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Subject: Public Notice 17-11, Sandia National Laboratories Corrective Action Complete Six Sites 2017

Dear Mr. Cobrain:

I am writing in support of the New Mexico Environment Department's (NMED) proposal to approve Corrective Action Complete (CAC) status for six U. S. Department of Energy (DOE)/ Sandia National Laboratories (SNL) solid waste management units (SWMUs) as discussed in the NMED's Public Notice 17-11, issued November 17, 2017. As you are aware, I worked for the NMED for over 25 years, retiring from the agency at the end of 2015. For nearly all of those years of service, I worked for the NMED Hazardous Waste Bureau (HWB) or conducted work directly related to the business of the HWB. For the last 14 years of my time at NMED, I was the Albuquerque Group Manager of the HWB's Permits Management Program. I was on the teams that negotiated the SNL and Los Alamos National Laboratory Consent Orders for corrective action. I served as the project leader for the HWB for corrective action oversight at SNL for many years. Presented below are my comments in support of approval of CAC status for these six sites. These comments represent my opinions as a citizen. I have not been paid by anyone to generate these comments, and I offer them as a means to help support the NMED's proposal that these SWMUs be granted CAC status based on the work already completed at each of the sites.

I want to thank NMED for allowing me access to relevant records beyond the Fact Sheet/Statement of Basis upon my written request. Mr. Brian Salem provided the records that I needed to review. Mr. Cornelius Amindyas provided a comfortable space for me to review the documents. The documents I reviewed in addition to the Fact Sheet/Statement of Basis include parts of the RCRA Facility Investigation Reports and Annual Groundwater Monitoring Reports that pertain to the 6 SNL SWMUs.

General Comment About SWMUs with Groundwater Monitoring Wells that are Septic Systems

Two of the SWMUs proposed for CAC are small septic systems (SWMUs 149, 154) that have been investigated under written procedures developed in negotiations between the DOE, SNL, and the NMED. Where groundwater monitoring wells were installed, the locations were negotiated in the field between DOE, SNL, and NMED staff. The locations of the wells are not

immediately adjacent to the points of discharge, but instead are typically several hundred feet in a direction believed to be hydraulically downgradient based on surface topography and general knowledge of groundwater flow directions throughout the surrounding area. The reason the well locations were placed further away than is normally done is based on two major factors. First, groundwater flow velocities near and at the highlands on the east side of Kirtland Air Force Base are expected to be higher than those commonly observed in the Albuquerque Basin proper; and second, wastes have not likely been discharged into these septic systems for many years prior to the groundwater investigations. By placing the wells further away, it was believed that if groundwater contamination exists at some particular SWMU, there was a higher chance of discovering the contamination under the belief that the contaminant plume would have migrated some distance downgradient from its source by the time the groundwater investigation was initiated.

If a contaminant is detected in the groundwater at a SWMU, then further investigation may or may not be warranted depending on the concentrations of the contaminant and how consistent the contaminant was detected. In the case of the six SWMUs currently being proposed for CAC status, low levels of contaminants were potentially found or were found in groundwater at SWMUs 149 and 154. However, as discussed below, no further investigations of the groundwater at these two SWMUs are necessary.

General Comment about MDAs Exceeding Background Levels

There are several statements in the Fact Sheet/Statement of Basis that discuss in some cases, that for radionuclides, the minimum detectable activity (MDA) achieved during the analysis of samples slightly exceeded the respective approved background level for a given radionuclide. SNL typically includes these radionuclides in radiological risk assessments setting the maximum detected level as the MDA when sample results were all reported as less than the MDA. This approach taken by SNL is conservative. Additionally, I agree that the MDAs are only slightly higher than the approved background levels, and at the levels of the MDAs, there is no significant risk to human health or the environment. My main point however is to make clear that I support the NMED's (and SNL/DOE's) position that these data are acceptable for their intended purpose (to support site characterization or clean up).

SWMU 8, Open Dump (Coyote Canyon Blast Area) and SWMU 58 Coyote Canyon Blast Area

SWMUs 8 and 58, combined, encompass a large area where explosive testing was conducted. Many smaller areas within these SWMUs have been identified and referred to as "features". The features include locations where testing occurred or where debris was dumped or left on the ground surface after tests were completed. Most of the features occupy only small areas, and potential or actual contamination is limited to surface soil or shallow subsurface soil. The features are also mainly located on the flatter areas within the SWMU boundaries rather than on hill slopes where access is more difficult.

SWMU 58 represents the zone of fragment dispersal from explosives testing. The many features found in its area, and including those of SWMU 8, are scattered across much of the two sites. From experience, high order (full) detonations leave but trace amounts of explosives in soil. The

components of test objects and test structures that can be found after such detonations tend to be chiefly nonhazardous solid wastes. Although sometimes unsightly, these wastes and remnant structures are not significant threats to human health or the environment.

Sampling of surface soil at the numerous features scattered across SWMUs 8 and 58, in my opinion, adequately covers the general dispersion zone of SWMU 58. Contaminants present in surface soil at the features are more likely to occur at higher levels than those in surface soil outside of these features. So sampling results from the features would be conservative as applied to the overall dispersion zone.

I have considerable personal experience walking over SWMUs 8 and 58 looking at the numerous features. In my opinion, Features 8Y/58B (Debris Pile and Pit Area) have the largest potential for being a source for groundwater contamination. These features, collectively, were basically a large open dump containing considerable quantities of debris, including concrete, wood, metal, plastic, and even several jet assist takeoff (JATO) motors, all which chiefly are nonhazardous debris. The main concern was the possibility of liquid contaminants being disposed of at the dump site, including whether fuel had been used at the site to burn wood and other combustible debris, and whether any such liquids could have contaminated groundwater.

Two groundwater monitoring wells were installed to evaluate water quality at SWMUs 8 and 58, including well CCBA-MW1. Well CCBA-MW1 is situated to monitor groundwater from various features, including Features 8Y/58B. Groundwater samples from both wells indicate that no contamination is present, and I make this statement taking into consideration sporadic, low-level detections of toluene, benzo (b) fluoranthene, and benzo (a) pyrene, for which there is no definitive evidence of actual contamination. Fluoride was detected in groundwater at a maximum of 5.36 mg/L, with all other results less than 2 mg/L (the New Mexico Water Quality Control Commission (NMWQCC) standard is 1.6 mg/L); however, I believe the fluoride detected is of natural origin given that the levels of fluoride are not exceptionally elevated, and that SWMUs 8 and 58 are situated along the Tijeras Fault Zone where there is evidence of weak mineralization throughout the area. For example, fluorite (CaF_2) is common at abandoned mines and prospects in the area. In my opinion, based on the investigation already done, additional groundwater wells and groundwater monitoring are not needed at SWMUs 8 and 58.

In conclusion, soil sampling indicates that residual contamination at SWMUs 8 and 58 does not pose unacceptable risk to human health or the environment. Groundwater was investigated and determined not to be contaminated. Thus, SWMUs 8 and 58 are appropriate for CAC status.

SWMU 68, Old Burn Site

SWMU 68 consists of a burn pan, when used for testing, was filled with water and floating fuel. After tests were completed, wastewater was discharged into a ditch where it flowed into an overflow basin. In addition to the burn pan, burn tests using magnesium scrap and SNAP reactors were also conducted in a plastic lined pit. A mound, referred to as the 68A Mound, lies to the north of the burn pan. Of these features, I considered the ditch and overflow basin as the two features having the most potential to cause groundwater contamination.

Soil samples were collected from the burn pan, ditch, and overflow basin. Soil samples were also collected from the plastic line pit, the arroyo south of the 68A Mound, at the 68A mound, and an area cleaned up under a voluntary corrective measure (VCM) in 2004.

Table 7 of the Fact Sheet/Statement of Basis shows that, collectively, a number of organic contaminants were detected in soil; however, none represents a significant risk. According to the table, the risk driver for the site is the inorganic constituent arsenic; however, the maximum level of arsenic detected is in my opinion indicative of background levels. Thus, arsenic should not be considered a true contaminant at this site, and its contribution to the risk results should be ignored. Furthermore, in my opinion, all of the metals (inorganics) listed in Table 7 have maximum levels that are indicative of background concentrations.

The risk of lead contamination is addressed separately from Table 7, as appropriate. Lead contaminated soil was detected and removed from the overflow basin. The maximum lead concentration found in verification samples was less than 800 mg/kg. In fact, an argument could be made that the average lead concentration left on site is sufficiently low that the site meets the risk level for residential land use (in consideration of the risk pertaining to lead).

Three groundwater monitoring wells were installed at SWMU 68. Groundwater flow in this part of Kirtland Air Force Base is complex and can be controlled by the bedrock paleotopography beneath the unconsolidated sediments that overly the bedrock. I believe that the well locations that were utilized are acceptable, and that the groundwater data obtained from the wells are adequate to make a decision about groundwater quality at this site. Groundwater samples indicate that no contamination is present, including consideration of the toluene detected at trace levels in the July 2012 samples, which were likely a result of laboratory contamination. Fluoride was detected at about 2.3 mg/L (the NMWQCC standard is 1.6 mg/L); however, I believe this level is indicative of natural conditions. There is no known significant source for fluoride based on historical operations conducted at the site, lending credence to the argument that the observed fluoride is of natural occurrence. Taking all of the above into account, I am satisfied that additional groundwater wells and groundwater monitoring are not needed for this site.

The NMED proposes industrial controls for the site stating "However, the estimated excess cancer risk is not acceptable for a residential land-use scenario", which is in reference to radionuclides (cesium-137, thorium-232, uranuim-235 and uranium-238). However, these radionuclides are not regulated by the NMED. The DOE, under its procedures and authority, has deemed the site suitable for unrestricted radiological release and may argue against any restriction imposed by the NMED on land use due to these radionuclides. If that push back occurs, I recommend that the NMED accept the position of the DOE as a TEDE of 3.2 mrem/year is much less than background in this part of the world and is a level that does not pose a threat to human health or the environment.

In conclusion, soil sampling indicates that residual contamination at SWMU 68 does not pose unacceptable risk to human health or the environment. Groundwater was investigated and determined not to be contaminated. Thus, SWMU 68 is appropriate for CAC status.

SWMU 149, Building 9920 Septic System

SWMU 149 is an abandoned small septic system consisting of a septic tank connected to a seepage pit. Soil samples collected adjacent to the seepage pit and analyzed for a wide range of possible contaminants indicate that no significant chemical or radiological contamination is present.

Traces of various contaminants were sporadically detected in groundwater samples over several years of monitoring; however, the only significant and consistently detected potential contaminants are selenium and fluoride. Selenium, although at concentrations exceeding the approved background level, does not occur at concentrations exceeding the U. S. Environmental Protection Agency (EPA) Maximum Contaminant Limit (MCL) or NMWQCC standard of 0.05 mg/L. Fluoride exceeds the NMWQCC standard of 1.6 mg/L. However, the levels of selenium and fluoride do not notably exceed the approved background levels for these constituents. Based on my experience working on groundwater issues at SNL, including that concerning the establishment of background conditions, I believe the selenium and fluoride concentrations detected in the water samples from well CTF-MW3 are of natural origin and are related to the geologic environment that exists where the SWMU is located. My opinion is supported in that concentrations of chloride and potassium suggest that the groundwater at SWMU 149 contains a component of deep-sourced groundwater that is upwelling along faults. Deep groundwaters often contain higher concentrations of natural inorganic constituents compared to shallow, usually younger groundwaters.

The one-time trace detections of constituents such as acetone, toluene, and 2-amino 4,6-dinitrotolune are of no concern. It is doubtful that that these constituents are actually present in the groundwater, and if they do, they occur at insignificant levels. Nitrate is also of no concern even though levels occasionally slightly exceed the approved background level which is not uncommon at some areas within Kirtland Air Force Base. Nitrate at this site does not exceed the EPA MCL and NMWQCC standard of 10 mg/L.

The trihalomethanes chloroform, bromodichloromethane, and dibromochloromethane were detected at generally less than 0.5 µg/L in six, two, and three groundwater samples, respectively, over a period of eight quarters suggesting that they might be groundwater contaminants. However, none of these compounds exceeds their respective tap water screening level. Furthermore, chloroform occurs at levels far below the NMWQCC standard of 0.100 mg/L. All three trihalomethanes combined do not exceed EPA's standard for total trihalomethanes at 0.080 mg/L. Although these compounds may be used as solvents, refrigerants, or feedstock for making other chemicals, they occur occasionally in trace amounts in drinking water as a result of disinfecting water using chlorine. If these trihalomethanes are indeed groundwater contaminants, the trace levels at which they have been detected indicate that they are insignificant. Thus, additional groundwater wells and groundwater monitoring are not needed for this site.

In conclusion, soil and groundwater sampling indicate that the trace levels of contamination at SWMU 149 do not pose unacceptable risk to human health. The depth at which contamination occurs precludes unacceptable ecological risk. Thus, SWMU 149 is appropriate for CAC status based on a residential land use scenario.

SWMU 154, Building 9960 Septic System, Septic Tanks and Drainfield

SWMU 154 consists of a small septic system that discharged from Building 9960 to a seepage pit east of the building, and a small high explosives (HE) drain system connected to two seepage pits on the west side of the building. In addition, there is a small seepage pit located approximately 43 feet northwest of Building 9961. Soil samples collected adjacent to the seepage pits indicate that barium; silver; 2-Amino-4,6-dinitrotoluene; 4-amino-4,6-dinitrotoluene; 2-4-dinitrotoluene; 3-nitrotoluene; 4-nitrotoluene; 1,3,5,7-Tetranitro-1,3,5,7-tetrazocane (HMX); 1,3,5-Trinitrobenzene; hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX); and 2,4,6-Trinitrotoluene contamination are present in subsurface soil surrounding the HE seepage pits. 2,4,6-Trinitrotoluene is the main risk driver for soil contamination. The HE drain system at SNL is unusual among the small septic systems at SNL in that appreciable contamination was found in soil at the site.

I note that arsenic, selenium, and chromium (III and VI) are included as soil contaminants in the risk assessment, but each of these are likely representative of natural background concentrations, should not be considered as contaminants for the site, and should be ignored in evaluating the risk assessment results. I also believe that lead, detected at a maximum concentration of 30 mg/kg, occurs only at background levels and should not be considered a contaminant at SWMU 154.

In groundwater samples, RDX is the only compound with consistent detections. RDX occurs at small concentrations (about 0.1-0.3 µg/L) compared to the screening level for tap water of 7.02 µg/L. Sporadic trace detections of other organic and inorganic contaminants in groundwater are of no concern as there is no definitive evidence that they are indeed contaminants. Furthermore, I believe the elevated fluoride and arsenic levels observed in groundwater at SWMU 154 are of natural origin, and do not represent contamination. Concentrations of chloride and potassium suggests that the groundwater at SWMU 154 contains a component of deep-sourced groundwater that is upwelling along faults. Deep groundwaters often contain higher concentrations of natural inorganic constituents compared to shallow, usually younger groundwaters. Furthermore, there is no source of fluoride or arsenic at SWMU 154, and arsenic was detected only at background levels. In summary, the only real contaminant in the groundwater at SWMU 154 is RDX, albeit at trace concentrations of no concern.

The levels of contamination found in soil and groundwater at SWMU 154 do not pose unacceptable risk to human health or the environment for the foreseeable future land use. Furthermore, the trace concentrations of RDX in groundwater are not significant, thus, additional groundwater monitoring or further investigation of groundwater are not needed for this site. SWMU 154 is appropriate for CAC status based on an industrial land use scenario.

SWMU 502, Building 9938 Surface Discharge Site

SWMU 502 consists of a small area defined by a shallow depression located near Building 9938. Approximately 250-gallons of wastewater that was generated from explosive synthesis activities were discharged to the ground surface at the site. The site conceptual model is simple -- shallow soil contamination would be all that would be expected given the small amount of the discharge and that groundwater is in the range of 350 feet.

Pentaerythritol tetranitrate (PETN); RDX; Dinitrophenol, 2,4-; HMX, barium, and perchlorate are the contaminants found in the soil, with PETN being the main risk driver for this SWMU. Trace amounts of numerous other organic contaminants were also detected in the soil samples, but they are not of significance. Although arsenic and antimony are also listed as risk drivers according to Table 11 of the Fact Sheet/Statement of Basis, in my opinion, these constituents are of naturally occurring concentrations, are not contaminants, and should be ignored as risk drivers. Furthermore, all other inorganic constituents listed in Table 11, with the exception of barium, also represent background concentrations, and thus, should not be classified as actual contaminants for the site; they too should be ignored as contributing to the calculated risk for the site. As would be expected, concentrations of PETN generally decrease notably at depths of 2 feet or more, indicating most of the contamination was in surface soil.

The low levels of soil contamination that occur at SWMU 502 do not pose unacceptable risk to the environment or human health based on a residential land use scenario. Thus, SWMU 502 is appropriate for CAC status.

In summary, all six of the SWMUs proposed for Corrective Action Complete should be granted this status. Additionally, there is no need for the groundwater monitoring that was conducted at some of these SWMUs to continue into the future, and there is no need for further groundwater investigations. My latter point considers that additional investigations would be costly and require considerable investment of work and time by the DOE/SNL and the NMED, with little chance that significant contamination would be found by the additional effort. Because no standards have been exceeded, groundwater remediation is not warranted at any of the SWMUs where groundwater was investigated.

On a personal note, I wish to acknowledge that I really enjoyed working for you during the last approximately four years of my time with the HWB. The NMED is lucky to have you as an employee. Thank you for your consideration of my comments, and I hope they are helpful in the prosecution of this matter.

Sincerely,

William P. Moats