 ft bgs in the Phase II work plan which will be prepared after the SIR is approved.

LANL Response

6. Concentrations at locations 03-608182 and 03-608181 did not change substantially with depth. Changes at location 03-608182 ranged from 0.02 mg/kg to 0.3 mg/kg, and changes at location 03-608181 ranged from 0.014 mg/kg to 0.026 mg/kg. Most concentrations at location 03-608181 were below the estimated quantitation limits. The text has been revised to include this information.

   As shown on Plates 1 and 2, a historical sample was collected between 2 ft and 9 ft bgs within the boundary of SWMU 03-009(a) at location 03-22537. The Laboratory could find no note or statement anywhere in the SIR that the sample collected between 2 ft and 9 ft bgs at location 03-22537 may not be representative of current site conditions. The sample from 4.0−5.0 ft bgs at this location was collected in 2003, only 6 yr before the 2009 investigation, and the site has not been disturbed so the sample is representative of current site conditions. No inorganic chemicals were detected above background values (BVs) and no organic chemicals (analyzed for VOCs, semivolatile organic compounds, TPH-DRO, TPH–gasoline range organics) were detected.

   As described in the approved investigation work plan for Upper Sandia Canyon Aggregate Area (LANL 2008, 103404.43; NMED 2008, 102721), the objective of the sampling performed during the 2009 investigation was to define vertical extent at locations 03-608178, 03-608179, and 03-608180 and lateral extent at locations 03-608181 and 03-608182. Based on the results of the sampling at these locations, lateral and vertical extent have been defined. The approved investigation work plan did not identify the need to collect additional samples within the depth interval of 2 ft to 9 ft bgs. The results of the human health risk screening for the construction worker scenario at SWMU 03-009(a) are a cancer risk of 3×10^{-7} and a hazard index (HI) of 0.01. Both these results are approximately 2 orders of magnitude below NMED target levels. Similarly, the ecological risk-screening results show adjusted HIs less than 0.1 for all receptors, except plants (and less than 0.03 for all receptors, except earthworms and plants), and a lowest-effect ecological screening level–based HI for the plant of 0.5. Based on the existing sample results, it is very unlikely that additional sampling results between 2 ft and 9 ft bgs would cause risk targets for the construction worker scenario or ecological receptors to be exceeded. Additional sampling at SWMU 03-009(a) is not warranted.

NMED Comment

7. Section 6.4.2.4, Site Contamination, page 32:

According to Table 6.4-5, chromium was detected in 6 tuff samples at SWMU 03-029, rather than 1 soil and 2 tuff samples, as stated in the text. The discussion on nature and extent of chromium on page 34 appears to be based on incorrect reporting of sampling media. Resolve the discrepancy and revise the SIR accordingly.

LANL Response

7. The text in section 6.4.2.4 is correct: chromium was detected above BVs in one soil and two tuff samples. The media columns in Tables 6.4-4, 6.4-5, and 6.4-6 were incorrect for four samples and have been revised to indicate “Soil” as the medium for samples RE03-09-13443, RE03-09-13444, RE03-09-13446, and RE03-09-13447. The chromium data for samples RE03-09-13443, RE03-09-13446, and RE03-09-13447 are below the soil BV and are indicated with a “—” to signify they are not detected above BV. The nature and extent discussion of chromium is correct. In addition, Table 6.4-5 has been revised to add four nondetect results above the soil BV for cadmium and to remove four nondetect results for selenium below the soil BV.

NMED Comment

8. Section 6.5.4.4, Nature and Extent of Contamination, page 46:

While evaluating the nature and extent, the Permittees repeatedly make statements that concentrations were similar across the site and provide a range of concentrations of detected contaminants. However, there was more than an order of magnitude difference between the range of detected concentrations (e.g., detected concentrations of copper ranged from 0.696 mg/kg to 10.2 mg/kg). NMED concurs that no further investigations are warranted at this site, but either remove the references to concentrations being similar across the site and revise the text accordingly or provide an explanation of why the Permittees believe the concentrations are similar.

LANL Response

8. Text has been revised to state, "Concentrations did not change markedly across the site." Although in the case noted in NMED's comment that there was more than an order of magnitude difference, the actual range of concentrations (maximum minus minimum) was only 9.5 mg/kg, which is less than the range of the soil background data set (15.75 mg/kg). The range of copper concentrations in the soil background data set actually approaches 2 orders of magnitude (minimum 0.25 mg/kg and maximum 16 mg/kg). In the other cases in the report where this statement is made, the ranges of concentrations are from 0 mg/kg to 19 mg/kg (all sites combined). In effect, there is not a substantial change in concentrations across these sites to warrant additional sampling.

NMED Comment

9. Section 6.6.1.4, Nature and Extent of Contamination, page 51:

At SWMU 03-012(b), chromium concentrations detected in soil from samples collected from location 03-608199 were used to determine that the lateral extent of chromium contamination was defined. However, this location is not depicted on either Plate 8 or Figure 6.6-1, making it difficult to evaluate whether the extent is defined. In addition, data for samples collected at location 03-608199 is not included in Table 6.6-2. Revise the SIR accordingly.

LANL Response

9. Location 03-608199 is associated with SWMU 03-014(q), which is a holding tank associated with the former TA-03 wastewater treatment plant. This SWMU received a certificate of completion for corrective actions complete without controls from NMED (2011, 111821) and is not included in the SIR. Figure 6.6-1 and Plates 8 and 9 have been revised to label SWMU 03-014(q) and to include locations 03-608198, 03-608199, and 03-608200 with inorganic chemical concentrations above BVs and detected organic chemicals. The nature and extent discussion in section 6.6.1.4 has been revised to reference the plates, where appropriate. Table 6.6-2 has not been revised.

NMED Comment

10. Section 6.6.2.5, Summary of Health Risk Screening, page 57:

The Permittees state "[B]ased on the risk-screening assessment results, no potential unacceptable risks exist for the industrial, construction worker, and residential scenarios at SWMU 03-045(b)." The statement is inaccurate since the extent of contamination is not defined at the site as stated in

Section 6.6.2.4 (Site Contamination) of the SIR. Only two samples were collected from one location at the site and the Permittees concluded that the lateral extent of contamination is not defined at the site. In addition, the samples were not analyzed for hexavalent chromium which is a potential contaminant for the site. It is acceptable to perform screening level risk evaluations on an incomplete data set to guide further investigations; however, the statement that the site does not pose an unacceptable risk before characterization of the site is complete, is not supported by data. Similarly, ecological risk cannot be determined until complete site characterization data is available. Revise the text to either remove the statement or clarify that this risk assessment is based on insufficient data. This comment also applies to SWMU 03-013(i), AOC 03-014(c2), SWMU 03-045(c), SWMU-03-045(e), AOC C-03-022, and SWMU 60-007(a).

LANL Response

10. The text has been revised to state, "[B]ased on the risk-screening assessment results *and the available data*, no potential unacceptable risks exist…." This statement is accurate and appropriate for each of the sites mentioned in the comment. The risk-screening assessments indicate no potential unacceptable risks exist under the industrial, construction worker, and residential scenarios at these sites based on the data presented in the report. No conclusion or recommendation is made based on these statements. The fact that additional sampling is warranted for extent purposes is separate from the risk-assessment results. The text in the conclusion section makes no statement regarding the risk-assessment results and makes no recommendation for corrective action complete for these sites. The recommendations section makes it clear that additional sampling at these sites is needed. In addition, the text in section 10.1 states, "Upon completion of the proposed Phase II sampling, the data will be used to confirm the extent of contamination has been defined and to complete human health and ecological risk-screening assessments for all remaining sites. The results will be presented in a Phase II investigation report for the Upper Sandia Canyon Aggregate Area."

NMED Comment

11. Section 6.6.3.4, Site Contamination, page 59:

Samples were collected from two depths from only one location at the SWMU 03-045(c). The lateral and vertical extent of contamination is not defined because samples were collected only from one location. Concentrations of several organic chemicals increased with depth at this location. For example, the detected concentrations of benzo(a)pyrene and Aroclor-1260 at location 03-608196 increased with depth. These detected concentrations exceeded the NMED residential soil screening levels (SSLs). The Phase II work plan must propose sampling to define the vertical and lateral extent of contamination at SWMU 03-045(c).

LANL Response

11. The SIR acknowledges that lateral extent at SWMU 03-045(c) is not defined. The report has been revised to conclude that the vertical extent of polychlorinated biphenyls and some PAHs is not defined and further sampling for vertical extent is warranted. The Phase II work plan will propose sampling to define the vertical and lateral extent of contamination at SWMU 03-045(c).

NMED Comment

12. Section 6.7.4.4, Nature and Extent of Contamination, page 65:

The detected concentrations of several organic chemicals increased with depth at location 03-608219, the most distant location sampled. Benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene were detected at concentrations above the NMED residential SSLs in all samples collected at location 03-608219. The vertical extent of contamination is not defined at the site and the Permittees must propose additional sampling in the Phase II work plan. The risk screening assessment presented in the SIR also indicates that the site poses unacceptable carcinogenic risk under both the residential and industrial land use scenarios. (See also Comment # 1)

LANL Response

12. Of the 20 organic chemicals detected at location 03-608219, 15 were PAHs. The other 5 organic chemicals either decreased or did not change substantially with depth. PAH concentration changes ranged from 0.0014 mg/kg to 3.23 mg/kg. The largest concentration changes were 0.696 mg/kg, 0.87 mg/kg, 1.88 mg/kg, 2.38 mg/kg, and 3.23 mg/kg for anthracene, chrysene, fluoranthene, phenanthrene, and pyrene, respectively, which are 48 to 12,800 times the residential SSLs and 760 to 18,400 times the industrial SSLs. The concentration changes for benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene were 0.62 mg/kg, 0.52 mg/kg, and 0.59 mg/kg, respectively. Concentrations of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene exceeded the residential SSLs and were equivalent to benzo(a)pyrene or an order of magnitude less than the industrial SSLs. However, TPH-DRO concentrations did not change substantially with depth (2 mg/kg) at this location. In addition, as discussed in Comment 1, evaluating potential risk using the generic industrial scenario is not representative of any hypothetical or actual exposure at this site. The activity patterns that might be somewhat representative (other than no exposure) include groundskeeping and/or site maintenance/cleanup. These types of activities entail much less exposure time and frequency than is currently used for the industrial scenario but may occur over a similar exposure duration. Conservatively, one might assume an exposure frequency of 12 d/yr to 24 d/yr (1 d/mo or 2 d/mo), an exposure time of 8 h/d, and an exposure duration of 25 yr to conduct the described activities. Modified industrial SSLs using exposure frequencies of 12 d/yr or 24 d/yr are 43.9 mg/kg and 21.9 mg/kg for benzo(a)pyrene and 439 mg/kg and 219 mg/kg for benzo(a)anthracene and benzo(b)fluoranthene. These SSLs are 172 and 86 times [benzo(a)anthracene], 17 and 8 times [benzo(a)pyrene], and 138 and 69 times [benzo(b)fluoranthene] the maximum concentrations of these PAHs at location 03-608219. Therefore, additional sampling for vertical extent is not warranted. The nature and extent discussion has been revised to incorporate information presented in this response.

    See response to Comment 1.

NMED Comment

13. Section 6.9.9.4, Site Contamination, page 114:

The Permittees have used available data from surrounding SWMUs to define the extent of contamination. However, the data utilized to define the extent of contamination is not included in the SIR. For example, to define the extent of copper contamination at SWMU 03-056(d), the data from surrounding SWMUs (e.g., SWMU 03-014(g), SWMU 03-14(d), 03-014(h) and SWMU 03-014(j)) were

used. However, the sampling locations and associated data cited in the text were not provided on Figure 6.9-1, Plate 12, or Table 6.9-21 making it difficult to evaluate whether the extent is defined for the site. While it is appropriate to use the available data from nearby SWMUs to define the extent of contamination, the data must be included in associated tables and figures to allow the reviewer to ascertain that the extent of contamination is defined. There are several other instances in the SIR where data from other SWMUs is utilized but not provided. Review the entire SIR and provide all associated data that is being utilized to define the nature and extent of contamination of a site.

LANL Response

13. Sampling locations and data associated with other sites and used to define the nature and extent of contamination of a site have been added to the appropriate figures and plates. The revised figures and plates include Figure 6.6-1 and Plates 8 and 9 for SWMU 03-012(b) (see response to Comment 9) and Figure 6.9-1 and Plates 12 and 13 for SWMU 03-056(d). Callouts to plates for other sites have been added to the nature and extent discussions, where appropriate.

NMED Comment

14. Section 6.18.4.3, Soil, Rock, and Sediment Sampling Analytical Results, page 154:

The text states that four soil samples were collected from two locations and analyzed for organic chemicals at AOC 03-051(c). However Table 6.18-3 reports six rows of data. Analytical data for samples collected from locations 03-608328 (one depth) and 03-608329 (two depths) are repeated but two different values are reported for each of these samples. In addition, the Table 6.18-3 is incomplete, results are reported only for few of the contaminants (i.e., from acenaphthene to chrysene) although the text includes discussion on several other organic compounds that are not included in the table. Resolve the discrepancy and revise the table accordingly.

LANL Response

14. Table 6.18-3 has been revised to reflect the correct number of samples with detected organic chemicals in the four samples collected at two locations, and the table now includes all organic chemicals detected. Column headings for dibenz(a,h)anthracene through TPH-DRO have been added to the table.

NMED Comment

15. Section 6.20.4.4, Extent of Contamination, page 165:

Concentrations of TPH increased with depth at two sample locations at SWMU 03-056(a), as shown on Plate 5. Text in Section 6.20.4.4 states that further sampling to define the depth of contamination of TPH is not required. Provide further justification on how the vertical extent of TPH is defined. Otherwise, propose to collect additional samples at SWMU 03-056(a) in order to define the vertical extent of TPH contamination.

LANL Response

15. The nature and extent discussion of TPH-DRO indicated concentrations increased slightly with depth. At three locations, concentrations ranged from 3.1 mg/kg to 10.1 mg/kg, while TPH-DRO concentrations were from 104 mg/kg (0.0−1.0 ft) to 288 mg/kg (1.0−2.0 ft) at location 03-608347.

Although concentrations increased with depth by 184 mg/kg at location 03-608347, the concentrations at this location were more than 17 times and 6 times the industrial screening guideline. The residential screening guideline for diesel No. 2/crankcase oil was approximately 100 times and the industrial screening guideline for diesel No. 2/crankcase oil was approximately 180 times the next highest TPH-DRO concentration (10.1 mg/kg). As noted in previous and current NMED guidance, the TPH screening guidelines must be used in conjunction with the screening levels for petroleum-related contaminants. For the samples at location 03-608347, no TPH constituents were detected, and the residential and industrial ratios to the screening guidelines were 0.1 and 0.06 for the site. It should be noted that NMED's 2015 guidance provides an industrial screening guideline of 3000 mg/kg, which is an order of magnitude above the maximum TPH-DRO concentration at this SWMU. Therefore, no additional sampling for extent of TPH-DRO is warranted.

The above text has been incorporated in the extent discussion for TPH-DRO at SWMU 03-056(a).

NMED Comment

16. Section 7.2.2.4, Nature and Extent of Contamination, page 190:

The discussion on nature and extent of selenium contamination for SWMU 60-002 (east) incorrectly states that "[s]elenium was not detected above the Qbt 2,3,4 BV." Selenium was detected at 0.579 mg/kg above the Qbt 2,3,4 BV (i.e., 0.3 mg/kg) in the sample collected from 4-4.5 ft. at location 60-22517 (see Table 7.2-4). However, NMED concurs with the Permittees that further sampling for extent of selenium is not warranted. Revise the text accordingly.

LANL Response

16. The comment refers to the wrong section. The text in sections 7.2.4.3 and 7.2.4.4 has been revised to indicate selenium was detected in one sample above the Qbt 2,3,4 BV and seven samples had detection limits above the BV.

NMED Comment

17. Section 7.3.4.1, Soil, Rock, and Sediment Sampling, page 194:

The text states that "[t]wenty samples were collected from five locations. At each location, samples were collected from 0.0-1.0 ft, 2.0-3.0 ft, 4.0-5.0 ft, and 9.0-10.0 ft bgs." Section 7.3.5, Summary of Human Health Screening, states that "[n]o samples were collected from the 0.0-1.0 ft depth interval and the industrial scenario was not evaluated for AOC 60-004(f)." Review of Table 7.3-1 also indicates that samples were not collected from the 0.0-1.0 ft interval. Resolve the discrepancy and revise the text accordingly.

LANL Response

17. The text in section 7.3.4.1 has been revised to indicate samples were collected from the depth intervals of 1.0–2.0 ft, 2.0–3.0 ft, 4.0–5.0 ft, and 9.0–10.0 ft bgs.

NMED Comment

18. Section 8.3.4.4, Nature and Extent of Contamination, page 230:

Table 8.3-3 does not report butylbenzene[n-] at 9.4 mg/kg as stated in the text. Table 8.3-3 reports only one detection at 0.00054 mg/kg at location 61-24310 (1.5-2.0 ft). Resolve the discrepancy and revise accordingly.

LANL Response

18. There is no discrepancy between the text in section 8.3.4.4 and Table 8.3-3, and no revision is necessary. The text in section 8.3.4.4 states, "Butylbenzene(n-) and sec-butylbenzene were detected in one and two samples with maximum concentrations of 0.00054 mg/kg and 9.4 mg/kg, respectively." Table 8.3-3 reports n-butylbenzene detected in one sample at 0.00054 mg/kg and sec-butylbenzene detected in two samples at 9.4 mg/kg and 8.74 mg/kg.

NMED Comment

19. Section 8.3.5, Summary of Health Risk Screening, page 233:

The Permittees were directed to remove contaminated soils containing concentrations above the risk-based screening levels and to collect confirmatory samples at SWMU 61-002 in a Notice of Approval Letter issued on November 9, 2010 for the Investigation Report for Upper Sandia Canyon Aggregate Area. Also see NMED's comment in Notice of Disapproval (comment no. 21) issued on September 1, 2010. As stated previously, NMED cannot make a corrective action complete determination until additional remediation activities are conducted.

LANL Response

19. As demonstrated by the risk-screening assessments presented in the SIR, removal of contaminated soil is not warranted. No potential unacceptable risks exist under the industrial and construction worker scenarios, which are the current and reasonably foreseeable future land uses at this site. No concentrations of COPCs are above the risk-based industrial screening levels in the depth interval of 0.0–1.0 ft bgs, and only one COPC concentration is above the risk-based construction worker screening level in the depth interval of 0.0–10.0 ft bgs (the cancer risk and HI were below target limits); additional exceedances of construction worker SSLs occurred below 10 ft bgs. The only potential unacceptable risk is for the residential scenario in the depth interval of 0.0–10.0 ft bgs, which is not representative of current or future exposures. The only reasonably expected activities at this site are road construction and maintenance of buried utilities. The sampling locations with exceedances of screening levels are within approximately 10.0−15.0 ft of Jemez Road (Figure I-4.3-1), and the only activity that might occur in this area would involve access to utility lines, which are not deeper than 8 ft bgs (the depth has been confirmed by recent remediation activities at SWMU 61-007, located along East Jemez Road approximately 2000 ft east of SWMU 61-002). If Jemez Road were to be widened, excavation would be less than 10 ft deep and pavement would likely cover the locations with deeper screening-level exceedances. Therefore, the 0.0−10.0-ft-bgs exposure depth for construction workers is protective of all reasonably expected activities at this site.

    In addition, although SWMU 61-002 is not regulated as a petroleum storage tank site, a release of a petroleum product occurred in the subsurface. At NMED's request, a Tier One evaluation was performed based on New Mexico Petroleum Storage Tank Bureau corrective action guidelines

(Title 20 of the New Mexico Administrative Code, Chapter 5, Part 12, Section 1213). The Tier One evaluation is intended to determine whether soil contamination poses a threat to groundwater in the future and is presented in the remedy completion report (LANL 2007, 100722, Appendix E, section E-4.0). The Tier One evaluation indicated that the residual subsurface petroleum hydrocarbon concentrations did not exceed New Mexico Petroleum Storage Tank Bureau risk-based screening levels for any current or reasonably foreseeable future exposure pathway.

NMED's September 1, 2010, disapproval letter (NMED 2010, 110697) and November 9, 2010, approval letter (NMED 2010, 111398) for the Upper Sandia Canyon Aggregate Area investigation report indicated that use of 95% UCLs for EPCs in evaluating risk was inappropriate because contaminated areas were easy to identify and were accessible for removal. The use of 95% UCLs as EPCs is consistent with the U. S. Environmental Protection Agency's (EPA's) Risk Assessment Guidance for Superfund, as cited in Section XI.E.7 of the Compliance Order on Consent. This approach was used for the risk evaluations for all other sites in the SIR and is consistent with risk-based cleanups performed elsewhere at the Laboratory. In addition, the remaining contaminated area is not easily accessible given the depth of contamination and its location next to Jemez Road.

Further remediation and confirmation sampling at SWMU 61-002 is not appropriate. The fact that concentrations exceed the residential risk-based screening levels is not relevant because residential use is not a current or reasonably foreseeable future land use; the residential scenario is not required to obtain corrective action complete with controls. Additionally, as shown by the Tier One evaluation, the contamination poses no threat to groundwater in the future. The Laboratory's recommendation for corrective actions complete with controls is appropriate for this site, with the controls being the continuance of the current land use, which precludes any exposure and risk to receptors. The information presented in the report is sufficient for NMED to make a corrective action complete determination for this site, and no revision to the report is necessary.

NMED Comment

20. Section I-4.4.2, Exposure Evaluation, pages I-45 – I-51:

The exposure evaluation states that actual activity patterns are not represented by those activities assumed by the industrial scenario, and that risks are overestimated. Given that each site was evaluated separately in the risk assessments as separate exposure areas (with a few exceptions where sites were combined) that receptors would likely be exposed, and that many of the sites are adjacent to or close to each other, receptors' exposure areas may overlap more than one site. The U.S. EPA's (1989) risk assessment guidance states that known or suspected activity patterns should be considered during the exposure assessment and in estimating exposure areas. The activity patterns of human and ecological receptors at the sites evaluated in this report may encompass more than one site, and lead to subsequent exposure of contaminants at more than one site. Include in the discussion of uncertainties an evaluation of activity patterns for each type of receptor and exposure area and provide a qualitative evaluation of receptors possible exposure to more than one site. Also discuss whether the presently calculated risks are still overestimated and if exposure to multiple sites would increase risk and hazard estimates.

LANL Response

20. The text states, "The current and reasonably foreseeable future land use is industrial. To the degree actual activity patterns are not represented by those activities assumed by the industrial scenario, uncertainties are introduced in the assessment, and the evaluation presented in this assessment

overestimates potential risk. An individual may be subject to exposures in a different manner than the exposure assumptions used to derive the industrial and construction worker SSLs. For the sites evaluated, individuals might not be on-site at present or in the future for that frequency and duration."

This generic statement regarding actual versus hypothetical scenario exposures at the sites is appropriate given that the sites evaluated in the Upper Sandia Canyon Aggregate Area investigation report are inactive or no longer exist and are not continually occupied. The levels of exposure similar to those defined by the scenarios are unlikely for any of the sites because receptors are present (if at all) for very short periods. Where possible exposure may occur over several sites, the sites were evaluated together [e.g., SWMUs 03-14(k,l,m,n) and 03-015 and AOC 03-053]. The opposite is also true: if exposure across different areas of a SWMU is unlikely, the SWMU was split into subareas, (e.g., SWMU 60-002). Actual activity patterns for potential receptors within the aggregate area are not known, but given the generic industrial and construction exposure assumptions (potentially exposed individual is outside on-site for 8 h/d, for 225 d/yr or 250 d/yr) and the absence of regular daily operations requiring workers to be present at any of the evaluated sites, exposure and risk are almost certainly overestimated by the generic scenarios. Although some sites are located close together, and some have been aggregated for this reason, no actual or foreseeable activities could result in exposure intensity commensurate with the exposure time, frequency, and duration represented by the scenarios.

Activity at sites is infrequent at best and more likely nonexistent. The sites evaluated consist of former or inactive storage areas, a septic system, outfalls, structures from the former wastewater treatment plant, disposal sites, storm drainages, and miscellaneous former operational or other types of releases. Workers are not continuously present at storage areas and disposal sites but are present only when material is delivered or picked up. There is probably no activity at outfalls unless there is the need to maintain access, maintain the grounds, or clean up debris, all of which are short-term, infrequent activities. The former wastewater treatment plant structures are not used, except possibly for temporary storage in the general vicinity. The most common activity across the aggregate area might be site landscaping/groundskeeping (mowing grass, cutting weeds, repairing roads) and walking to and between buildings where operations occur. None of these activities would result in the type of exposure time, frequency, and duration set forth in calculating industrial and construction SSLs, even if the activity brought a receptor in contact with more than one site. Therefore, the calculated risks are overestimated and exposure to multiple sites would not increase risk, hazard, and dose estimates.

In the case of SWMUs 03-014(k,l,m,n) and 03-052(f), the default industrial exposure parameters are overly conservative given the actual or likely activities at these sites. For these sites, modified industrial SSLs are calculated based on reduced, but more realistic, exposure frequencies (see response to Comment 1).

The activity patterns for the ecological receptors are not known. A realistic assessment of spatial exposures requires information on the quality of the habitat as well as the x- and y-dimension spatial trends in chemical of potential ecological concern (COPEC) concentrations. TA-03, TA-60, and TA-61 are highly developed and industrialized areas within the Laboratory boundary, with numerous buildings, paved roads, and areas around buildings and minimal natural and good-quality habitat. As such, few, if any, areas associated with the Upper Sandia Canyon Aggregate Area sites evaluated would be used by ecological receptors for extended periods. Over half the sites are no longer used, are not accessible to any receptor, or are no longer present. The sites are also small: 85% are less than 0.2 hectares and only one site is more than 0.55 hectares. Therefore, because of the lack of

quality habitat and small size of the area, only a negligible fraction of the animal's time would be spent at most sites.

The Laboratory has conducted spatial assessments to support the canyons investigations (Gonzales et al. 2004, 085207; Gonzales et al. 2006, 093786; Gonzales et al. 2008, 102790; Gonzales et al. 2009, 106682) using the ECORSK model, which combines spatial data on contaminants with information on wildlife occurrence and foraging ranges. These assessments addressed all contaminant sources in the watershed, including SWMUs (mainly on the mesa tops) and investigation reaches in the canyon bottoms. For threatened and endangered species, the results of ecological exposure for simulated individuals were evaluated and for other wildlife risks to populations were evaluated. The ECORSK model results in the Canyons reports pointed to a low risk to wildlife because much of the Laboratory has no contaminant sources, and the areas that have sources generally are less attractive to wildlife, thereby resulting in the lack of significant spatially cumulative ecological exposures. For the nonmobile receptors (earthworm and plants), there are no issues regarding activity patterns and exposure to more than one site. As a result, the assessment of individual sites is a worst-case condition because it is assumed that receptors spend 100% of their time at the site and that the EPCs that drive estimations of potential for risk are constant or persistent throughout the exposure area. This is somewhat compensated for by applying the population area use factor, but this involves the conservative assumption that the receptor spends proportionally equal amounts of time across its home range and the population area. In reality, the receptor likely does not use its home range uniformly and might actually avoid contaminated/developed areas. The total number of hours or days that a receptor would spend at a site(s) in the course of a year or a lifetime might be so minimal as to constitute only a case of acute exposure. Therefore, the assessment results overestimate the potential exposure and risk, and exposure across multiple sites would not increase the risk estimates.

Section I-4.4.2 has been revised to include a discussion of the activity patterns of receptors at the sites evaluated in this report.

NMED Comment

21. Section I-4.4.2, Exposure Evaluation, pages I-45 – I-51:

The text concludes that the elevated levels of PAHs at AOC 03-051(c) are the result of asphalt paving and laboratory infrastructure and are not a result of site activities. However, TPH was detected in the same samples at AOC 03-051(c) and the data do not preclude that the PAHs are related to the TPH at the site. AOC 03-051(c) is a paved area where drums of acetone, vacuum pump oil, and ethylene glycol were stored. Voluntary measures were conducted in 1995 to remove known areas of operational leaks of vacuum pump oil. It is likely that residual contamination remains and the vacuum pump oil, which is a refined petroleum lubricant oil containing PAHs, may be the source for the PAHs detected at the site. However, it is noted that interviewed workers indicate non-petroleum oils were used. It is not clear that workers would remember all oils used given this site could date back to the 1960's. Clarify the dates of operations. Also, as expressed in General Comment Number 1, it may be in the best interest of LANL to propose background values for PAHs in soil for this site. Otherwise, sufficient evidence has not been provided to exclude PAHs as being site related. AOC 03-051(c) would only be eligible for corrective action complete with controls. Revise the text accordingly.

LANL Response

21. NMED's description of AOC 03-051(c) in its comment is incorrect. AOC 03-047(g) is a paved area where drums of acetone, vacuum pump oil, and ethylene glycol were stored. AOC 03-051(c) consists of two former areas of stained asphalt at TA-03 attributed to operational leaks of vacuum pump oil (LANL 1995, 057590, p. 6-84). Both areas were removed during a VCA conducted in 1995 (LANL 1996, 053780). The VCA work plan states that the vacuum pumps associated with AOC 03-051(c) were removed before 1995 (ICF Kaiser Engineers 1995, 056879). The dates of operation of AOC 03-051(c) are not clear but likely were after 1990 and ceased around 1993 or 1994 when the "Rolling Mill" facility in building 03-141 was decommissioned, and the building was gutted and retrofitted as the "Beryllium Technology" facility.

    Interviews with current and former workers are the main, if not often the only, sources of site information used in the site descriptions and operational histories presented in reports as well as historical OU work plans, historical investigation reports, and investigation work plans. The information provided in these interviews is very reliable and often replaces or clarifies available written documentation found in other sources (e.g., the SWMU report). Corrections made to site descriptions and operations are often based on the observations of workers at a facility.

    As noted in a draft of the RFI work plan for OU 1114, Addendum 1, the oil stains were associated with the exhaust outlet from an indoor vacuum pump; the exhaust outlet was located immediately above the area stained with oil (LANL 1995, 062241, p. 5-18-1) (see page from draft work plan in Attachment 1). The text states that the oil used in the vacuum pump is nonhazardous mineral oil. The SWMU report incorrectly states that these stains are from a leaking compressor and a drum storage area. However, the reference cited in the draft text is missing from the Paper Records for OU 1114. Based on the references included in the Paper Records binder reference, LANL 1995, 1217, cited in the draft work plan, was either an MSDS for the mineral oil, or it was a memorandum documenting an interview or conversation with staff who worked in building 03-141 and who were familiar with the operations of the vacuum pumps. Although the title of the reference was not included in the review draft of Addendum 1, a large number of the references for Chapter 6 in the approved RFI work plan for OU 1114, Addendum 1, consist of memoranda documenting conversations with people about the history of and operations at buildings and other sites. As documented in the MSDS referenced in the approved RFI work plan for OU 1114, Addendum 1, the oil used was nonhazardous mineral oil (LANL 1995, 057590, p. 6-111). A copy of the MSDS is included in Attachment 2. This clearly and independently supports the worker's statement in the recent interview and is considered to be correct. The final OU 1114 work plan description of this AOC was changed because the site was undergoing a VCA and a no further action recommendation was anticipated (see Attachment 4) (LANL 1995, 057590, pp. 6-80–6-84, Table 6-11, p. 6-91).

    Section I-4.4.2 has been revised to include further supporting information on the nature of the vacuum pump oil.

NMED Comment

22. Section I-4.4.2, Exposure Evaluation, pages I-45 – I-51:

The text states that the elevated levels of PAHs at SWMUs 03-014(k,l,m,n) are related to asphalt paving and laboratory infrastructure and are not a result of site activities. Although the highest detection of benzo(a)pyrene was not present in the same location as the highest detections of TPH, benzo(a)pyrene and other PAHs were detected along with TPH at the same locations at the site and could therefore be the result of site activities. The industrial and residential risks from exposure to soil

at SWMUs 03-014(k,l,m,n) are above the NMED target levels and additional corrective action must be conducted. It was noted that text in Section I-4.5.9 states that further sampling will be conducted at SWMUs 03-014(k,l,m,n) for TPH. Additional sampling must be proposed in order to calculate a statistically-based exposure point concentration (EPC) (i.e., based on 95% upper confidence limits) for PAHs. Revise the text accordingly. (See Comment # 1)

LANL Response

22. The text in section I-4.5.9 has been revised. Additional sampling will not be conducted at SWMUs 03-014(k,l,m,n). The extent of contamination is defined and/or further sampling for extent is not warranted. The EPCs used to evaluate risk at SWMU 03-014(k,l,m,n) are statistically based (i.e., based on 95% upper confidence limits) for the PAHs. A total of 45 samples were collected in and around the sludge beds, of which 5 or 6 detected concentrations of PAHs were reported and only 1 of which was from a sample within the beds. The concentrations from the sample within the bed were 2 orders of magnitude higher than concentrations in samples outside of the bed. This result supports the conclusion that PAH concentrations in the one sample with detected concentrations within the beds were from asphalt and not from site-related contamination.

    See response to Comment 1.

NMED Comment

23. Section I-4.4.2, Exposure Evaluation, pages I-45 – I-51:

It was noted that text in Section I-4.5.9 states that further sampling will be conducted at SWMUs 03-014(k,l,m,n) to determine the vertical extent of TPH contamination. However, Section 9.0 and Section 10.2 of the SIR indicate that the nature and extent of contamination at SWMUs 03-014(k,l,m,n) is defined and no further sampling for extent is warranted. The sites are recommended for corrective action complete without controls. Clarify whether additional sampling will be conducted at SWMUs 03-014(k,l,m,n).

LANL Response

23. The text in section I-4.5.9 has been revised. Additional sampling will not be conducted at SWMUs 03-014(k,l,m,n). The extent of contamination is defined and/or further sampling for extent of TPH-DRO is not warranted.

NMED Comment

24. Tables I-2.3-8, I-2.3-14, I-2.3-15, I-2.3-18, I-2.3-19, I-2.3-20, I-2.3-21, I-2.3-22, I-2.3-24, I-2.3-25, I-2.3-26, I-2.3-30, I-2.3-32, I-2.3-33, I-2.3-35, I-2.3-36, I-2.3-38, I-2.3-48, I-2.3-55, I-2.3-56, I-2-3-66, I-2.3-67, I-2.3-69, I-2.3-74, I-2.3-75, I-2.3-78, I-2.3-79, I-2.3-82, and I-2.3-84, pages I-134 – I-224:

Upper confidence limits (UCLs) were calculated for many constituents that had less than six detections. UCLs should only be calculated for data sets that meet the minimum requirements. As stated in US EPA's (2010) ProUCL guidance, the minimum requirements for calculating UCLs are: 1) each data set must contain at least eight samples for the analyte being evaluated; and 2) there must be a minimum of six detections for the analyte being evaluated. US EPA's (2010) ProUCL guidance also states that although it is possible to calculate UCLs with small datasets (i.e., n ≤ 8) and low frequencies of detection (i.e., ≤ 6 detected observations), these estimates are not considered

reliable and representative enough to make defensible and correct cleanup and remediation decisions. If both of these minimum requirements are not met, then maximum detected concentrations should be used as the EPC. Revise these tables accordingly and any subsequent risk and hazard calculations that would be affected. It is also noted that LANL's EP-DIV-SOP-10006 states that a minimum of five detections and ideally 8-10 detections are also required to statistically determine the EPC; however, this document has not been revised in several years and may need updating.

LANL Response

24. No revisions to the EPC tables and subsequent risk and hazard calculations were made. UCLs were calculated only for data sets that met the minimum requirements; minimum of eight samples and five or more detections. These minimum requirements were previously set forth by NMED and have been used for several years in calculating 95% UCLs for risk assessments. NMED's rationale was to be consistent with other statistical computations, such as comparisons to background data. The Laboratory's standard operating procedure reflects this direction.

    EPA's ProUCL 4.1.00 User's Guide (EPA 2010, 109944) states, "Statistics (e.g., UCL95) computed based upon only a few detected values (e.g., < 4 to 6) cannot be considered reliable enough to estimate the EPC terms having potential impact on the human health and the environment." This guidance does not indicate less than six detected observations but rather gives a range of fewer than four to six detections, indicating some leeway in the number of detections. It is highly unlikely that a UCL based on five detects (as calculated in the Upper Sandia SIR) is that much less "reliable and representative" than a UCL based on six detects; it is certainly more representative than a maximum detected concentration. EPA recommends that the maximum observed value not be used as an estimate of the EPC term representing average exposure. The EPC term represents the *average* exposure contacted by an individual over an exposure area during a long period of time, not the maximum exposure; therefore, the EPC term should be estimated by using an *average* value (such as a 95% UCL of the mean) and not by the maximum concentration. The User's Guide also states, "Some practitioners tend to use the maximum detected value as an estimate of the EPC term. This is especially true when the sample size is small such as < 5, or when a UCL95 exceeds the maximum detected values" (EPA 1992, 073789, p. 30). The Laboratory maintains that calculating a UCL from eight or more samples and five detects is more "reliable and representative" than using a maximum detected concentration as long as the UCL does not exceed the maximum and is consistent with previous calculations approved by NMED.

    Note: In the ProUCL 5.0 User Guide, the latest EPA guidance states, "Statistics (e.g., UCL95) computed based upon only a few detected values (e.g., < 4) cannot be considered reliable enough to estimate the EPC terms having potential impact on human health and the environment" (EPA 2013, 251074, section 1.12, p. 28). Therefore, the later or more current EPA guidance indicates that less than four detected values rather than less than the four-to-six range is not considered reliable and representative.

NMED Comment

25. Tables I-4.3-1 through I-4.3-28, pages I-354 – I-362:

The vapor intrusion risk based concentrations displayed in Tables I-4.3-1 through I-4.3-28 are incorrect. The Johnson and Ettinger model returns risk based results in units of micrograms per kilogram (µg/kg). The risk based concentrations in Tables I-4.3-1 through I-4.3-28 are displayed in

units of milligrams per kilogram (mg/kg) and it does not appear that the risk based concentrations were converted from µg/kg to mg/kg. Thus, the risk based concentrations and the subsequent risk and hazard calculations are underestimated by three orders of magnitude. Revise Tables I-4.3-1 through I-4.3-28 to include the correct risk based concentrations and subsequent risk and hazard calculations. Update the cumulative risks and hazards.

LANL Response

25. Tables I-4.3-1 through I-4.3-29 have been revised to include the vapor-intrusion risk-based concentration in units of milligrams per kilogram and the HQs, cancer risks, and HIs have been recalculated.

NMED Comment

26. Tables I-4.3-3, I-4.3-8, and I-4.3-24, pages I-355, I-357, and I-361:

Footnote "c" indicates that a surrogate was used for 2-hexanone. A reference concentration (RFC) is available for 2-hexanone in US EPA's Integrated Risk Information System (IRIS). Update the hazard quotient for 2-hexanone on Tables I-4.3-3, I-4.3-8, and I-4.3-24 to use the original toxicity criteria for 2-hexanone, rather than a surrogate. However, even if a surrogate was used for toxicity data (e.g., MEK), the chemical and physical properties for 2-hexanone should still have been used in the modeling. Revise the physical and chemical property tables to reflect those for 2-hexanone.

LANL Response

26. The physical and chemical properties table (Table I-3.3-2) does not need to be revised. The values in this table are for 2-hexanone. The Johnson and Ettinger spreadsheets have been modified to include the chemical and physical information for 2-hexanone, Tables I-4.3-3, I-4.3-6, I-4.3-8, and I-4.3-24 have been revised to present the vapor-intrusion risk-based concentration generated for 2-hexanone rather than a surrogate, and the HQs have been recalculated for 2-hexanone.

NMED Comment

27. Table I-4.3-4, page I-355:

Methylnaphthalene[2-] is a VOC retained as a COPC at SWMU 03-013(i) due to its noncarcinogenic endpoint. However, the toxicity data in the Johnson and Ettinger model are outdated and since the last update of the model (1994), the inhalation data for 2-methylnaphthalene has been rescinded. Either surrogate toxicity data should be used or the exclusion of 2-methylnaphthalene must be addressed in the uncertainty section of the risk assessment.

LANL Response

27. The toxicity value used for 2-methylnaphthalene is the reference concentration for naphthalene, which is used as a surrogate for 2-methylnaphthalene. Methylnaphthalene[2-] has been included with this information added to notes in Tables I-4.3-1, I-4.3-4, I-4.3-6, I-4.3-10, I-4.3-14, I-4.3-18, I-4.3-20, I-4.3-22, and I-4.3-25.

NMED Comment

28. Table I-3.3-1, page I-228:

The toxicity equivalent EPC for 1,2,3,4,6,7,8-Heptachlorodibenzodioxin (4.59E^{-8} mg/kg) at location CAMO-09-6010 is incorrect. The original EPC was 8.45E^{-5} mg/kg and when a toxicity equivalency factor of 0.01 is applied, the result is 8.45E^{-7} mg/kg. It is noted that updating Table I-3.3-1 with the correct value does not change the overall results of the risk assessments. However, update Table I-3.3-1 and all subsequent risk and hazard calculations for SWMU 03-045(h).

LANL Response

28. The toxicity equivalent EPC for 1,2,3,4,6,7,8-heptachlorodibenzodioxin at location CAMO-09-6010 in Table I-3.3-1 and all subsequent risk and hazard calculations for SWMU 03-045(h) (Tables I-4.2-179, I-4.2-182, I-4.2-183, I-5.3-42, I-5.3-43, and I-5.4-43) have been revised.

NMED Comment

29. Table I-5.3-42, page I-398:

Several inorganic ecological COPCs (aluminum, barium, chromium, cobalt, copper, nickel, selenium, and vanadium) were not included in the minimum ecological screening level (ESL) comparison for SWMU 03-045(h). Revise Table I-5.3-42 to include these COPCs and any subsequent ecological risk assessment calculations that may be affected.

LANL Response

29. SWMU 03-045(h) EPC tables are Tables I-2.3-49 and I-2.3-50. Samples were collected at SWMU 03-045(h) from 0.0−0.5 ft and 6.0−7.0 ft. Only hexavalent chromium and nitrate were detected in the 0.0−0.5 ft (antimony had elevated detection limits). The other inorganic chemicals, including those listed in NMED's comment, were below BVs at the surface but were detected above BVs at 6.0−7.0 ft. Therefore, the inorganic chemicals are not COPCs for the industrial scenario and for ecological risk and are not included in Tables I-4.2-180 (industrial) and I-5.3-42 (ecological). Table I-2.3-49, which presents the EPCs for SWMU 03-045(h) for ecological risk and/or for the industrial scenario, has been revised to eliminate aluminum, barium, chromium, cobalt, copper, nickel, selenium, and vanadium as COPCs.

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LANL (Los Alamos National Laboratory), November 2007. “Remedy Completion Report for the Investigation and Remediation of Solid Waste Management Unit 61-002 at Technical Area 61, Revision 1,” Los Alamos National Laboratory document LA-UR-07-7695, Los Alamos, New Mexico. (LANL 2007, 100722)

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Attachment 1

Pages from Draft Addendum 1 to the RFI Work Plan for OU 1114

5.18 Vacuum Pump Exhaust Stains

5.18.1 Description and History

SWMUs 3-051(c) and 3-056(l) represent oil stains located along the east side of the Rolling Mill Building, TA-3-141 (Fig. 5-18-1). During a 1993 site reconnaissance visit, three distinct three to five-foot diameter stains were observed on uncompacted chip seal, primarily gravel, near the building. The oil stains were associated with the exhaust outlet from an indoor vacuum pump; the exhaust outlet is located immediately above the area stained with oil. The SWMU Report incorrectly states that these stains are from a leaking compressor and a drum storage area (LANL 1990, 0145). As documented in the material safety data sheet (MSDS), the oil used in the vacuum pump is nonhazardous mineral oil (LANL 1995, 1217). Another area stained with vacuum pump oil, and/or exhaust, that is inside a metal shed which housed a vacuum pump. Exhaust stains cover the concrete slab and were on the shed wall and the gravel surface surrounding the shed. These SWMUs will share a sampling background plan because of their proximity and the similar source of contaminants.

5.18.2 Investigation Approach and Objectives

Investigation activities for SWMUs 3-056(l) and 3-051(c) will focus on detecting the presence and nature of potential contamination within the soil underlying the gravel and from the concrete slab under the metal shed on the east side of TA-3-141. Because the source of contamination is from the vacuum pump exhaust which could potentially be contaminated with radionuclides and metals, PCOCs for this site include gross alpha/beta, gamma spectroscopy, tritium, TPH, and Appendix VIII metals.

Biased sampling will be conducted in soils underlying the gravel and from stained concrete at SWMU 3-056(l). This biased approach is based on historical information about the PRS, current observation of the site, and PCOC and soil migration potential described in Subsection 5.0.3 of Addendum 1.

Attachment 2

Material Safety Data Sheet

3-001262

MATERIAL SAFETY DATA SHEET

penreco
A DIVISION OF PENNZOIL PRODUCTS COMPANY

PRODUCT IDENTIFICATION

Manufacturer's Name	PENRECO
Address	R.D. 2, BOX 1 KARNS CITY, PA 16041-9799
Emergency Telephone No.	(713) 236-6070
Trade Name	6969 MINERAL OIL
Synonyms	TECHNICAL MINERAL OIL

CAS Number: 64742-54-7
MSDS Code: 000481

NFPA Hazard Identification

Degree of Hazard	Hazard Ratings
Health: 0	0 - Least
Fire: 1	1 - Slight
Reactivity: 0	2 - Moderate
	3 - High
	4 - Extreme

INGREDIENTS

COMPONENT NAME / CAS NUMBER	HAZARDOUS IN BLEND	PERCENTAGE MIN	PERCENTAGE MAX	COMPONENT EXPOSURE LIMITS	UNITS
HYDROTREATED HEAVY PARAFFINIC DISTILLATE 64742-54-7	NO		100.00	OSHA PEL ACGIH TLV	NO LIMIT NO LIMIT

EP ENVIRONMENTAL, SAFETY & HEALTH

(713) 546-6227

EFFECTIVE DATE: SEPTEMBER 25, 1992

DISCLAIMER OF WARRANTY:

THE INFORMATION CONTAINED HEREIN IS BASED UPON DATA AVAILABLE TO US, AND REFLECTS OUR BEST PROFESSIONAL JUDGEMENT. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY USE, OR ANY OTHER WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF SUCH DATA, THE RESULTS TO BE OBTAINED FROM THE USE THEREOF, OR THAT ANY SUCH USE DOES NOT INFRINGE ANY PATENT. SINCE THE INFORMATION CONTAINED HEREIN MAY BE APPLIED UNDER CONDITIONS OF USE BEYOND OUR CONTROL AND WITH WHICH WE MAY BE UNFAMILIAR, WE DO NOT ASSUME ANY RESPONSIBILITY FOR THE RESULTS OF SUCH APPLICATION. THIS INFORMATION IS FURNISHED UPON THE CONDITION THAT THE PERSON RECEIVING IT SHALL MAKE HIS OWN DETERMINATION OF THE SUITABILITY OF THE MATERIAL FOR HIS PARTICULAR PURPOSE.

REQUIRED UNDER USDL SAFETY AND HEALTH REGULATIONS FOR SHIP REPAIRING, SHIPBUILDING, AND SHIPBREAKING (29 CFR 1915, 1916, 1917).

HEALTH EFFECT INFORMATION

EYE CONTACT	THIS PRODUCT IS MINIMALLY IRRITATING TO THE EYES UPON DIRECT CONTACT. BASED ON TESTING OF SIMILAR PRODUCTS AND/OR COMPONENTS.
SKIN CONTACT	THIS PRODUCT IS NOT EXPECTED TO CAUSE ANY SKIN IRRITATION UPON DIRECT SINGLE OR REPEATED AND PROLONGED CONTACT; HOWEVER, SIMILAR CHEMICAL COMPOSITION PRODUCTS APPLIED TO THE SKIN OF LABORATORY ANIMALS RESULTED IN MINIMAL TO SLIGHT DERMAL IRRITATION.
INHALATION	THIS PRODUCT HAS A LOW VAPOR PRESSURE AND IS NOT EXPECTED TO PRESENT AN INHALATION HAZARD AT AMBIENT CONDITIONS. CAUTION SHOULD BE TAKEN TO PREVENT AEROSOLIZATION OR MISTING OF THIS PRODUCT. THE PERMISSABLE EXPOSURE LIMIT (PEL) AND THRESHOLD LIMIT VALUE (TLV) FOR THIS PRODUCT AS OIL MIST IS 5 MG/M3. EXPOSURES BELOW 5 MG/M3 APPEAR TO BE WITHOUT SIGNIFICANT HEALTH RISK. THE SHORT-TERM EXPOSURE LIMIT FOR THIS PRODUCT AS AN OIL MIST IS 10 MG/M3. SEE HEALTH DATA SECTION BELOW.
INGESTION	INGESTION IS RELATIVELY NON-TOXIC UNLESS ASPIRATION OCCURS. THIS PRODUCT HAS LAXATIVE PROPERTIES AND MAY RESULT IN ABDOMINAL CRAMPS AND DIARRHEA. SEE HEALTH DATA SECTION BELOW.
HEALTH DATA	EXPOSURE TO A LARGE SINGLE DOSE, OR REPEATED SMALL DOSES OF MINERAL OIL BY INHALATION, ASPIRATION OR INGESTION LEADING TO ASPIRATION CAN LEAD TO LIPID PNEUMONIA OR LIPID GRANULOMA. THESE ARE LOW-GRADE, CHRONIC, LOCALIZED TISSUE REACTIONS WHICH ARE NOT FATAL. SHORTNESS OF BREATH AND COUGH ARE THE MOST COMMON SYMPTOMS. THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CONCLUDED THAT HIGHLY REFINED MINERAL OILS ARE GROUP 3 SUBSTANCES, "NOT CLASSIFIABLE AS TO THEIR CARCINOGENICITY TO HUMANS," BASED ON INADEQUATE HUMAN AND INADEQUATE ANIMAL EVIDENCE. IARC HAS ALSO CONCLUDED THAT THERE IS NO EVIDENCE FOR THE CARCINOGENICITY TO EXPERIMENTAL ANIMALS OF WHITE OILS WHEN ADMINISTERED BY ROUTES OTHER THAN BY INTRAPERITONEAL INJECTION. THIS SUBSTANCE IS NOT CARCINOGENIC ACCORDING TO THE OSHA HAZARD COMMUNICATION STANDARD.

IV. FIRST AID PROCEDURES

EYE CONTACT	IMMEDIATELY FLUSH EYES WITH LARGE AMOUNTS OF WATER AND CONTINUE FLUSHING UNTIL IRRITATION SUBSIDES. IF MATERIAL IS HOT, TREAT FOR THERMAL BURNS AND TAKE VICTIM TO HOSPITAL IMMEDIATELY.
SKIN CONTACT	REMOVE CONTAMINATED CLOTHING. IF MATERIAL IS HOT, SUBMERGE INJURED AREA IN COLD WATER. IF VICTIM IS BEVERELY BURNED, REMOVE TO A HOSPITAL IMMEDIATELY.
INHALATION	THIS MATERIAL HAS A LOW VAPOR PRESSURE AND IS NOT EXPECTED TO PRESENT AN INHALATION EXPOSURE AT AMBIENT CONDITIONS.
INGESTION	MAY ACT AS A LAXATIVE. DO NOT INDUCE VOMITING.

PERSONAL HEALTH PROTECTION INFORMATION

EYE PROTECTION	EYE PROTECTION IS NOT REQUIRED UNDER CONDITIONS OF NORMAL USE. IF MATERIAL IS HANDLED SUCH THAT IT COULD BE SPLASHED INTO EYES, WEAR PLASTIC FACE SHIELD OR SPLASH-PROOF SAFETY GOGGLES.
SKIN PROTECTION	NO SKIN PROTECTION IS REQUIRED FOR SINGLE, SHORT DURATION EXPOSURES. FOR PROLONGED OR REPEATED EXPOSURES, USE IMPERVIOUS CLOTHING (BOOTS, GLOVES, APRONS, ETC.) OVER PARTS OF THE BODY SUBJECT TO EXPOSURE. IF HANDLING HOT MATERIAL, USE INSULATED PROTECTIVE CLOTHING (BOOTS, GLOVES, APRONS, ETC.).
RESPIRATORY PROTECTION	RESPIRATORY PROTECTION IS NOT REQUIRED UNDER CONDITIONS OF NORMAL USE. IF VAPOR OR MIST IS GENERATED WHEN THE MATERIAL IS HEATED OR HANDLED, USE AN ORGANIC VAPOR RESPIRATOR WITH A DUST AND MIST FILTER. ALL RESPIRATORS MUST BE NIOSH CERTIFIED. DO NOT USE COMPRESSED OXYGEN IN HYDROCARBON ATMOSPHERES.
VENTILATION	IF VAPOR OR MIST IS GENERATED WHEN THE MATERIAL IS HEATED OR HANDLED, ADEQUATE VENTILATION IN ACCORDANCE WITH GOOD ENGINEERING PRACTICE MUST BE PROVIDED TO MAINTAIN CONCENTRATIONS BELOW THE SPECIFIED EXPOSURE OR FLAMMABLE LIMITS.
OTHER	CONSUMPTION OF FOOD AND BEVERAGE SHOULD BE AVOIDED IN WORK AREAS WHERE HYDROCARBONS ARE PRESENT. ALWAYS WASH HANDS AND FACE WITH SOAP AND WATER BEFORE EATING, DRINKING, OR SMOKING.

MSDS CODE: 000401 PRODUCT: 6969 MINERAL OIL PAGE 5 OF 6

V. FIRE PROTECTION INFORMATION

FLASH POINT	APPR. 470F	TEST METHOD	C.O.C.
AUTOIGNITION TEMPERATURE	NO DATA	TEST METHOD	NO DATA
FLAMMABLE LIMITS IN AIR % BY VOL.	LOWER NO DATA		UPPER NO DATA

EXTINGUISHING MEDIA	USE DRY CHEMICAL, FOAM, OR CARBON DIOXIDE.
SPECIAL FIRE FIGHTING PROCEDURES	WATER MAY BE INEFFECTIVE BUT CAN BE USED TO COOL CONTAINERS EXPOSED TO HEAT OR FLAME. CAUTION SHOULD BE EXERCISED WHEN USING WATER OR FOAM AS FROTHING MAY OCCUR, ESPECIALLY IF SPRAYED INTO CONTAINERS OF HOT, BURNING LIQUID.
UNUSUAL FIRE AND EXPLOSIVE CONDITIONS	DENSE SMOKE MAY BE GENERATED WHILE BURNING. CARBON MONOXIDE, CARBON DIOXIDE, AND OTHER OXIDES MAY BE GENERATED AS PRODUCTS OF COMBUSTION.

VI. REACTIVITY DATA

STABILITY (THERMAL, LIGHT, ETC.)	STABLE	CONDITIONS TO AVOID	NONE
HAZARDOUS POLYMERIZATION	WILL NOT OCCUR	CONDITIONS TO AVOID	NONE
INCOMPATIBILITY MATERIALS TO AVOID	MAY REACT WITH STRONG OXIDIZING AGENTS.		
HAZARDOUS DECOMPOSITION PRODUCTS	NONE		

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	CONSULT HEALTH EFFECT INFORMATION IN SECTION III, PERSONAL HEALTH PROTECTION INFORMATION IN SECTION V, FIRE PROTECTION INFORMATION IN SECTION VI, AND REACTIVITY DATA IN SECTION VII. NOTIFY APPROPRIATE AUTHORITIES OF SPILL. CONTAIN SPILL IMMEDIATELY. DO NOT ALLOW SPILL TO ENTER SEWERS OR WATERCOURSES. REMOVE ALL SOURCES OF IGNITION. ABSORB WITH APPROPRIATE INERT MATERIAL SUCH AS SAND, CLAY, ETC. LARGE SPILLS MAY BE PICKED UP USING VACUUM PUMPS, SHOVELS, BUCKETS, OR OTHER MEANS AND PLACED IN DRUMS OR OTHER SUITABLE CONTAINERS.
WASTE DISPOSAL METHOD	ALL DISPOSALS MUST COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS. THE MATERIAL, IF SPILLED OR DISCARDED, MAY BE A REGULATED WASTE. REFER TO STATE AND LOCAL REGULATIONS. CAUTION! IF REGULATED SOLVENTS ARE USED TO CLEAN UP SPILLED MATERIAL, THE RESULTING WASTE MIXTURE MAY BE REGULATED. DEPARTMENT OF TRANSPORTATION (DOT) REGULATIONS MAY APPLY FOR TRANSPORTING THIS MATERIAL WHEN SPILLED. WASTE MATERIAL MAY BE LANDFILLED OR INCINERATED AT AN APPROVED FACILITY. MATERIALS SHOULD BE RECYCLED IF POSSIBLE.

VIII. HANDLING AND STORAGE

HANDLING AND STORAGE REQUIREMENTS	DO NOT TRANSFER TO UNMARKED CONTAINERS. STORE IN CLOSED CONTAINERS AWAY FROM HEAT, SPARKS, OPEN FLAME, OR OXIDIZING MATERIALS. THIS PRODUCT IS NOT CLASSIFIED AS HAZARDOUS UNDER DOT REGULATIONS. FIRE EXTINGUISHERS SHOULD BE KEPT READILY AVAILABLE. SEE NFPA 30 AND OSHA 1910.106--FLAMMABLE AND COMBUSTIBLE LIQUIDS.
ADDITIONAL INFORMATION	THIS PRODUCT IS NOT KNOWN TO CONTAIN ANY SARA TITLE III, SECTION 313 REPORTABLE CHEMICALS AT OR GREATER THAN 1.0% (0.1% FOR CARCINOGENS). THIS PRODUCT IS ON THE TOXIC SUBSTANCES CONTROL ACT (TSCA) INVENTORY.

IX. PHYSICAL PROPERTIES

BOILING POINT	APPROX. 800 F	PERCENT VOLATILE	NIL
MELTING POINT	N/A	VAPOR DENSITY (AIR=1)	N/A
APPEARANCE	TRANSPARENT FLUID	EVAPORATION RATE (EE=1)	< 1
ODOR	ODORLESS	SPECIFIC GRAVITY	APPRO 0.875 @ 60/60F
VAPOR PRESSURE	< 1MM HG @ 70 F	MOLECULAR WEIGHT	VARIES
SOLUBILITY	NEGLIGIBLE IN WATER		

Attachment 3

Photographs



Photo 1 **SWMUs 03-014(k,l,m,n) showing the sludge beds from east to west with each sludge bed surrounded by asphalt berms that are decaying and crumbling into the beds**



Photo 2 **SWMUs 03-014(l and m) close up showing the decaying asphalt berms between the SWMUs as well as asphalt within the bottom of SWMU 03-014(m)**



Photo 3 AOC 03-047(g) showing the paved asphalt surface on the north side of building 03-141 where drums were stored



Photo 4 **AOC 03-051(c) showing the paved asphalt surface at the northeastern corner of building 03-141 previously stained due to operational leaks of vacuum pump oil**



Photo 5 **AOC 03-051(c) looking south showing the paved asphalt surface at the northeastern corner of the building previously stained due to operational leaks of vacuum pump oil and the adjacent paved asphalt area**



Photo 6 SWMU 03-052(f) culvert that discharges storm water runoff from TA-3 into the drainage channel



Photo 7 **SWMU 03-052(f) drainage channel showing debris including aggregate and asphalt**



Photo 8 SWMU 03-052(f) close up of pieces of aggregate and asphalt in drainage channel



Photo 9 **SWMU 03-052(f) view from drainage channel south to sidewalk running parallel to channel**



Photo 10 **SWMU 03-052(f) view from drainage channel north to sidewalk running parallel to channel**

Attachment 4

Pages from the Final Addendum 1 to the OU 1114 Work Plan

SWMU 3-043(c) is listed in the SWMU Report as a decommissioned tank for storage of mixed, corrosive waste (LANL 1990, 0145). The SWMU is actually a former manhole, TA-3-718, that was part of the LANL liquid industrial waste line system that transported wastes from TA-3-40 to TA-45, and then to TA-50 (Elder et al. 1986, 17-001). The manhole was 3 ft long x 4 ft wide x 4 ft deep and located below grade on the northeast side of TA-3-40. TA-3-718 was constructed of steel-reinforced concrete with walls 8-in. thick (Engineering drawing ENG-C 11340). The 6-in.-diameter industrial waste line passed directly through the bottom of the manhole. Upon removal in 1984, the manhole was found to be intact with no signs of cracking. In addition, no fluid was observed within the manhole.

Rationale for Recommendation: SWMU 3-043(c) is being proposed for NFA for two reasons: TA-3-718 was inaccurately identified in the SWMU Report as an underground storage tank and because no threat exists from TA-3-718. TA-3-718 was part of the industrial waste line system and was remediated after removal in 1984 (LANL 1994, 17-1170; Elder et al. 1986, 17-001). The general soil cleanup guidelines for the removal project consisted of collecting soil samples at appropriate intervals from representative locations along the bottom and walls of the trench and analyzing for gross alpha, gross beta, tritium, or gamma spectroscopy. Because there is no record of a soil cleanup at this site, sampling results fell below the minimum levels specified in the soil cleanup guidelines for the removal project. Minimum gross alpha and gross beta levels were 75 pCi/g, tritium was 250 pCi/mL, and gamma spectroscopy was 20 μR/h.

6.4.4.3 Voluntary Corrective Action/Expedited Cleanup

The following SWMUs are recommended for NFA because they will be undergoing a voluntary corrective action (VCA) between the months of July and September 1995. The VCA process addresses small-scale sites with no controversial issues or which merely involve good facility management practices. Described below is the common rationale for recommendation for NFA for all SWMUs undergoing VCA.

Rationale for Recommendation: SWMUs 3-003(l), 3-003(p), 3-022, 3-047(d), and 3-051(c) are recommended for NFA because they are in the process of a VCA. These sites are being remediated because they have an obvious remedy that can be rapidly implemented , previous sampling data and/or archival data are available to adequately identify chemicals of potential concern (COPCs), and the VCA will be the final solution of the PRS. These processes will allow for the quick removal of contamination, reducing health and environmental risks associated with past Laboratory operations. Any contaminated soil will be contained and disposed off site to a permitted disposal facility in accordance with the waste management plan (WMP).

SWMU 3-003(l) is listed in the SWMU Report as an area of potential contamination from two transformers (PCB ID #s 5557 and 5558) previously located in the basement of the Van de Graaff Building, TA-3-16 (LANL 1990, 0145). Both transformers became inactive in 1988. The transformers were removed in 1989 without incident and taken to TA-21-61 where they were drained (LANL 1989, 17-449; Bailey 1991, 17-1033). While Weston reported that the transformers had a history of leaks, all were contained within the building. No oil could have entered the floor drains located 30 ft from the transformers; furthermore, no stains were noted on the floor at the time of removal (LANL 1989, 17-018). Staining was subsequently noted in a 1994 visit. Confirmatory swipes revealed PCB levels between 2 870 µg/100 cm^2 and 3 065 µg/100 cm^2. ESH-19 immediately initiated a double wash/double rinse cleanup and conducted post-cleanup sampling which yielded PCB concentrations between 3 760 µg/100 cm^2 and 352 µg/100 cm^2 (Heskett 1994, 17-1210). Based on these results, additional cleanup work at TA-3-16 is required. A VCA plan will be submitted to DOE to remove the affected concrete and underlying soil (if any), or to fix the contamination in place. EPA Region 6 will be contacted to establish cleanup requirements specific to this site if remediation is required.

SWMU 3-003(p) was a storage area east of the warehouse building TA-3-142, which was built in 1960. From the 1960s to 1994, SWMU 3-003(p) was used for storage of drums and miscellaneous equipment, including

electrical capacitors and transformers that may have contained insulating oils containing PCBs. Site visits document unlabeled drums and apparent stains on the soil from spills and/or leaks from the drums or equipment. The storage area is currently covered with asphalt and slopes gently southward from the warehouse. The VCA area is unpaved and is transected by a drainage channel that was rerouted when the area was paved. Two large trees are located within the VCA area; these trees will be protected during remediation activities.

In 1994 asphalt and soil samples were collected prior to resurfacing activities at this PRS site and analyzed for antimony and lead . Analytical results from the fixed laboratory indicated that antimony concentrations were below the SAL for antimony and the levels of lead were just over the lead SAL. Based on these results, a 20-square-ft area has been identified as containing elevated lead concentrations within surface soils. There is potential spread of contamination to the south by wind and rain runoff.

The proposed remedy for this site is to excavate and remove the soil until site-specific preliminary remediation goals (PRGs) are met. Upon confirmation that the PRG has been met, the area will be backfilled, recontoured, and reseeded. Soil that is removed in the remediation will be considered hazardous waste until confirmed otherwise.

SWMU 3-022 includes a concrete sump and a steel beam support structure that were part of an aboveground mineral oil storage and pumping system. The system supported the operation of a generator in TA-3-316. Two aboveground steel storage tanks that were part of the storage system were removed in early 1995. The electrical supply, pumps and aboveground piping associated with the tanks have been removed. The mineral oil was Shell Diala AX, which is described in the material safety data sheet as a mixture of refined hydrotreated middle distillates (30-40%) and severely hydrotreated light napthenic distillates (60-70%). The product does not contain detectable levels (<1 ppm) of PCBs. The product is reportedly classified as an oil under Section 311 of the Clean Water Act. Based upon data available to Shell, the product is not regulated by the Superfund Amendments and Reauthorization Act (SARA)Title III.

The potential release site is not listed in the Laboratory's HSWA permit. The site has been proposed for VCA because the remedy is obvious and the contaminants involve only nonhazardous chemicals. A sample of the mineral oil taken on July 23, 1991, failed to detect PCBs above 5 ppm (west tank), and 10 ppm (east tank). There has not been a report of any spills or leaks from the tanks. A waste profile form completed on January 21, 1993, states that the water in the sump was analyzed for toxic metals, PCBs, reactivity, ignitability and corrosivity and did not detect any of these parameters.

Clean backfill will be placed in the sump after confirmatory sample data are available. The fill material will be compacted and the finished surface at the former sump will be graded as needed for drainage and erosion control .

SWMU 3-047(d) is a former drum storage area for TA-3-22. TA-3-22, the steam plant, consisted of an area occupied by a 6-ft x 15-ft asphalt pad located adjacent to the east side of TA-3-22. Various materials such as 30-weight motor oil, Stoddard solvent, and waste oil were stored in drums at SWMU 3-047(d) from approximately 1954 to 1989.

In 1987, a six-inch asphalt berm was added to the asphalt pad to provide secondary containment. The drums within the storage area were stored horizontally on metal stands. Spigots, with collection pans underneath, were used to dispense the contents. There were no documented spills or releases of product in this area. However, accidental spills may have discharged unknown quantities of drum contents to the environment over the years.

In 1989, a new location was selected for an upgraded materials storage area. The original drum storage area's asphalt pad was removed and disposed of at the Los Alamos County landfill. The potential contaminated area is on the eastern edge of the former storage pad. The soils which lay under the pad also may be contaminated if product penetrated the asphalt. Although this is not a high use area, contaminates could have been spread to the east by foot traffic or rain runoff.

All excavated areas will be backfilled with clean soil/tuff and seeded with appropriate materials. Removed soil will be considered hazardous waste until confirmed otherwise (LANL 1995, 17-1267).

SWMU 3-051(c) represents three distinct three to five-foot diameter stains of vacuum pump oil and/or exhaust, located on the east side of TA-3-141. Vacuum pump oil may contain contaminants associated with the processes the vacuum pump was used for, including small amounts of heavy metals from equipment wear. The potential contaminated area is not a high use area but contamination could be spread by foot traffic and rain runoff to the east. As excavation proceeds soil/tuff material will be analyzed at a mobile field laboratory for organic and inorganic constituents to determine final extent of contamination.

Following confirmatory sampling, all excavated areas will be backfilled with clean soil/tuff and seeded or covered with appropriate materials. Engineering controls are proposed for installation beneath the vacuum pump exhausts to prevent future contamination. Removed soil will be considered hazardous waste until confirmed otherwise (LANL 1995, 17-1267).

6.4.5 PRSs Recommended for Deferred Action

6.4.5.1 PRS Is Active With No Credible, Off-Site Pathways

SWMU 3-038(f) TA-3-1502 was a transportable used as a hot change house for the industrial waste line removal workers. The transportable was hooked into the old industrial waste line via a manhole, TA-3-728. When the removal project reached the lines that serviced TA-3-1502, new lines were installed to connect the transportables to the new industrial waste line via manhole TA-3-759. Manhole TA-3-728 was removed along with the old lines. The industrial waste line removal project ended in 1986 and TA-3-1502 was vacated by the workers. In 1987 the transportable was removed leaving the lines connecting it to manhole TA-3-759 in the ground (LANL 1994, 17-1045).