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DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY DUGWAY PROVING GROUND
DUGWAY UT 84022-5000

REPLY TO
ATTENTION OF:

TEDT-DP-SA

7 May 2008

MEMORANDUM THRU Headquarters, U. S. Army Developmental Test Command, ATTN: TEDT-RIS (Dr. Oxenberg), 314 Longs Corner Road, Aberdeen Proving Ground, MD 21005-5055

FOR U. S. Nuclear Regulatory Commission, Region IV, Division of Nuclear Materials Safety, Nuclear Material Safety Branch B, ATTN: Mr. Jack Whitten), 611 Ryan Plaza Drive, Suite 400, Arlington, TX 76011

SUBJECT: Response to 14 January 2008 Letter Regarding Assessment of Former Burial Site at Dugway Proving Ground (DPG)

1. This correspondence is in response to your letter dated 14 January 2008 regarding a former burial site (Solid Waste Management Unit (SWMU) 11) located at Dugway Proving Ground (DPG), Dugway, Utah. DPG has been working with the State of Utah's Department of Solid and Hazardous Waste (DSHW) to investigate and remediate SWMU 11 under the State's SWMU requirements. It is also our understanding that DSHW personnel have provided subsequent investigation reports to the Utah Department of Environmental Quality Radiation Bureau. The following is a brief summary of the investigation activities and results for SWMU 11 to date.

2. SWMU 11 corresponds to a location known as the East Granite Holding Area, which is bounded by the three walls of the canyon. The site consists of three open (i.e. partially backfilled) trenches oriented roughly east-west along the north side of the canyon. A fourth large backfilled trench oriented north-south is located in the western half of the canyon. These trenches were used for the burning of propellant waste, which contained beryllium (Be) in the mid 1960s. In the DPG Resource Conservation and Recovery Act (RCRA) Facility Application, SWMU 11 was reported as a radioactive landfill. The East Granite Holding Area was not identified in the available literature as being associated with the testing of radiological munitions conducted at DPG in the 1950s and 1960s. Historical inspection records indicate that buried wastes in the area consisted primarily of "contaminated rags and papers." Evidence suggests that Army radioactive waste materials repackaged for sea disposal in the Able Area may have also been disposed at the DPG burial area corresponding to SWMU 11 after the sea disposal program was discontinued. Radioactive waste materials from laboratory activities in other areas of DPG were stored in a CONEX container to protect individual storage containers from the elements. Materials stored in the CONEX included tritium (H-3) and carbon-14 (C-14). In March 1980, contaminated glassware was removed from the CONEX by the DPG Radiation Safety Officer and disposed at an offsite location. At the time of the 2005 and 2006 SWMU 11 radiological surveys, no laboratory wastes remained in the CONEX.

3. In June 2000, DPG notified the U. S. Nuclear Regulatory Commission (NRC) about SWMU 11. NRC personnel visited the site in September 2000, and during a limited survey of the area were unable to detect any radioactivity significantly above background. The questions surrounding this site by the NRC personnel revolved around the open trenches and an

assumption these trenches were part of the radiological disposal site. Subsequent records searches, validated with field sampling efforts, clearly delineate the open trenches are not part of the radiological disposal area.

4. The non-radiological portion of SWMU 11 is remnants of a beryllium burn test. During the spring and summer of 1965, DPG received 50,000 pounds of propellant waste, of which 300 pounds were estimated to be beryllium metal. Under the direction of the U. S. Air Force and with the approval of the State of Utah, a study was conducted to determine the dispersion of beryllium in the environment resulting from burning beryllium-containing missile propellant wastes in an open trench (U. S. Army Environmental Hygiene Agency [USAEHA]). During this study, two trenches contained the waste material, one parallel to the ridge (TR-1) and approximately 300 feet (ft) long, and the second perpendicular to the ridge (TR-4) and approximately 100 ft long. According to the USAEHA report, both trenches were backfilled after completion of the study. However, at the time of the radiological surveys in 2005 and 2006, only the trench perpendicular to the ridge remained backfilled to existing grade. This portion of SWMU 11 is under contract to be closed by removing all waste materials and backfilling/re-grading the area. Monitoring wells have recently been installed to address potential groundwater contamination.

5. Radiation surveys at SWMU 11 were performed in accordance with the *Multi Agency Radiation Survey and Site Investigation Manual* (MARSSIM; U. S. Nuclear Regulatory Commission, 2000), and other applicable NRC guidance, for the purpose of demonstrating that the surveyed areas within SWMU 11 met the criteria for free release and unrestricted use. The intent of this survey was to serve as both a characterization and, if appropriate, a final status survey.

6. Based upon a review of DPG history, DPG identified the following preliminary radionuclides of concern: Cobalt-60 (Co-60), H-3, C-14, and Radium-226 (Ra-226). However, due to the limited site history, it was deemed conservative to collect gross (i.e., not radionuclide-specific) field measurements and laboratory analyses were conducted to determine if any additional site-related radionuclides of concern were present at SWMU 11.

7. Per Code of Federal Regulations Title 10, Chapter 20 (10 CFR 20), and applicable State of Utah guidance, the release criteria allowing unrestricted use at a site is an above-background total effective dose equivalent (TEDE) of 25 millirem per year (mrem/yr) to an average receptor in the critical (residential) group, or the group of individuals most likely to receive the highest dose from residual radioactive material at the site (10 CFR 20.1402; Utah Administrative Code R313-15-402). Typically, compliance with the 25 mrem/yr TEDE is also protective of ecological receptors, as demonstrated by the 10 milliGray per day (mGy/d) and 1 mGy/d (365 mrem/yr and 36.5 mrem/yr) screening levels for terrestrial plants and animals, respectively, presented in United States Department of Energy (DOE), 2002. In addition, exposures associated with the site must be As Low As Reasonably Achievable (ALARA), defined in 10 CFR 20.1003 as "making every reasonable effort to maintain exposures as far below the dose limits...as is practical."

8. Results from the SWMU 11 investigation were evaluated against generic surface and soil screening levels obtained from Volume 2 of U. S. Nuclear Regulatory Commission Guidance

(NUREG)-1757 (2003). The screening levels are above-background surface (including removable activity) or soil concentrations that result in the TEDE of 25 mrem/yr. Per NUREG-1757, a generic screening analysis using look-up values rather than development of site-specific Derived Concentration Guideline Levels (DCGLs) is appropriate at SWMU 11 due to the limited potential for contamination based on site history, the more conservative nature of screening values, and the preliminary stage of the investigation.

9. Prior to radiation survey activities, SWMU 11 locations were divided into survey units, which were classified according to the expected potential for residual contamination. Three survey units were established in the work plan. Per the work plan, the open trenches (i.e., TR-1, TR-2, and TR-3) were considered to be one Class 2 survey unit. The CONEX container and its surrounding soils were classified as a separate Class 3 survey unit. Finally, surface soils outside of the open trench area (including TR-4) were considered to be a Class 3 survey unit. After completion of the radiological surveys, TR-4 and additional surveyed land area to the west (including the areas designated as TR-5 and TR-6) were grouped as a single Class 2 survey unit. The CONEX container remained a stand-alone Class 3 survey unit.

10. The background area for SWMU 11 survey units was determined upon arrival onsite. The area selected was also located on the east side of Granite Mountain, in the canyon immediately to the south of SWMU 11. There is no record of any radiological activities in this area. The background survey area included locations both near and away from exposed rock to account for any variability due to naturally-occurring materials. A background test pit was excavated to obtain background soil samples at depth.

11. Per MARSSIM, field measurement locations were labeled and documented to ensure reproducibility and defensibility. Survey grids measuring approximately 40 ft long by 15 ft wide (i.e., one-half of the trench width) were established for trenches TR-1, TR-2, and TR-3. A survey grid of approximately the same size was established for the additional land area to the west of TR-4. All accessible surfaces of the CONEX container were surveyed for fixed contamination and swipe samples collected for removable contamination. Each location within the survey grids had a unique identifier that included the trench name, directional side of the trench, and sequential number (e.g., TR-1-1N).

12. A two-part evaluation was used to determine if the SWMU 11 survey units met the release criterion. This evaluation follows the process outlined in MARSSIM Section 8 for the Scenario A null hypothesis, which assumes that the median survey unit measurement exceeds that of the reference area by more than the screening level. In other words, the survey unit is assumed to have residual contamination greater than the release criterion or screening level until it has been proven otherwise. Per MARSSIM Section 8 and the flowchart presented in Figure F.2.2, the process for evaluating gross measurements is as follows:

a. Difference between the largest survey unit measurement and the smallest background area measurement is less than the screening level or DCGL – *Survey unit meets the release criterion.*

b. Difference of the survey unit mean and the background area mean is greater than the screening level – *Survey unit does not meet the release criterion.*

c. Difference between any survey unit measurement and any background area measurement is greater than the screening level and the difference of the survey unit mean and the background area average is less than the screening level – *Conduct Wilcoxon Rank Sum (WRS) test and elevated measurement comparison.* Where required, the WRS test was performed using the Microsoft Excel spreadsheet formulae shown in MARSSIM Appendix I.

13. The results of the surveys and analysis of soil samples indicated that trenches TR-1, TR-2, and TR-3 met the release criteria and are suitable for unrestricted use. In addition, the CONEX container itself was found to be free of radioactive contamination, and can be returned to use, recycled, or disposed of as nonradioactive waste.

14. Initially the scope of the radiological survey at SWMU 11 outside of the open trenches consisted of only the area of the backfilled trench (TR-4; Figure F.1.2). However, prior to commencing test pitting activities, two areas with anomalous magnetic readings were discovered during a routine sweep using a Schonstedt magnetometer. One of those locations, immediately to the west of TR-4, also demonstrated elevated radiation levels (as well as some visible debris) and was designated TR-5. The second area, located to the west of the CONEX container at the back of the canyon, demonstrated radioactivity at background levels and was designated TR-6. Due to the discovery of these areas, the area included in the radiation surveys was extended from the western edge of TR-4 to approximately the western wall of the SWMU 11 canyon.

15. Characterization activities at TR-5 indicated elevated radiation readings and investigations were suspended as the stop-work criteria of 500 micro Roentgen per hour (µR/hr) was exceeded when six inches (6") of soil was removed from above the area of elevated readings. It is assumed that this small area of elevated activity exceeds the release criterion of 25 mrem/yr. Further surface characterization consisted of collecting metal fragments for analyses. These metal fragments were analyzed and a Strontium-90 (Sr-90) emitter is postulated for the buried source, either with the Sr-90 entrained directly into the metal of the drums or, more likely, by surface contamination from a dispersed source of Sr-90. Based on the field measurements it is concluded that two or more discrete sources are present in the subsurface. Additional sources may be present at greater depths, resulting in more shielding and less instrument response at the surface. The depth of material in this unmarked disposal area is not known, although based on the depth of the depressions in the area, material may be present as close as 3 to 4 ft below the surface. However, excavations at test pit EP15, west of the CONEX container, showed debris buried as deep as 8 ft below ground surface.

16. As noted your January 14 letter, DPG was requested to provide the results of the assessment of the former burial site and to implement one of the two following actions:

a. If the assessment demonstrates that the former burial site meets the 25 millirem per year (mrem/yr) dose limit, submit documentation of the assessment to the NRC for inclusion into the docket file to support the license termination decision, or

b. If the assessment demonstrates that the burial site does not meet the 25 mrem/yr limit, inform NRC in writing of your plans for the remediation of the burial site, including a proposed timetable for remediation, and if applicable, submit a decommissioning plan in accordance with 10 Code of Federal Regulations (CFR) §30.36(d).

17. The results of the RCRA investigations at SWMU 11 indicate that all areas with the exception of the two localized hot spots in TR-5 meet the 25 mrem/yr dose limit and may be considered for unrestricted release.

18. SWMU 11 will be remediated under the State of Utah DSHW SWMU requirements. The proposed remedy for the areas of elevated activity includes designing a soil cover of sufficient depth to limit exposure to 25 mrem/yr. DPG anticipates using a dose exposure model (such as Microshield or other similar model) for assessing the appropriate depth of soil for the cover. In addition to a soil cover, institutional controls will be enforced preventing any intrusive activities at the site. In order to comply with State of Utah regulations for degradation of groundwater, DPG will install down gradient monitoring wells.

19. DPG has issued a contract with Shaw Environmental through the Army Corps of Engineers to remediate/remove the beryllium test area and design and construct a cover system that meets all Utah Hazardous Waste closure rules as well as the NRC requirements. The path forward which includes design work and subsequent remedial work plans are in the preliminary stages right now and drafts are anticipated later this summer which will be available for concurrent review and comment.

FOR THE COMMANDER:

Clair D. McBride

CLAIR D. MCBRIDE
Chief, Safety Office