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Mr. Dave Cobrain
Hazardous Waste Bureau
2905 Rodeo Park Dr. E/Bldg 1
Santa Fe, NM 87505

RE: Draft Summary of Risk Findings and Fact Sheet to Support Intent to Deny LANL Permit Application for Technical Area 16 Burn Ground

Mr. Cobrain:

Attached please find two documents provided in support of the intent to deny Los Alamos National Laboratory's (LANL) permit request for the Technical Area 16 (TA-16) Burn Units:

1. Brief summary of the conclusions of the ecological risk assessment supporting denial, and
2. Summary of the risk assessment and air modeling for use in the Fact Sheet.

If you or any of your staff have questions, please contact me at (801) 451-2864 or via email at paigewalton@msn.com.

Thank you,

Paige Walton
AQS Senior Scientist and Project Lead

Enclosures

cc: Steve Pullen, NMED (electronic)
James Bearzi, NMED (electronic)
Joel Workman, AQS (electronic)

Brief summary of the conclusions of the ecological risk assessment supporting denial

The permit application for Los Alamos National Laboratory's (LANL) Technical Area 16 (TA-16) burn units (TA-16-399 and TA-16-388) is being denied based upon uncertainty in the conclusions of the ecological risk assessment. The results of the ecological risk assessments using both surface soil data collected across TA-16 and air modeling (Open Burn Open Detonation Model, OBODM) indicated a low to moderate potential for risk to non-protected species. The screening assessment as provided by LANL incorporated toxicity data that are based on no-observed adverse effect levels (NOAELs). Elevated risk using a NOAEL only indicates that there is potential for an effect and does not allow conclusion regarding whether continued operation of the units would be protective of the environment. A more refined site-specific assessment, incorporating lowest-observed adverse effect levels (LOAELs), which is the lowest concentration at which an effect is seen, and potentially an assessment of bioavailability and evaluation of routes of ingestion is needed to determine whether past operations at TA-16 combined with continued burn operations at TA-16 would result in adverse ecological risk.

TA-16 Burn Units Fact Sheet

Summary. Technical Area 16 (TA-16) consists of two historic burning units (TA-16-388 and TA-16-399) at Los Alamos National Laboratory (LANL). LANL is submitting an application to permit the units, which are currently under interim status. Air modeling and soil sampling were conducted to assess human health and ecological impacts from past and future operations. Based on the assessments submitted date, LANL has not provided sufficient demonstration that continued operation of the burning units would not result in adverse risk to the environment.

Air modeling and depositional patterns. The Open Burn Open Detonation Model (OBODM) was developed at the U.S. Army Dugway Proving Ground to specifically evaluate release and dispersion characteristics from open burn/open detonation (OB/OD) operations. OBODM shows how emission products from open burning will rise and transport and disperse downwind. These data are used to estimate deposition of the emission products onto soil. OBODM was applied to: 1) understand depositional patterns at TA-16 from OB activities, and 2) evaluate the extent of impacts from conducting propane assisted burns. Two runs were conducted: one assuming 35 lbs of high explosive (HE) contaminated waste and a second burning 250 lbs of HE contaminated waste. The results from OBODM indicated that there was a dominant depositional area to the north and to the east/southeast of the burn units. The depositional patterns were the same regardless of the weight of waste burned. The only difference between the two scenarios was the extent of deposition. In addition, the OBODM indicated that there was potential for adverse ecological risk due to dioxin/furan congeners.

A second modeling approach using the model CALPUFF, which can estimate concentrations of pollutants from non-steady-state emission sources, was also used. The results from CALPUFF were compared to the results from OBODM. While there was no correlation between the maximum deposition and the estimated risks, the dominant areas of deposition as predicted by CALPUFF were consistent with those predicted by OBODM. Both OBODM and CALPUFF indicated that the primary areas of dispersion and deposition are to the north and east/southeast of the burn units.

Soil sampling. To verify the results of the air modeling, discrete surface soil samples were collected at 36 locations for analysis for dioxin/furan congeners and at 31 locations for metals analysis. Concentrations of dioxin/furans as well as metals detected above background levels were plotted on a site map. The highest concentrations of all data were found to the north and east/southeast of the burn units. The soil data confirmed the deposition pattern predicted by both OBODM and CALPUFF. Since both the modeling and soil data are consistent, it can be concluded that the levels of contamination detected within TA-16 were a result of past operation of the burn units at TA-16 and that contamination detected in soil at TA-16 is not likely from other sources.

The results from the soil sampling were also evaluated in a human health and ecological screening level risk assessment to determine if the burn units could be operated in the future in a manner protective of human health and the environment.

What is a risk assessment? A risk assessment, whether human health or ecological, is conducted to determine if constituents in various environmental media could cause harm to humans or animals that come into contact with them. The risk assessment provides an understanding of potential risks posed by contamination in the absence of any cleanup or removal. In the case of the TA-16 burning ground, this would equate to assessing risks posed by contamination due to past operations of the units.

Risk assessments address the following four basic questions:

1. Who [humans (resident or industrial worker) and/or animals] could potentially be exposed and to what levels of contamination in the environmental media (e.g., soil, air, vegetation)?
2. How could this exposure to site contamination occur (e.g., ingestion, inhalation) and how often may they be exposed (e.g., frequency at site, amount of food ingested)?
3. How do chemicals affect health (toxicity)?
4. What is the potential for actual risk and what level of risk is deemed acceptable?

Human health risk assessment. The screening level risk assessment conducted by LANL evaluated both an industrial worker and a hypothetical resident who could be exposed to contamination through ingestion, inhalation, and dermal contact with contaminants in soil. Methodologies outlined in the New Mexico Soil Screening Guidance were followed and site concentrations were compared to the 2009 Soil Screening Levels (SSLs). The resulting risk calculations indicated that both risk and hazard were below the New Mexico target levels of 1E-05 for cancer risk and 1.0 for hazard. Since a screening level approach is deemed conservative, and the results were below target risk/hazard levels, additional analysis of human health risk was not required.

Ecological risk assessment. The ecological screening level risk assessment included several indicator species: kestrel, robin, deer mouse, desert cottontail, red fox, Montane shrew, earthworm, and plants. The only identified protected species potentially present in the TA-16 area was the Mexican spotted owl. The kestrel, which is a high trophic level carnivore, was used as a surrogate receptor for the owl.

The initial screening assessment applied very conservative assumptions, to include maximum ingestion rates, an assumption that contaminants were 100% bioavailable, and use of toxicity reference values (TRVs) based on no-observed adverse effect levels (NOAELs). The results of this initial screen indicated that there were elevated hazards (above the target hazard level of 1.0) for the robin, deer mouse, earthworm, red fox, Montane shrew, and plant. The screening assessment concluded that there was no adverse risk for the kestrel, Mexican spotted owl or desert cottontail.

Following NMED, LANL and Environmental Protection Agency (EPA) guidance, area use and population use factors were applied. These factors account for how much of actual home range of each receptor is included in potentially impacted areas. The adjusted hazard quotients indicated acceptable risk for all receptors with the exception of the deer mouse, Montane shrew, plant, and earthworm, which had hazards indicative of low to moderate risk.

Using the site maps of soil sampling results, there was an area clearly elevated compared to the rest of the TA-16 site. In order to assess potential risk to this area of highest impact, a spatial assessment was conducted for the deer mouse and Montane shrew. These two receptors were selected as they appear to be the most sensitive species. The results of the spatial analysis indicated slightly elevated hazard (1.9) for the deer mouse but acceptable hazard for the Montane shrew.

All of the levels of assessment applied conservative TRVs based on NOAELs. The NOAEL is the maximum quantity of a chemical that results in no detectable adverse effect. Use of NOAELs results in a conservative estimation of risk and is useful in initial screening level assessments. However, if the NOAEL-based assessment results in a hazard quotient greater than the target level of 1.0, additional refinement is needed using a lowest-observed adverse effect level- (LOAEL) based TRV. The LOAEL is the lowest concentration at which an adverse effect is observed. In addition, LOAELs are often more representative of population risks and the potential for an adverse effect can not be ruled out without first looking at the risk using a LOAEL. The results of the ecological risk assessment indicated elevated risk (low) to the deer mouse based on the use of NOAEL-based TRVs, but as a more refined analysis using a LOAEL was not provided, there is uncertainty and an overall conclusion of risk could not be made.

Comparison of levels to other canyons: Dioxin/furan levels detected at TA-16 were compared to levels detected in other canyons at LANL including Los Alamos Canyon, Pueblo Canyon, and Pajarito Canyon. Biota studies are being conducted in these canyons and to date the results of these studies have not shown adverse impacts to small animals (e.g., deer mouse). The range of dioxin/furans detected in these areas was approximately 2E-10 to 5E-06 milligrams per kilogram (mg/kg). LANL indicted that the 95% upper confidence level of the mean (UCL) for TA-16 was 6.65E-06 mg/kg, which is similar to other areas. It is agreed that for most of TA-16, detrimental impact to small animals would most likely not occur. However, the area of elevated contamination identified by both the model and soil sampling predicted dioxin/furan concentrations an order of magnitude higher than either the TA-16 UCL or the other LANL canyons, adding uncertainty to assessment of the areas of highest impact around the burn units.

Conclusions. Evaluation of the human health risk assessment and soil data indicate there are no adverse impacts from exposure to current levels of contamination to either residential or industrial receptors. The air modeling indicated elevated risk in close proximity to the burn units, but on a site-wide basis, confirmed that risk above target levels to human receptors is not likely from continued operations of the burn units.

Evaluating the ecological assessment as submitted by LANL, there is low to moderate ecological risk to non-protected species to include the deer mouse, Montane shrew, and earthworm. A more refined site-specific assessment, incorporating LOAELS, and potentially an assessment of bioavailability and evaluation of routes of ingestion, is needed to determine whether past operations at TA-16 combined with continued burn operations at TA-16 would result in adverse ecological risk.