

**DEPARTMENT OF THE AIR FORCE
INSTALLATION RESTORATION PROGRAM
KIRTLAND AIR FORCE BASE
NEW MEXICO**

**APPLICATION DATED: JULY 2000
REVISION DATED: AUGUST 2002**

SAFETY EVALUATION REPORT

January 6, 2003

Table of Contents

| | | |
|-------|--|----|
| 1. | BACKGROUND AND PROPOSED ACTION. | 1 |
| 1.1 | Background..... | 1 |
| 1.2 | Purpose and Need for Proposed Action | 1 |
| 1.3 | Description of Proposed Action | 1 |
| 2. | FACILITY OPERATING HISTORY | 2 |
| 2.1 | License | 2 |
| 2.2 | License History | 2 |
| 2.3 | Previous Decommissioning Activities | 3 |
| 3. | FACILITY DESCRIPTION | 3 |
| 3.1 | Site Location and Physical Description | 3 |
| 3.2 | Population Distribution | 3 |
| 3.3 | Current/Future Land Use | 4 |
| 3.4 | Meteorology and Climatology | 4 |
| 3.5 | Geology and Seismology | 4 |
| 3.6 | Surface Water and Groundwater Hydrology | 5 |
| 3.7 | Historical and Cultural Resources | 5 |
| 3.8 | Ecology/Endangered Species | 5 |
| 4. | RADIOLOGICAL STATUS OF THE FACILITY | 6 |
| 4.1 | Contaminated Structures, Systems and Equipment | 6 |
| 4.2 | Radiological Status of Surface and Subsurface Soils | 6 |
| 4.3 | Radiological Status of Groundwater and Surface Water | 7 |
| 5. | DOSE MODELING EVALUATIONS | 8 |
| 5.1 | Unrestricted Release Screening Criteria | 8 |
| 5.2 | Unrestricted Release Using Site-Specific Information | 8 |
| 5.2.1 | Surface Soil DCGLS..... | 10 |
| 5.2.2 | Building Surfaces DCGLS..... | 10 |
| 6. | ALTERNATIVES CONSIDERED AND RATIONALE FOR CHOSEN ALTERNATIVE ... | 10 |
| 6.1 | Alternatives Considered | 10 |
| 6.1.1 | No Action | 10 |
| 6.1.2 | Restricted Release | 10 |
| 6.2 | Rationale for Chosen Alternative | 11 |
| 7. | ALARA ANALYSIS | 11 |

Table of Contents

| | | |
|------|---|----|
| 8. | PLANNED DECOMMISSIONING ACTIVITIES | 11 |
| 8.1 | Contaminated Structures | 11 |
| 8.2 | Contaminated Systems and Equipment | 11 |
| 8.3 | Soil | 11 |
| | 8.3.1 Waste Characterization | 12 |
| | 8.3.2 Waste Volumes | 12 |
| | 8.3.3 Waste Forms and Classification | 12 |
| | 8.3.4 Waste Handling | 12 |
| 8.4 | Surface and Groundwater | 13 |
| 8.5 | Schedules | 13 |
| 9. | PROJECT MANAGEMENT AND ORGANIZATION | 13 |
| 9.1 | Decommissioning Management | 13 |
| 9.2 | Decommissioning Task Management | 13 |
| 9.3 | Decommissioning Management Positions and Qualifications | 14 |
| 9.4 | Training | 14 |
| 9.5 | Contractor Support | 14 |
| 10. | RADIATION SAFETY AND HEALTH PROGRAMS | 14 |
| 11. | ENVIRONMENTAL MONITORING PROGRAM | 15 |
| 12. | RADIOACTIVE WASTE MANAGEMENT PROGRAM | 15 |
| 13. | QUALITY ASSURANCE PROGRAM | 15 |
| 14. | FACILITY RADIATION SURVEYS | 16 |
| 14.1 | Release Criteria | 16 |
| 14.2 | Characterization Surveys | 16 |
| 14.3 | Remedial Action Support Surveys | 17 |
| 14.4 | Final Status Survey Design | 17 |
| 14.5 | Final Status Survey Report | 19 |
| 14.6 | Review of Final Status Survey Report..... | 19 |
| 15. | FINANCIAL ASSURANCE | 20 |
| 16. | CONCLUSIONS AND RECOMMENDATIONS | 20 |
| 17. | ENVIRONMENTAL REVIEW | 20 |
| 18. | REFERENCES | 21 |
| 19. | REGIONAL/HQ's COORDINATION | 23 |

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LICENSEE: Department of the Air Force, Kirtland Air Force Base, Albuquerque, NM

SUBJECT: SAFETY EVALUATION REPORT: APPLICATION DATED JULY 2000,
AND REVISED AUGUST 2002, TO APPROVE KIRTLAND AIR FORCE
BASE OT-10 TRAINING SITE DECOMMISSIONING PLAN

1. BACKGROUND AND PROPOSED ACTION

1.1 Background

Kirtland Air Force Base (KAFB) is located in Albuquerque, New Mexico. The licensee requested that four former Defense Nuclear Weapons School (DNWS) Radiation Training Sites at KAFB be released for unrestricted use. These four inactive DNWS radiation training sites (TS5, TS6, TS7 and TS8), comprise KAFB's Installation Restoration Program Site OT-10 and are being decommissioned to meet the NRC requirements for unrestricted use, as defined in 10 CFR Part 20, Appendix E. The DNWS radiation training sites are located in the north central part of KAFB. From 1961 to 1990, these sites were used to train radiological response personnel to detect contamination generated during simulated nuclear weapons accidents. Known quantities of Brazilian thorium oxide sludge were applied and tilled into site soils to simulate dispersed plutonium. The OT-10 training sites consist of approximately 43 acres, in which approximately 9.4 acres were affected with elevated thorium concentrations. The OT-10 training sites are owned by the U.S. Government and regulated by the NRC under USAF Master Materials License 42-23539-01AF.

1.2 Purpose and Need for Proposed Action

The purpose of the proposed action is to reduce residual contamination at the OT-10 training sites for unrestricted use. NRC is fulfilling its responsibilities under the Atomic Energy Act to make a decision on a proposed license amendment for decommissioning that ensures protection of the public health and safety and environment.

1.3 Description of Proposed Action

Planned decommissioning activities include excavating and packaging contaminated vegetation, debris, and soil; profiling (sampling and analyzing) excavated soil and debris, manifesting the waste and transporting the waste by truck and/or rail to a licensed low-level waste storage facility at either Envirocare of Utah in Clive, Utah, or as allowable, by truck to Waste Control Specialists, a State of Texas licensed facility in Andrews County, Texas. KAFB estimates that the total volume of land areas impacted above the derived concentration guideline level (DCGL) of 5.7 picoCuries per gram (pCi/g) of thorium-232, is approximately 25,779 cu. yds. The excavated areas will be graded and replanted with native vegetation after the NRC staff has approved the Final Status Survey (FSS.)

2. FACILITY OPERATING HISTORY

2.1 License

The former DNWS radiation training sites were established in November 1961 at KAFB to train federal and state personnel on detection of dispersed contamination resulting from simulated nuclear weapon accidents. The training sites are owned by the U.S. Government and regulated by the NRC under the United States Air Force (USAF) Master Materials License 42-23539-01AF. A Master Materials License (MML) is a materials license issued to a Federal organization, authorizing use of material at multiple sites. The MML authorizes the licensee (i.e., Department of the Air Force) to issue permits for the possession and use of licensed material under the license, and ties the licensee to a framework for oversight by the NRC and internal licensee inspection of the MML.

To simulate radiological contamination that may result from nuclear accidents, known quantities of Brazilian thorium oxide sludge were applied and tilled into the soil at the OT-10 training sites, TS5, TS6, TS7, and TS8. The thorium oxide sludge applied at these training facilities served as a low hazard analog to plutonium. A total inventory of 602 kg of thorium-232 was applied and distributed respectively at each of these sites. The area and total inventory of thorium for each site is depicted in Table 1. The TS8 area was also used as a storage site containing two storage bunkers constructed within its fenced area. The TS6 area contained a solid waste management unit with a 50-ft by 50-ft fenced area previously used to store drums of thorium oxide sludge, contaminated soil, and waste fuels. The training activities have been discontinued at these facilities since 1990. Currently, there is minimum debris remaining at the training sites. The debris consists mainly of small metal fragments and military equipment parts. The four inactive training sites, TS5 through TS8, are currently scheduled for decommissioning.

Table 1: Total area contaminated and inventory of thorium by site

| OT-10 Training Site | Area Contaminated (acre) | Thorium inventory applied (kg) |
|---------------------|--------------------------|--------------------------------|
| TS5 | 2.7 | 214 |
| TS6 | 6.1 | 307 |
| TS7 | 0.03 | 36 |
| TS8 | 0.4 | 44 |

2.2 License History

Under the MML the Department of the Air Force issued a permit for the four former DNWS Radiation Training Sites at KAFB. These inactive sites are Training Sites 5-8 (TS5 through TS8), which have a cumulative size of approximately 43 acres. These four sites comprise KAFB's Installation Restoration Program (IRP) Site OT-10. These sites are located in the north-central part of KAFB. From 1961 to 1990, the sites were used to train radiological response personnel in the detection of dispersed contamination resulting from simulated nuclear weapons accidents. Known quantities of Brazilian thorium oxide sludge were applied

and tilled into site soils to simulate dispersed plutonium. Four other training sites (Training Sites 1 through 4) remain active and are not addressed in the licensee's DP.

2.3 Previous Decommissioning Activities

Training activities were discontinued at TS5 through TS8 in 1990. Large pieces of military equipment, such as fuselages, vehicle parts and other debris present at TS5 through TS8 were removed and redistributed at active sites TS1 through TS4. The debris remaining at TS5 through TS8 consists primarily of small metal fragments and small military equipment parts. TS8 was also used as a storage site and has two storage bunkers (Buildings 28005 and 28010) located within its fenced area. In addition, TS6 contains corrective action unit (CAU) SS-69, a 50-foot (ft) by 50-ft area previously used to store drums of thorium oxide sludge, contaminated soil, and waste fuels. CAU SS-69 is managed as a separate corrective action unit under Kirtland's AFB's Resource Conservation and Recovery Act (RCRA) Part B Permit.

Between March and May of 1996, chain-link fences were installed around the contaminated land areas at TS5, TS6 and TS7. A chain-link fence was already installed around TS8. In May 1998, an erosion control measure was implemented in Arroyo del Coyote, an ephemeral stream that parallels the eastern edge of TS6. The licensee took measures to prevent the arroyo from eroding the eastern edge of TS6 and mobilizing radioactively-contaminated soils. KAFB re-shaped the banks and bed of the arroyo near TS6 and stabilized the western bank with gabion mattresses and spur dikes.

There have been no additional decommissioning activities on Site OT-10, TS5 through TS8. The licensee has performed three investigations on the nature and extent of radioactive waste contaminated soils and has performed an initial survey for decommissioning.

3. FACILITY DESCRIPTION

3.1 Site Location and Physical Description

KAFB is located approximately 5 miles southeast of Rio Grande near Albuquerque, New Mexico, and near the intersection of Routes 25 and 40. The Installation Restoration Program (IRP) Site OT-10 is located in the north-central part of KAFB. It comprises four inactive radiation Training Sites (TS) designated TS5, TS6, TS7, and TS8. The total area of the four facilities is approximately 175,000 m² (43.2 acres) with the total affected area is estimated at 37,350 m² (9.23 acres). The contaminants of potential concern associated with thorium oxide sludge include thorium-232 and its decay progeny and to a lesser extent, uranium-238 and its decay progeny. The extent of contamination is limited to the immediate vicinity of the training sites and to a maximum depth of 5 feet (1.524 meters) below ground surface. The vertical extent of ground contamination is typically 1-2 feet (~0.61 meters) below ground surface. An estimated 27,500 yd³ (21,025 m³) are radiologically contaminated.

3.2 Population Distribution

Albuquerque is the largest city and population center in New Mexico and the seat of Bernalillo County. It is situated in west-central New Mexico on the upper Rio Grande. The 2000 census indicated the population of Albuquerque is 448,000. Albuquerque is located to the north and

west of the Kirtland Federal Complex. The Isleta Indian Reservation borders the Kirtland Federal Complex on the south. The Pueblo of Isleta, located approximately 8 miles southwest of the Kirtland Federal Complex, had a population of 1,703 in 1990. KAFB is located in the southeast quadrant of Albuquerque, New Mexico, adjacent to the Albuquerque International Sunport. The base is the third largest installation in Air Force Materiel Command, covering 51,558 acres and employing over 23,000 people, including more than 4,200 active duty and 1,000 Guard, plus 3,200 part-time Reserve personnel. On the north side, the base is divided into an East Community Complex and a West Industrial Complex. The south side of the base is occupied by special test areas operated by Sandia National Laboratories/New Mexico (SNL/NM), the Department of Energy and Air Force Research Laboratory. SNL/NM is the headquarters and the largest laboratory for Sandia National Labs and employs more than 6,600 employees. Additionally, the base golf course and the Manzano Mountain Complex are located on the south side of KAFB.

3.3 Current/Future Land Use

This action would not have an adverse impact on future land use. KAFB has used the training sites since they were established in 1961. Remediation activities would provide a long-term positive impact to local socioeconomic conditions. Currently, land areas at Site OT-10 cannot be used for activities other than radiological training because dose rates associated with contamination at the sites can exceed 25 mrem/year. Removal of radiologically contaminated materials would free the sites for recreational, residential, and/or industrial use. In addition, removal of Site OT-10 from administrative controls would release economic resources for use elsewhere.

3.4 Meteorology and Climatology

The climate at KAFB is typical of a high-desert plateau, with low precipitation, wide temperature extremes and typically, clear sunny days. The highest mean maximum temperature is 91 °F and the lowest mean temperature is 24 °F. The mean annual precipitation is about 8.4 inches and the mean annual snowfall is 1.25 inches. Summer rains typically account for nearly half of the annual moisture, in the form of brief but heavy local thunderstorms. The prevailing wind direction from May through October is south to southeast, and the mean wind speed is approximately 8 knots. From November through April, the prevailing wind direction is north to northwest, and the mean wind speed is 7 knots.

3.5 Geology and Seismology

Kirtland Federal Complex is located on a high, arid mesa about five miles east of the Rio Grande in Bernalillo County, New Mexico. The mesa is cut by the east-west trending Tijeras Arroyo (arroyo – a small steep-sided watercourse or gulch with a nearly flat floor, usually dry except after heavy rains), which drains into the Rio Grande. The western portion of KAFB lies within the Albuquerque-Belen Basin. The Albuquerque-Belen structural basin contains the through flowing Rio Grande and lies within a series of grabens and structural basins called the Rio Grande Rift. The deposits consist of interbedded gravel, sand silt, and clay, the bulk of which are referred to as the Santa Fe Group. The soils types consist of Tome very fine sandy loam, Gila fine sandy loam, Bluepoint-Kokan association, Wink fine sandy loam and Tijeras gravelly fine sandy loam. The Santa Fe Group contains sediments which were deposited as an alluvial fan, playa and

fluvial deposits that filled the subsiding basin. The thicknesses of most basin-fill deposits are greater than 3,000 feet, although the thickness varies considerably because of faulting in the basin. The Santa Fe Group contains beds of unconsolidated to loosely consolidated sediment and interbedded volcanic rock. The materials range in size from boulders to clay.

The east side of the Kirtland Federal Complex north of Tijeras Arroyo is bounded by the southern end of the Sandia Mountains and south of Tijeras Arroyo by the Manzanita Mountains (foothills of the Manzano Mountains). Most of the Complex is relatively flat, sloping gently westward toward the Rio Grande. However, the eastern portion of the Complex extends into the canyons of the Manzanita Mountains. The western slope of the Manzanita Mountains is precipitous and rough and has numerous canyons and arroyos. The elevation in the Complex ranges from 5160 ft on the western side up to 7988 ft in the Manzanita Mountains on the eastern side. The mean elevation of the Kirtland Federal Complex is 5348 ft.

3.6 Surface Water and Groundwater Hydrology

The OT-10 training sites are located in the Hydrogeologic Region of KAFB. The estimated hydrologic conductivity in this unit ranges from less than 0.3 ft/day to greater than 30 ft/day. The depth to groundwater is between 300 to 500 ft. Groundwater is thought to be unconfined in the upper portion of the aquifer, but this may not be true in all areas. The uppermost aquifer occurs within the Santa Fe Group. A shallow saturation zone above the regional aquifer, approximately 200 to 250 ft below ground surface has been identified in the Hydrogeologic Region. This zone is located adjacent to and northwest of the KAFB landfill. It is associated with either a system of multiple perched aquifers or a groundwater mound. The extent of a shallower saturation zone has not been defined and it is unknown if it exists in the vicinity of the four training sites.

This action would not have an adverse impact on water resources. The KAFB OT-10 training sites are not located in a flood plain of any streams or rivers. There are no wetlands located in the project area. There would be no water bodies diverted in order to remediate the training sites. Accumulating rainwater in affected areas would be dammed, mixed with contaminated soils, and/or left to evaporate. Only a small quantity of water would be used for dust suppression.

3.7 Historical and Cultural Resources

The area directly surrounding the proposed project area was surveyed for cultural resources and one historic site was located. This site would not be disturbed by the proposed action. No other historic properties have been located surrounding or within the project area.

3.8 Ecology/Endangered Species

According to the KAFB *Integrated Natural Resource Management Plan*, there are no known federally listed threatened or endangered species on the AFB. The western burrowing owl (*Athene cunicularia hypugaea*) is a federal species of concern that has been observed on KAFB. This bird nests in prairie dog towns. The loggerhead shrike (*Lanius ludovicianus*) is also a federal species of concern. Loggerhead shrikes occupy grassland, pinyon-juniper, and riparian habitats. This specie has been observed on the AFB and is found in the area throughout the year.

The gray vireo (*Vireo vicinior*) is the only state-listed threatened species known to be on the AFB. Gray vireos have been observed in ungrazed juniper woodland at the base of the western foothills of the Manzanita Mountains at elevations between 5,900 and 6,600 feet. This area is located in the eastern most portion of the Base. Site OT-10 would not present attractive habitat to the gray vireo because of its distance from vireo nesting areas.

Critical habitats are those areas considered essential for maintaining or restoring threatened or endangered species populations. Neither the New Mexico Department of Game and Fish nor the U.S. Fish and Wildlife Service has designated or identified any critical habitat on KAFB.

4. RADIOLOGICAL STATUS OF THE FACILITY

Characterization of the OT-10 Training Sites involved four different radiological survey investigations which the licensee conducted between 1988 and 2001. The surveys involved sampling and analysis of soil and sediment. The soil properties were characterized to determine pH, conductivity, moisture, unconfined compression strength, dry density, field density and permeability. The land area surveys comprised scanning surveys, followed by static gamma radiation measurements and soil sampling and analysis. The licensee calculated concentration guidelines for surface contamination of soils in the impacted areas of the training sites using RESRAD code, Version 6.1. The DCGLs would define the maximum amount of residual contamination in soils that would satisfy the NRC's regulations in 10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination." The NRC would not approve the DP unless it met the 25 mrem for unrestricted release criteria and the doses would be bounded by 25 mrem.

4.1 Contaminated Structures, Systems and Equipment

TS8 contains two storage bunkers, Buildings 28005 and 28010, located within the fenced area. Each building is approximately 10 ft by 20 ft with a maximum height of 10 ft, concrete floors, steel doors and front walls, and corrugated steel ceilings and back walls. The ceilings, side walls and back walls are covered under earth. There are no utilities in the bunkers. During 2001, the licensee performed building surveys of the two bunkers. The bunker surveys comprised scanning, static measurements and sampling. The two bunkers exhibited high levels of surface activity and gamma exposure rates. The highest gamma exposure rate for the two buildings, 28010 and 28005, ranged from 250 uR/hr to 4.5 mR/hr, respectively; and the highest surface contamination levels were 544 dpm/100 cm² to 200,000 dpm/100 cm², respectively, for the two bunkers. The licensee may decide to demolish the bunkers in lieu of remediating them. The NRC will ensure that the licensee meets the unrestricted release criteria and the doses would be bounded by 25 mrem for the buildings, in the event that the licensee determines to remediate the buildings.

4.2 Radiological Status of Surface and Subsurface Soils

Between December 1985 to January 1990, the licensee assessed potential radionuclide contamination in surface and subsurface soils, vegetation, and surface water and assessed potential offsite migration for training sites TS5 through TS8. The results indicated radiological contamination in the environmental media. There were no indications of contaminant migration into surface water drainage or the groundwater aquifer system.

An extensive scan investigation of the OT-10 training sites was conducted between October 1994 and May 1995. The investigation included surface gamma ray surveying as well as soil discrete sampling to delineate the extent of radionuclide contamination. The results of the investigation indicated that radiological contamination at OT-10 is empirically limited to Th-232 and its decay progeny. The maximum level of Th-232 contamination for each of the training sites is provided in Table 2.

The USAF conducted more recent investigation during 1996-1998 to reassess radionuclide contamination levels, vertical extent of contamination, and background conditions. In this respect, the USAF confirmed the horizontal extent of previously identified contamination and observed a maximum Th-232 concentration for each of the training sites. Further, radionuclide concentrations extended at certain hot spots to depths reaching 1- 5 ft below ground surface (bgs.) The data was based on 88 surface and/or subsurface soil samples collected from cores obtained at points where surface soils exhibited the highest observed levels of radioactivity. The total affected area of contamination was defined to be approximately 9.23 acres. Table 2 presents the estimated concentrations and volumes of thorium contaminated soil at the IRP OT-10 site.

The primary radioactive contaminant of concern with the thorium oxide sludge include thorium-232 and its decay progeny and, to a lesser extent, uranium-238, and its decay progeny. Uranium-235 and its decay progeny provide an insignificant contribution to the total effective dose equivalent (TEDE). The thorium series is in secular equilibrium; whereas the uranium series is not in secular equilibrium. The extent of contamination is limited to the immediate vicinity of the training sites and to a maximum observed depth of 5-ft below ground surface (bgs.) The vertical extent of contamination is typically 1 to 2 ft bgs in high activity areas and is limited to 6 inches bgs in areas of low to moderate activity. An estimated 25,779 cu. yds. of soil are radiologically contaminated above the DCGL of 5.7 pCi/g.

Table 2: Estimated Areas, Volumes, and Concentrations of Thorium-Contaminated Soil

| Training Site | % of Area Contaminated (Acre) | Volume of Contaminated Area (yd ³) | Average Depth of Contaminated Soil (in) | Average Th-232 Concentration (pCi/g) | Range of Th-232 Concentration (pCi/g) |
|---------------|-------------------------------|--|---|--------------------------------------|---------------------------------------|
| TS5 | 20 (2.7) | 5,640 | 16 | 68 | 2.2 - 421.6 |
| TS6 | 32 (6.1) | 15,600 | 16 | 101 | 2.8 - 683.4 |
| TS7 | 0.3 (0.03) | 60 | 19 | 55 | 2.3 - 466 |
| TS8 | 17 (0.4) | 6,220 | 16 | 76 | 2.1 - 1,047.9 |
| Bkgd | N/A | N/A | N/A | 0.91 | 0.67 - 1.2 |

4.3 Radiological Status of Groundwater and Surface Water

The gamma radiation scanning surveys did not identify contaminant migration into surface water drainages. In addition, there is a difference of approximately 495 ft between the maximum depth of soil contamination and groundwater at OT-10 that prevents contaminant migration to groundwater.

5. DOSE MODELING EVALUATIONS

The NRC staff has reviewed and evaluated the site specific DCGLs which the licensee submitted on November 19, 2002 and October 2, 2002, in accordance with NUREG-1727, "NMSS Decommissioning Standard Review Plan," for compliance with the dose criteria in 10 CFR Part 20, Subpart E, for unrestricted release. Because there are no listed species or critical habitats that would be adversely affected by this action, dose to humans is a limiting case and no separate ecological risk analyses were performed. The NRC staff evaluated the dose modeling approaches, the appropriate scenario(s) compatible with the unrestricted release of KAFB OT-10 training facilities and the input parameters used in the dose impact analysis submitted by the licensee. The NRC staff conducted probabilistic dose analysis, using site specific parameters and the applicable resident farmer scenario, using RESRAD Version 6.21. The NRC staff used realistic distributions of the most sensitive input parameters. Based on these site-specific probabilistic analyses, and using the best estimate of the dose results as recommended in NUREG-1727, the calculated DCGLs were found comparable with the licensee's proposed DCGLs, which were based on deterministic dose analysis and input parameters using RESRAD Version 6.1. The NRC staff concluded that the dose modeling completed for the proposed action is reasonable and appropriate for the exposure scenarios under consideration. In addition, the dose estimate provides reasonable assurance that the dose to the average member of the critical group will not exceed 25 mrem/year dose criterion in 10 CFR 20.1402. This conclusion is based on the modeling effort submitted by the licensee and the independent analysis by the NRC staff.

5.1 Unrestricted Release Screening Criteria

These criteria do not apply to this site.

5.2 Unrestricted Release Using Site-Specific Information

The NRC staff evaluated available generic information on the KAFB OT-10 training facilities and surroundings. The information included the status of the training sites, the operational history, the general geology, the hydrology, the demography, and the generic activities of inhabitants within a few mile radius from the site. The NRC staff evaluated the available site-specific characterization and survey data to assess the extent of contamination (e.g., horizontal/vertical) and subsequently established the appropriate source term(s) for the dose modeling analysis. The NRC staff also evaluated surface water and groundwater monitoring data, as well as survey information on radiological background levels and the unaffected areas. The main radionuclides of concern at the site are listed in Table 3. The relative radionuclide ratios or equilibrium conditions for the decay chains of Th-232, U-238, and U-235 were selected based on licensee's analysis of secular equilibrium and derivation of radionuclide concentrations.

A member of the critical group may be subjected to all exposure pathways under the "resident farmer scenario" as documented in NUREG-1727. These pathways include: external exposure; inhalation from re-suspended soil; ingestion of plant products grown in contaminated soil and using aquifer to supply irrigation; ingestion of animal products grown onsite and using feed and water from potentially contaminated sources; ingestion of fish from a pond filled with water from the aquifer; direct soil ingestion; and human ingestion of drinking water from the aquifer. Based on NRC staff analysis, there appears to be no physical evidence to exclude the potential use of the soil in farming activities. The quality (e.g., salinity) and quantity of well water (withdrawn from

deep aquifers) could be appropriate for irrigation, livestock, and human domestic uses including drinking. It should be noted that RESRAD 6.21 default input parameters were used as a reference to compare with site-specific parameters. Certain occupancy and physical parameters were found highly sensitive and a single deterministic parameter cannot represent variability in the critical group receptor or uncertainties in the corresponding parameters. Therefore, NRC staff used distributions of such sensitive parameters to bound variable receptor occupancy parameters or anticipated variability in physical conditions. These parameters included: area of contamination, thickness of contamination, contaminated zone erosion rate, inhalation rate, mass loading factor for inhalation, indoor time fraction, outdoor time fraction, external gamma shielding, and indoor dust filtration factor.

The NRC staff employed NUREG-1727 approach for analysis of potential exposure pathways for the unrestricted use of decommissioned soil. The conceptual model for the site was selected as a flat surface soil with an area of 2000 - 90,000 m² and a thickness reaching 15 cm. The unsaturated zone (UZ) was assumed as a thick layer of 120 m thick. The aquifer was assumed directly below the UZ. Preliminary deterministic dose simulation runs were conducted using RESRAD 6.21 to assess the most significant pathways and the most sensitive parameters impacting the dose results. In addition, the NRC staff selected the best estimate of the dose distribution, through the performance period of 1,000 years, as recommended in NUREG-1727. Finally, the NRC staff compared its derived DCGLs, equivalent to 25 mrem/y, using probabilistic analysis with the licensee's proposed DCGLs for final approval.

The contaminated surfaces or structures at the site comprise two buildings (bunkers) located at TS8 area and designated Buildings 28005 and 28010. The bunkers may be removed; however, if they remain intact at the site, it is more likely that they will be used for storage. The bunkers are small buildings with curved arch ceilings with an approximate average dimension of 6.0 m x 3.0 m x 2 m. The bunkers have no windows, no internal lights, and most of the ceiling is low. The bunkers were used for storage of concentrated thorium materials. The licensee assumed a ratio of 11:100 for Th-230 to Th-232. This ratio was used in NRC staff analysis of surface soil. U-235 represents approximately 2.2 percent of the total uranium, which corresponds to 11 percent contribution overall from the U-235 decay chain. Therefore, because of such low concentration it has no significant contribution to the dose. The licensee assumed an industrial scenario with a full time occupancy of 250 days per year and 8 hours per day. The NRC's building occupancy scenario, including pathways for external exposure, inhalation of removable residual contamination, and ingestion of removable contamination, was considered in the dose assessment to derive the DCGLs for building surface contamination.

The NRC staff conducted deterministic dose analysis using RESRAD-Build 3.21. The NRC staff used relatively conservative input parameters as recommended in NUREG/CR-6755. The DCGLs derived with this analysis were found to be higher (e.g., less restrictive) than the DCGLs proposed by the licensee by a factor of two or three. Therefore, the NRC staff approved the licensee's proposed DCGLs, with no additional probabilistic analyses conducted.

5.2.1 Surface Soil DCGLS:

The DCGLs derived for the KAFB OT-10 training site were calculated using the Th/U ratio as determined by the licensee. All pathways were included in the scenario including the drinking water pathway. The results indicated that most of the dose was related to Th-232, Th-228 and Ra-228 with the main component of the dose (85-90 percent) resulted from direct exposure. The plant ingestion pathway dose corresponded to 10-15 percent of the total dose. Other pathways such as inhalation and ingestion of meat, milk, soil and water corresponded to less than 5 percent of the total dose.

5.2.2 Building Surfaces DCGLS:

The results based on RESRAD-Build for structures indicated that Th-232 contributed to 80-90 percent of the dose and Th-228 and Ra-228 to most of the remaining dose. The inhalation pathway was the dominant contributor to the overall dose followed by the ingestion and external pathways.

6. ALTERNATIVES CONSIDERED AND RATIONALE FOR CHOSEN ALTERNATIVE

6.1 Alternatives Considered

The proposed action is to decontaminate and remediate the OT-10 training sites to release for unrestricted use as delineated in 10 CFR Part 20, Subpart E, that being 25-mrem/year total effective dose equivalent (TEDE) to the average member of the critical group (i.e., resident farmer scenario.) The ultimate goal of the decommissioning is to release the OT-10 training sites from the USAF Master Materials License. The general decommissioning would result in the excavation of the source material from the OT-10 training sites to meet the unrestricted use criteria. The excavated material would be transported to a licensed low-level radioactive waste (LLRW) facility, e.g., Envirocare of Utah, for disposal. The unimportant quantities of source material, as defined in 10 CFR 40.13 would be shipped to a burial facility (e.g., WCS facility in Andrews County, TX). Following any necessary remediation, the licensee would perform FSS in the area in accordance with the NRC approved DP.

6.1.1 Alternatives to the Proposed Action

There are no alternatives, including restricted release, to the proposed action besides taking no action.

6.1.2 No Action

NRC considered the no action alternative relative to the USAF's request for approval of the DP. The no action alternative would mean that NRC would not approve the DP and therefore, the licensee would not be able to release the site from their MML. The no action alternative is not acceptable because it would conflict with NRC's requirement in 10 CFR 40.42, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas," of timely remediation at facilities or outdoor areas that have ceased NRC licensed operations. Therefore, the no action alternative is not considered to be reasonable and is not analyzed further.

6.2 Rationale for Chosen Alternative

The NRC staff has reviewed the rationale for selecting the decommissioning alternative in the DP according to NUREG-1727, NMSS Decommissioning Standard Review Plan," Section 6, "Alternatives Considered and Rationale for Chosen Alternative." Based on this review, the NRC staff has determined that the USAF has adequately evaluated the impacts of all reasonable decommissioning alternatives.

7. ALARA ANALYSIS

The "Statements of Consideration" for 10 CFR Part 20, Subpart E (62 FR 39065, July 21, 1997), and the Final Generic Impact Statement (NUREG-1496), indicate that disposal of surface soil, at a licensed facility, for unrestricted release exposure scenarios meets the ALARA requirement and therefore, the licensee does not have to perform a cost justification as required by the Standard Review Plan. The USAF will remove contaminated soil to achieve a calculated dose of less than 25 mrem/year; which is sufficient to comply with ALARA requirements.

The NRC staff has reviewed the information submitted by USAF to demonstrate that the preferred decommissioning option is ALARA as required in 10 CFR Part 20, Subpart E, in accordance with the criteria in the NMSS Decommissioning Standard Review Plan, Section 7.0 "ALARA Analysis." Based on this review, the NRC staff concludes that the preferred option provides reasonable assurance that the remediation will result in residual radioactivity levels which are ALARA. The USAF has committed to demonstrating compliance during remediation by meeting the concentration limits established in the DP and implementing a protocol to optimize ALARA concepts during the remediation activities.

8. PLANNED DECOMMISSIONING ACTIVITIES

8.1 Contaminated Structures

The contaminated structures at the site comprise two buildings (bunkers) located at TS8 area and designated Buildings 28005 and 28010. The bunkers are small buildings with curved arch ceilings with an approximate average dimension of 6.0 m x 3.0 m x 2 m. The bunkers have no windows, no internal lights, and most of the ceiling is low. The bunkers were used for storage of concentrated thorium materials. The licensee will attempt to remediate the buildings followed by final status surveys. However, if the contamination on the buildings is recalcitrant, then demolition and disposal of the buildings will be performed. The storage bunkers will be demolished using a backhoe equipped with shears and/or a jack hammer or equivalent.

8.2 Contaminated Systems and Equipment

There are no contaminated systems or equipment associated with this proposed action.

8.3 Soil

Contaminated soil represents the majority of the waste stream that may be generated during this proposed action. Light water spraying will control and minimize emissions of dust during excavation activities. As a result of the light water spraying, accumulated surface water in affected areas will be dammed and left to evaporate, and/or mixed into contaminated soils.

Significant quantities of waste or debris are not expected to be encountered during decommissioning activities covered by this plan. The NRC staff has reviewed the licensee's descriptions of the radioactive waste management program and based on this review, the NRC staff has determined that the waste will be managed in accordance with NRC requirements and in a manner that is protective of the public health and safety. Additionally, the NRC staff will review the implementation of the licensee's waste management program during inspection activities.

8.3.1 Soil Characterization

The contaminated soil will be identified and characterized to permit management in accordance with applicable NRC, DOD, State and DOT regulations. Soil samples may be collected and analyzed using gamma spectroscopy and/or radio-chemical analysis to determine radiological isotopes. Soil characterization may be performed by the licensee's contractor onsite or at an offsite laboratory.

8.3.2 Waste Volumes

Soil volume estimates projected to be excavated during decommissioning at the KAFB OT-10 training sites total approximately 25,779 cu. yds. A detailed description of these estimates is provided in The Department of the Air Force DP, Appendix D, "Calculations of Soil Volume."

8.3.3 Waste Forms and Classification

The physical form of wastes removed from KAFB OT-10 training sites is solid materials consisting of soil, soil-like material and debris. No liquid waste is expected. Radioactively contaminated solid wastes generated from the OT-10 training sites are expected to conform to the Class A criteria in 10 CFR Part 61. Waste classification will be made for each waste prior to shipment and will be transported and disposed of offsite under the supervision of a DOD-certified waste broker. Radioactively contaminated waste meeting NRC disposal requirements, and the disposal site acceptance criteria, are planned to be manifested and shipped as DOT Radioactive Material Hazard Class 7, Normal Form, exclusive use, low specific activity (LSA-I) materials, as described in 49 CFR 173.427. Contaminated soil will be disposed of at either of the following licensed disposal sites: (1) Envirocare of Utah in Clive, Utah, or (2) Waste Control Specialists in Andrews County, Texas.

8.3.4 Waste Handling

Field personnel will excavate soils from land areas exhibiting site-specific gamma-radiation field counts greater than the investigation level. Associated vegetation and debris will also be removed. Soils will be excavated in 3-6 inch lifts and land areas will be re-surveyed after each lift is removed. The contaminated soil, vegetation, and debris will be transferred to lined, steel intermodal containers, each nominally containing a maximum load of 15 cu. yds. External surfaces of loaded intermodal containers will be decontaminated prior to their placement onto trucks for transport offsite.

8.4 Surface and Groundwater

The gamma radiation scanning surveys did not identify contaminant migration into surface water drainages. In addition, there is a difference of approximately 495 ft between the maximum depth of soil contamination and groundwater at OT-10 that prevents contaminant migration to groundwater.

8.5 Schedules

Primary operational activities associated with decommissioning of the KAFB OT-10 training sites include excavating, packaging, and disposing of radiologically contaminated soil, operational sampling, final surveys and subsequent regrading and replanting with native vegetation, after the NRC has approved the final status survey. Excavation will tentatively begin in January 2003 and is expected to continue through-out 2003. Submittal of the Final Status Survey Report to the NRC is planned for early 2004. The NRC staff finds that the licensee has identified the tasks to be completed and the time frames for each have been identified. The NRC staff further finds that the proposed schedule is reasonable.

9. PROJECT MANAGEMENT AND ORGANIZATION

The NRC staff has reviewed the description of the decommissioning project management organization, position descriptions, management and safety positions and the manner in which the licensee, USAF, 42-23539-01AF, will use contractors during the decommissioning of the OT-10 training sites located at KAFB, according to NUREG 1757, Volume 1, "NMSS Consolidated Decommissioning Guidance," Section 17.1. Based on this review, the NRC staff has determined that the USAF has provided sufficient information which demonstrates that the decommissioning activities may be conducted safely and in accordance with NRC requirements.

9.1 Decommissioning Management

The USAF is responsible for the decommissioning activities at the OT-10 training sites. MWH Americas will conduct the decommissioning of Site OT-10, under the direction of the Air Force Center for Environmental Excellence. The contractor has a Project Manager, Site Manager and Site RSO. The MWH America's Site RSO will implement the Radiation Safety Plan. He or his USAF-approved representative will be onsite to manage the radiation safety activities. The USAF has an RSO assigned to KAFB as well as an Environmental Restoration Project Manager. Both the MWH Americas RSO and KAFB RSO and their designees have the authority to stop work should radiation safety concerns arise.

9.2 Decommissioning Task Management

The USAF has demonstrated that it has adequate controls on all tasks to be performed as part of the decommissioning activities at the OT-10 training sites at KAFB.

9.3 Decommissioning Management Positions and Qualifications

The USAF has demonstrated management positions are staffed by qualified individuals, from either the contract company or through the USAF. The Site Radiation Safety Officer qualifications and requirements were reviewed as part of the DP review and were found to be adequate.

9.4 Training

Standard operating procedures will be required for all major tasks associated with decommissioning, as well as generalized written procedures for routine tasks. Additionally, a training program, which includes initial OSHA hazardous waste site operations and emergency response and radiological safety training will be provided to ensure workers are informed of the potential safety and radiological hazards associated with decommissioning activities.

9.5 Contractor Support

The USAF will use contractor support for the majority of decommissioning activities. The activities addressed in the DP were reviewed by the NRC staff and found to be adequate.

10. RADIATION SAFETY AND HEALTH PROGRAMS

Section 4 of the DP contains the "Radiation Protection Program" and Appendix B of the DP contains the "Site-Specific Health and Safety Plan." The reference sections of the DP were reviewed and found to adequately address the radiological health and safety issues.

Occupational doses to decommissioning workers are expected to be low and well within the limits of 10 CFR Part 20. No radiation exposure to any member of the public is expected, and public exposure would therefore also be less than the applicable public exposure limits of 10 CFR Part 20. In addition, the licensee would install a security fence around each training site to control access and prevent unauthorized, untrained or unprotected personnel from entering the site. Therefore, the environmental impacts from the proposed action are expected to be small. Short and long-term impacts to human health due to radiological exposure are not expected. These include the potential release to the environment of airborne effluents, which may contain low-levels of radioactive contamination during certain activities such as excavation, packaging and waste transportation. NRC regulation 10 CFR Part 20 specifies the maximum amounts of radioactive materials that a licensee can release from a site in the form of either airborne or liquid effluents. The licensee has described in the DP, the controls established when these activities are being conducted. The controls include the use of light water spray to control the emissions of dust and work area particulate sampling. Site controls would be implemented to prevent unauthorized, untrained, or unprotected personnel from entering the site, to limit the spread of contamination, and to reduce the radiation exposures to safe ALARA levels. A radiation safety program would be implemented to protect site workers. The licensee performed analysis of collected soil samples, scanning measurements and used historical information to classify soil survey units. The licensee calculated concentration guidelines for surface contamination of soils in the impacted areas of the training sites using RESRAD code, Version 6.1. The DCGLs would define the maximum amount of residual contamination in soils that would satisfy the NRC's regulations in 10 CFR Part 20, Subpart E, "Radiological Criteria for

License Termination.” The NRC would not approve the DP unless it met the 25 mrem for unrestricted release criteria and the doses would be bounded by 25 mrem.

11. ENVIRONMENTAL MONITORING PROGRAM

The licensee has implemented an adequate environmental monitoring program as documented in the DP. However, it is not anticipated that measurable radon or radon progeny concentrations will be detected at the site perimeter.

There are no expected adverse impacts to air quality as a result of planned decommissioning activities. There would be a slight increase in dust emissions during the removal of the contaminated soil; however, there is little likelihood that airborne radioactive material would be a problem on the site during any operation conducted for the remediation. The USAF would minimize the potential for airborne effluent releases by using light water spray to suppress the dust during activities that could generate significant quantities of dust. Activities that could generate significant quantities of dust include the excavation of the soil, processing and packaging of the remediated soil into the intermodal containers. Heavily traveled, clean areas would also be sprayed lightly.

12. RADIOACTIVE WASTE MANAGEMENT PROGRAM

It is estimated there would be 1370 intermodal containers of contaminated soil and debris shipped offsite. Each truck would carry one intermodal container loaded with approximately 19 cubic yards of waste. It is estimated that 10 to 12 trucks will leave the base per day, 5 days per week for 7 to 8 months. There would be approximately 685 shipments by truck and/or rail to Envirocare of Utah in Clive, Utah, and 685 shipments by truck to Waste Control Specialists in Andrews County, Texas. Containers shipped to Envirocare will travel west on Gibson Boulevard to either Interstate 25 (truck shipments) or a rail siding at 100 Woodward Road (rail shipments). If rail transport is utilized, the intermodal containers would be loaded onto six position railcars with approximately 115 railcars utilized to transport the intermodals. Containers destined for WCS will travel north on Eubank Boulevard then west on Interstate 40 and south on State Highway 285. The addition of 10 to 12 trucks to a documented traffic volume on Gibson Boulevard of 27,000 to 45,000 vehicles per day poses a negligible impact to traffic volume. Ten to 12 trucks add less than 0.03 to 0.04 percent to the daily vehicle load.

Under normal operating conditions there is no expected dose to vehicle operators and members of the public, since the wastes are of low activity and would be shipped in U.S. DOT compliant, strong-tight containers. The only radiological risks associated with the transport of the wastes would involve the cleanup of any spilled material. In the unlikely event that a spill were to occur during transport, radiological controls would most likely be implemented during the cleanup of the spilled waste material. Therefore, the risks associated with the transport of the waste material is minimal.

13. QUALITY ASSURANCE PROGRAM

The licensee’s “Quality Assurance Project Plan” as submitted in Appendix E to the DP adequately meets the requirements in NUREG 1757, Volume 1, “Consolidated NMSS Decommissioning Guidance,” Section 17.6, Quality Assurance Program in support of

decommissioning of the OT-10 training sites at KAFB. Verification of specific aspects of the quality assurance plan will be verified during NRC Region IV inspection activities and documented in the respective inspection reports.

14. FACILITY RADIATION SURVEYS

14.1 Release Criteria

It should be pointed out that the total dose at the receptor location from all contaminated media (e.g., soil and surfaces) should be considered for demonstration of compliance with the NRC's dose criteria in 10 CFR Part 20, Subpart E. The USFA provided site specific, individual radionuclide derived concentration guideline levels (DCGLs) for volumetric contamination in the OT-10 training sites at KAFB, that will be used in the final status survey design to demonstrate compliance with the radiological criteria for unrestricted release (10 CFR 20.1402) in Table 3-1 of the DP. The approved DCGL values for volumetric contamination, calculated using RESRAD Version 6.21 computer code, are as follows:

Table 3: Radionuclides Relative Concentrations and Approved DCGLs

| Radionuclide | Initial Ore (pCi/g) | Current Processed or Leached Ore (pCi/g) | 1,000 Years from Present (pCi/g) | DCGLs (pCi/g) |
|---------------------|---------------------|--|----------------------------------|---------------|
| Th-232 Decay Series | | | | |
| Th-232 | 100 | 100 | 100 | 5.7 |
| Ra-228 | 100 | 100 | 100 | 5.7 |
| Th-228 | 100 | 100 | 100 | 5.7 |
| U-238 Decay Series | | | | |
| U-238 | 11 | 5.5 | 5.5 | 0.31 |
| U-234 | 11 | 5.5 | 5.5 | 0.31 |
| Th-230 | 11 | 11 | 10.95 | 0.62 |
| Ra-226 | 11 | 1.65 | 4.92 | 0.28 |
| Pb-210 | 11 | 1.65 | 4.92 | 0.28 |
| U-235 Decay Series | | | | |
| U-235 | 0.484 | 0.242 | 0.242 | 0.02 |
| Pa-231 | 0.484 | 0.484 | 0.479 | 0.03 |
| Ac-227 | 0.484 | 0.484 | 0.479 | 0.30 |

14.2 Characterization Surveys

In accordance with 10 CFR 30.36(g)(4)(i), USAF submitted a description of the conditions of the OT-10 training sites located at KAFB for decommissioning. The OT-10 training sites comprises

a land area of approximately 43 acres, in which approximately 9 acres is considered contaminated. The site characterization study is the radiation survey conducted to determine the nature and extent of radiological contamination at the site. The purpose of the site characterization study is to (1) permit planning for remediation activities, (2) demonstrate that it is unlikely that significant quantities of residual radioactivity have gone undetected at the site, (3) provide information to design the FSS, and (4) provide input into dose modeling.

As described in the DP, the licensee performed surveys from 1985 to 2001. A limited initial site characterization and survey investigation was conducted at TS5 through TS8 from December 1985 to January 1990. This investigation was intended to assess potential radionuclide contamination in surface and subsurface soils, vegetation, and surface water and to assess potential offsite migration. The results indicated there was a potential of radiological contamination in the environmental media and there may be limited, if any, or no offsite migration. It should be pointed out that there were no indications of contaminant migration into surface water drainage or groundwater aquifer system.

The NRC staff finds the site characterization acceptable to permit initial remediation based on the information submitted in the DP and as summarized, above.

14.3 Remedial Action Support Survey

The DP describes the remedial action support surveys which will be conducted to guide excavation, determine when a survey unit is ready for a FSS and provide updated estimates of site-specific parameters to help plan the FSS. The remedial action support surveys will consist of scanning and static gamma radiation readings and soil sampling analysis. Section 3.2.2, "Remedial Action Support Surveys" and Appendix E, "Quality Assurance Project Plan," to the DP addresses remedial action support surveys as part of the data quality objectives. The licensee has stated that thorium is in secular equilibrium and the alpha to beta ratio is 67 percent to 33 percent. The licensee has recommended the use of Actinium-228 as a surrogate for Thorium-232. Surrogate ratios will be bounded at the 95 percent upper confidence level and be quantified by gamma spectroscopy analysis. Surrogate ratios should be re-evaluated by appropriate radio-chemical analysis prior to the remedial action support surveys because the surrogate ratios developed prior to remediation may no longer be appropriate since the disturbance of the soil is known to change some ratios. The implementation of this type of survey as described in the DP in order to meet the NRC approved DCGLs is acceptable. Notwithstanding, the NRC staff will evaluate the implementation of the use of the surrogate ratios and the instrumentation calibration to the appropriate energy range and calculation of the minimum detectable concentration (MDC) for the sodium iodide detector during the inspection process.

14.4 Final Status Survey Design

The Department of the Air Force submitted a description of the planned final radiation survey in Section 5, "Planned Final Radiation Survey," and in Appendix E, "Quality Assurance Project Plan," as part of the DP. The FSS is the radiation survey performed after an area has been fully characterized, remediation has been successfully completed and the area is ready to be released for unrestricted use. The purpose of the FSS is to demonstrate that the area meets the radiological criteria for release from the license. The FSS design entails an iterative

process that requires appropriate site classification based on the potential residual radionuclide concentration levels relative to the DCGL values and formal planning using a Data Quality Objective (DQO) process.

The DP provided adequate information and documentation for the reference area based on data collected in the 2000/2001 survey. The reference area adequately represents similar physical, geological, radiological characteristics as the OT-10 training sites. The reference area will be used for background measurements which are used for comparisons with survey unit data. There were 20 reference area samples collected and analyzed by alpha spectroscopy for Th-232 and Th-230 and by gamma spectroscopy. Additionally the reference area was scanned with a 2 in. by 2 in. NaI detector. The average Th-232 concentration, which occurs naturally in background, was approximately $0.91 \text{ pCi/g} \pm 0.15$. The licensee stated that the uranium-238 background concentration was *assumed* to be 0.93 pCi/g . The licensee also states that actual reference area concentration for uranium-238 will be determined during project mobilization. The results of the uranium concentration for the reference area will be reviewed during NRC inspections.

KAFB intends to follow MARSSIM for the survey design and sampling methodology to demonstrate that the OT-10 training sites are suitable for unrestricted release for surface contamination. KAFB classified the contamination potential of the four different training sites, (TS5, TS6, TS7, and TS8) in the DP. The site characterization data was used as the principal means for initially classifying site areas. The Class 1 areas will comprise an area up to 2000 m^2 . Class 2 areas will range from about 2000 m^2 up to $10,000 \text{ m}^2$, while Class 3 areas have no size limit. KAFB describes the number of soil samples and locations in Section 5.1.3 of the DP. The survey units will be subdivided into $L = 100 \text{ m}^2$ square grid sections, in the provisional case where $n = 20$. The assumptions used for the provisional estimate of the number of samples is acceptable and follows the survey design as provided in MARSSIM. The only value that should not be modified is $\alpha = 0.05$, which is the probability of incorrectly releasing a survey unit.

The licensee intends to use 2-inch by 2-inch sodium iodide (NaI) scintillation detector to scan land areas for elevated residual radioactivity. Two detectors will be fixed to opposing sides of a push cart 1-ft apart and at 18 inches above ground surface. The scanning speed is approximately 1.5 feet/sec. Radiological data will be automatically tagged with location coordinates when count rates are recorded, using a differential correction GPS system with submeter accuracy. The bare detector efficiency is calculated to be 1.3 pCi/g and the collimated detector efficiency is calculated to be 1.9 pCi/g. In addition to the scanning, the licensee will sample each of the $2,000 \text{ m}^2$ Class 1 survey units with a calculated number of samples as determined from MARSSIM Table 5-3. The licensee will implement a systematic method for sample collection and subsequently perform gamma spectroscopy for each sample. The release of each survey unit will be determined using the Wilcoxon Rank Sum (WRS) test, a non-parametric statistical method.

The Class 2 survey units will be surveyed after all MARSSIM Class 1 survey units have been remediated. For Class 2 survey units at OT-10 a scanning survey will be performed.

The surfaces of storage bunkers (i.e., Buildings 28005 and 28010) at TS8 will be surveyed for contamination, to comply with surface contamination limits. Scanning surveys and

contamination wipe sample analysis for alpha will be performed for the bunkers. Additionally, gamma radiation surveys will be performed inside the bunkers.

The licensee will review and evaluate data for all survey units to identify whether additional remedial action, sampling, or measurements is required, to determine if a survey unit will meet the release criteria. In the event an area needs to be reclassified and additional remediation is required, based on the FSS findings, then the procedures which fully describe this process and/or calculate the $DCGL_{EMC}$, will be assessed as part of the evaluation of the FSS.

The NRC staff has reviewed the information in the DP for KAFB OT-10 training sites according to NUREG 1727, "NMSS Standard Review Plan," Section 14.3. Based on this review, the NRC staff has determined that KAFB FSS design is adequate to demonstrate compliance with radiological criteria for license termination.

14.5 Final Status Survey Report

In accordance with 10 CFR 40.428(j)(2), USAF will submit a report of the FSS results. The NRC staff will review the adequacy of the FSS results and findings submitted, coupled with their inspection results. Based on the review, the NRC staff will determine if the report adequately demonstrates compliance with the radiological criteria for unrestricted release of the OT-10 training sites. The NRC staff expects in the FSSR, the radionuclides of concern, estimate of standard deviation, surrogate ratios, corresponding DCGLs, calculations of the number of samples and data quality assessment for each survey and sub-survey units will be clearly presented.

14.6 Review of Final Status Survey Report

- Validation of certain areas with suspected subsurface contamination, as indicated by the licensee's historical characterization surveys, will be reviewed.
- The NRC staff will assess whether surrogate ratios are obtained using spatially distributed post remediation data to develop appropriate ratios for the Th-232 and Ac-228. The surrogate ratios will be bounded by the 95 percent upper confidence level and be quantified by gamma spectroscopy analysis. Surrogate ratios should be re-evaluated by appropriate radio-chemical analysis prior to the remedial action support surveys because the surrogate ratios developed prior to remediation may no longer be appropriate since the disturbance of the soil is known to change some ratios. Refer to section 14.3 of the SER.
- Implementation of the scan MDC will be assessed as part of the evaluation of the final status survey.
- NaI detector calibration, calculation of the minimum detectable concentration (MDC) and instrumentation operation will be assessed during the inspection process.

- Procedures relating to instrument calibration will be assessed as part of the evaluation of the final status survey.
- Analytical methods for quantifying contaminants in soil and sediments for alpha spectroscopy and gamma spectroscopy will be assessed as part of the evaluation of the final status survey.
- Procedure to identify additional remediation action, sampling or required measurements to determine whether a survey unit will meet the release criteria will be assessed as part of the evaluation of the final status survey.
- Review the results of the uranium-228 concentration for the reference area; as the DP indicated the information will be determined during project mobilization.
- Review the survey design and sampling methodology to determine if it follows MARSSIM. Ensure that the value $\alpha = 0.05$, is not modified, as it is the probability of incorrectly releasing a survey unit.

15. FINANCIAL ASSURANCE

Kirtland Air Force Base, Decommissioning Plan for Installation Restoration Program Site OT-10, Radiation Training Sites at Kirtland Air Force Base, New Mexico. The funding number for this decommissioning activity is USAF Contract No. F41624-97-D-8-13.

16. CONCLUSIONS AND RECOMMENDATIONS

This evaluation is limited to the Installation Restoration Program Site OT-10, Radiation Training Sites at KAFB. The results should not be applied to other parts without appropriate assessment.

For purposes of future evaluation, the Installation Restoration Program Site OT-10 Radiation Training Sites at Kirtland Air Force Base should not be considered as a non-impacted area (MARSSIM) because this area has been remediated from concentrations greater than the DCGL values. The NRC staff also notes that the calculated dose from this area should be included in the total dose from the site when the license is terminated.

The NRC staff recommends approval of the DP with the DCGL values for each radionuclide as noted in this Safety Evaluation Report.

17. ENVIRONMENTAL REVIEW

The NRC staff evaluated the environmental impacts of approving the Decommissioning Plan for the Installation Restoration Program Site OT-10 Radiation Training Sites at Kirtland Air Force Base. The NRC staff prepared an EA with input from the State of New Mexico's Office of Cultural Affairs, by letter dated April 9, 2002, and the U.S. Fish and Wildlife Service, by letter dated March 28, 2002. By letter dated February 7, 2002, after considering the documentation submitted by the licensee concerning the location of the decommissioning project, the State of New Mexico's Natural Heritage Program determined that there were no records of special interest species affected by the referenced project. In its letter, the State of New Mexico's Office

of Cultural Affairs indicated that the Proposed Action would not adversely affect any historic properties. The U.S. Fish and Wildlife Service indicated in its letter, that the described action would have no effect on listed species, wetlands, or other important wildlife resources. The NRC staff provided a draft of this EA to the State of New Mexico for review. The state did not comment on the EA.

Based on its review, the NRC staff concluded that the environmental impacts associated with the proposed action were not significant, and therefore, did not warrant denial of the decommissioning request. The NRC staff believes that the proposed action would result in minimal environmental impacts. The NRC staff has determined that the proposed action of decommissioning Site OT-10 to the remediation levels would result in reduced residual contamination levels at KAFB training sites, enabling release of the areas for unrestricted use and termination of the area from the Air Force Master Materials License, is the appropriate alternative for selection. Accordingly, the Commission reached a finding of no significant impact (FONSI). The EA and FONSI have been submitted to the Federal Register for publication.

18. REFERENCES

Commission's References

NRC, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG-1575, December 1997

NRC, "Consolidated NMSS Decommissioning Guidance," NUREG-1757, Volume 1, September 2002.

NRC, Draft, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," NUREG-1748, September 2001.

NRC, Draft, "Manual for Conducting Radiological Survey in Support of License Termination," NUREG/CR-5849, June 1992.

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NRC, "Guidelines for Decommissioning of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for By-Product, Source or Special Nuclear Material," May 3, 1973

NRC, NMSS Handbook for Decommissioning Fuel Cycle and Materials Licensees," NUREG/BR-0241

NRC, "Final Environmental Impact Statement on the Transportation of Radioactive Material by Air and Other Modes," December 1977.

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Neitzel, R., et al., 1999. *Occupational Noise Exposures in Five Construction Trades*. American Industrial Hygiene Association. Nov/Dec.

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USAF, 2001a. *Integrated Natural Resource Management Plan for Kirtland Air Force Base*. September 2001.

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USAF, 2000b. *Cultural Resource, Management Plan, Kirtland Air Force Base, New Mexico*. U.S. Air Force, Kirtland Air Force Base, New Mexico. July and Revised August 2000.

USFWS, 2002. Letter from U.S. Fish and Wildlife Service dated March 28, 2002.

CODE OF FEDERAL REGULATIONS

10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination," Code of Federal Regulations, 62 FR 139, July 21, 1997

29 CFR § 1910.95 Subpart G, "Occupational Noise Exposure," Code of Federal Regulations: Office of Federal Register National Archives and Records Administration. Washington, D.C.

10 CFR 40.13, "Unimportant Quantities of Source Material" Code of Federal Regulations: Office of Federal Register National Archives and Records Administration. Washington, D.C.

10 CFR 40.42, "Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas," Code of Federal Regulations: Office of Federal Register National Archives and Records Administration. Washington, D.C.

10 CFR 20.1402, "Radiological Criteria for Unrestricted Use," Code of Federal Regulations: Office of Federal Register National Archives and Records Administration. Washington, D.C.

19. REGIONAL COORDINATION

Rachel S. Browder, Health Physicist, Region IV

bcc w/enclosure (via ADAMS distrib):
 KEBrockman
 DBSpitzberg
 CLCain
 KDSmith
 RSBrowder
 RJEvans
 FCDB File
 RIV Files-4th floor file room (30-Docket)

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| RSBrowder | DBSpitzberg |
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