Final

Environmental Assessment for Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range

Prepared for
Headquarters Air Combat Command and
Nellis Air Force Base, NV

September 2006

ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFI	Air Force Instruction
AFIOH	Air Force Institute for Operational Health
Air Force	United States Air Force
API	Armor-Piercing Incendiary
ATSDR	Agency for Toxic Substances and Disease Registry
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CAF	Combat Air Forces
CCAQM	Clark County Air Quality Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CWA	Clean Water Act
DAC	Derived Air Concentration
DNWR	Desert National Wildlife Range
DoD	Department of Defense
DOE	Department of Energy
DU	Depleted Uranium
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
HAS	High Angle Strafe
HEI	High Explosive Incendiary
HQ ACC	Headquarters Air Combat Command
HTTC	High-Technology Test and Training Complex
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IERA/SDRH	Institute of Environment, Safety, and Occupational Health Risk Analysis, Radiation Surveillance Division, Health Physics Branch
LAS	Low Angle Strafe
LASTE	Low Altitude Safety and Targeting Enhancement
LLW	Low Level Waste
mm	Millimeter
MCL	Maximum Contaminant Level
MOUT	Military Operations in Urban Terrain
mrem	millirem
MRL	minimum risk level
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NBMG	Nevada Bureau of Mines and Geology
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NTS	Nevada Test Site
NTTR	Nevada Test and Training Range
O_3	Ozone
OFP	Operational Flight Program
ORISE	Oak Ridge Institute for Science and Education
OSHA	Occupational Safety and Health Act
OSHA	Occupational Safety and Health Administration
OT&E	Operational Testing and Evaluation
Pb	Lead
pCi/g	Picocuries Per Gram
P.L.	Public Law
PEL	Permissible Exposure Level
$PM_{2.5}$	Particulate Matter Less than 2.5 Microns
PM_{10}	Particulate Matter Less than 10 Microns
PSD	Prevention of Significant Deterioration
RAM	Radioactive Material
RANW	Range Wing
RCRA	Resource Conservation and Recovery Act
RIC	Radioisotope Committee
RSO	Radiation Safety Officer
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxide
STEL	Short Term Exposure Levels
TD&E	Tactics Development & Evaluation
TDMR	Target Debris Munitions Residue
TES	Test and Evaluation
TIP	Tactics Improvement Proposals
TP	Target Practice
U	Uranium
UNEP	United Nations Environment Programme
USACE	United States Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventative Medicine
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VA	Veterans Affairs
VOC	Volatile Organic Compound
WIC	Weapons Instructor Course
WINDO	Wing Infrastructure Development Outlook
WPS	Weapons Squadron
$\mu g/m^3$	micrograms per cubic meter

FINAL
FINDING OF NO SIGNIFICANT IMPACT

1.0 NAME OF THE PROPOSED ACTION

Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

The U.S. Air Force (Air Force) proposes to increase the use of depleted uranium (DU) ammunition at the Nevada Test and Training Range (NTTR) in order to meet ongoing test and training requirements for A-10 aircraft. Currently, and over the past decade or more, authorizations for DU rounds have been insufficient to fulfill these requirements. The Air Force is conducting this analysis to determine the potential environmental impacts of the proposed action and alternatives. The proposed action (Alternative A), would increase the number of DU rounds authorized to be fired on Target 63-10 by the 422nd Test and Evaluation Squadron (422 TES) and 66th Weapons Squadron (66 WPS) from 7,900 to 19,000 annually. Alternative B would increase the number of DU rounds to 26,400 to support Tactics Development and Evaluation and Tactics Improvement Proposals as well as the TES and WPS squadrons. The No-Action Alternative (Alternative C) would maintain the number of rounds at 7,900. The Air Force, Headquarters Air Combat Command prepared this EA in compliance with the National Environmental Policy Act, the Council on Environmental Quality regulations implementing NEPA, Air Force Instruction 32-7061 Environmental Impact Analysis Process, as promulgated in Title 32 of the Code of Federal Regulations Part 989, and other applicable federal and state-delegated environmental legislation.

3.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The Environmental Assessment provides an analysis of the potential environmental impacts resulting from implementing the proposed action or action alternatives. The Air Force assessed numerous resources that, in accordance with Council on Environmental Quality regulations, warranted no further examination. Those resources reviewed but not analyzed in detail in this assessment include: airspace management; cultural resources; socioeconomics and environmental justice; transportation; noise; and land management and use.

Five resource areas were evaluated in detail to identify potential environmental consequences: air quality; soils and water resources; health and safety; hazardous and radioactive materials and waste; and biological resources. As summarized below, implementation of the proposed action or the alternatives would not result in any significant impacts.

Air Quality. Under the proposed action, Alternative B, and the no-action alternative, there would be no increase in criteria air pollutants of CO, PM_{10}, $PM_{2.5}$, O_3, SO_x, and NO_x. Aerosolized oxides of uranium would be released under the proposed action, Alternative B, and the No-Action Alternative as a result of DU rounds hitting a target; however, the potential for release would be limited to only periods of intense firing and concentration levels of aerosolized uranium oxides would remain well below the most conservative standards for human health and safety. The oxides would pose no significant risk to the public in communities located more than 10 miles away from Target 63-10 or range personnel and contractors at closer locations on NTTR.

Soils and Water Resources. Implementation of the proposed action or Alternative B would result in limited soil contamination that would remain within 1,300 feet of Target 63-10. Contamination associated with isolated DU penetrators and fragments would continue to occur within the DU Licensed Area. Potential contamination of groundwater and surface waters would be unlikely because the dense soil composition precludes little vertical penetration of the soils and there are no surface waters at, near, or adjacent to Target 63-10. Also, groundwater in this area lies at great depths. Since dispersal of the DU particles remains limited to the licensed area within NTTR, little chance of significant impacts to soils and water exist from the proposed action and Alternative B. Soils and water resources would remain unchanged under the no-action alternative.

Health and Safety. Under the proposed action, Alternative B, and the no-action alternative, potential health hazards to the public for inhalation, ingestion, and skin contact would not occur due to lack of contact with potentially contaminated or toxic air, soils, and water. Range personnel and contractors would use protective gloves and other equipment when cleaning up DU rounds and fragments, preventing direct skin contact and the potential for exposure. Therefore, no significant impacts to the health and safety of both the public and Air Force personnel are anticipated.

Hazardous and Radioactive Materials and Waste. No new waste streams or new materials would be created through implementation of the proposed action or Alternative B. In either case, the increased rounds would remain within current Air Force capacities to store, use, and dispose of DU. Existing hazardous and radioactive materials storage and handling procedures would remain unchanged. In summary, no significant impacts to hazardous and radioactive materials and waste would occur under the proposal action or Alternative B. The no-action alternative would continue existing levels of DU expenditures on Target 63-10 and current range clean-up schedules. This alternative would not change the status quo, and therefore, would not pose any adverse effects if it were implemented.

Biological Resources. Both the proposed action and Alternative B would increase the number of rounds used on the existing target array, but would not expand the area of impact, which currently lacks significant quantities and diversity of plants and wildlife. Thus, there would be no additional impacts to migratory birds or other wildlife. Studies have established a negligible potential for DU uptake into plants and animals under existing conditions and therefore, little or no change to this level of uptake is

anticipated. The U.S. Fish and Wildlife Service Biological Opinion for desert tortoise covers Target 63-10 for use of DU and recognizes that recovery efforts of this species is not impacted by Target 63-10 use. No significant impact to vegetation, wildlife, and threatened and endangered species would be expected through implementation of the proposed action or Alternative B. Under the no-action alternative, no change to existing conditions for vegetation, wildlife, or species of concern would occur. Annual clean-up of DU penetrators from the ground surface would continue and no change of the existing levels of disturbance would occur.

4.0 CONCLUSION

On the basis of the finding of the Environmental Assessment, which is hereby incorporated by reference, I find no significant impact to human health or the natural environment would be expected from implementation of the proposed action, Alternative B, and no-action alternative (Alternative C). Therefore, issuance of this Finding of No Significant Impact is warranted, and preparation of an Environmental Impact Statement, pursuant to the National Environmental Policy Act of 1969 (Public Law 91-190) is not required.

ANTHONY A. FOTI
Colonel, USAF
Chief, Programs Division (A7Z)

13 Sep 06
Date

COVER SHEET
ENVIRONMENTAL ASSESSMENT FOR
INCREASED DEPLETED URANIUM USE ON TARGET 63-10,
NEVADA TEST AND TRAINING RANGE

Responsible Agency: United States Air Force, Air Combat Command

Proposed Action: The United States Air Force (Air Force) proposes to increase the use of depleted uranium (DU) ammunition at the Nevada Test and Training Range (NTTR). Under the proposed action, the Air Force would increase the number of DU rounds authorized to be fired on Target 63-10 by the 422nd Test and Evaluation (422 TES) and 66h Weapons Squadrons (66 WPS) from 7,900 to 19,000 annually.

Written comments and inquiries regarding this document should be directed to:

99 ABW/PA
4430 Grissom Ave., Ste 107
Nellis AFB, NV 89191
ATTN: Mr. Mike Estrada

In addition, the document can be viewed on and downloaded from the World Wide Web at http://www.nellis.af.mil/pa.htm and http://www.a7zpintegratedplanning.org.

Designation: Final Environmental Assessment

Abstract: The purpose of the proposed action is to meet the test and training requirements of the 422 TES and 66 WPS at Nellis Air Force Base (AFB). To accomplish this purpose, the Air Force would increase the annual authorization of DU rounds from the current level of 7,900 to the required level of 19,000. The 422 TES needs to fire 12,300 rounds, and the 66 WPS training requires 6,700 rounds annually, while the current authorization yields only 4,150 for the 422 TES and 3,750 for the 66 WPS. This testing and training would continue to occur on Target 63-10, the only target area in the United States authorized for air-to-ground firing of DU munitions.

The proposal would permit the Air Force to meet A-10 combat training requirements. Aircrews must train under conditions they would expect to encounter in combat, so realistic, quality training is essential. Limited testing and actual combat have demonstrated that the ballistic properties of DU rounds differ greatly from non-DU training rounds available to combat Air Force units. As such, the testing and training provided at Target 63-10 represents a unique and essential activity. Because no combat air forces A-10 units fire 30mm DU rounds during peacetime training, they must rely solely on Operational Flight Program testing and tactics validation from the 422 TES, and upon the training their Weapons Officers receive from the 66 WPS to impart lessons learned to the unit. The 422 TES tests and validates systems and tactics for the A-10. To increase accuracy and survivability for the A-10, the 422 TES must thoroughly test and apply upgrades to targeting systems. Lack of sufficient authorizations for DU rounds prevents meeting these requirements. Due to limited authorizations of DU use, this testing and training has not been accomplished consistently since 1993. The current DU authorization allows for less than half of the testing by the 422 TES and limits training of only 5 to 10 pilots per year. Without the proposed increase of DU rounds, A-10 pilots will not receive critical training in their primary weapon system, and hence, all A-10 pilots in the combat air forces will not fully understand the true capabilities and limitations of their aircraft armament.

In addition to the proposed action, the Air Force analyzed two alternatives: 1) enhanced use of testing and training rounds for Tactics Development & Evaluation (TD&E) and Tactics Improvement Proposals (TIP) expenditure (Alternative B) and 2) no action. Alternative B would authorize an additional 7,400 DU rounds to be fired on Target 63-10. These 7,400 rounds would support for the development and testing of A-10 tactics used by the TD&E and TIP units. With the 19,000 rounds proposed for the 422 TES and 66 WPS, the total expenditure of DU rounds would reach 26,400 per year. Under the no action alternative, the Air Force would not increase the annual expenditure of DU rounds. No change from current conditions would occur as a result of implementing the no-action alternative.

Final

Environmental Assessment for INCREASED DEPLETED URANIUM USE ON TARGET 63-10, NEVADA TEST AND TRAINING RANGE

United States Air Force
Air Combat Command

September 2006

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Environmental Assessment (EA) analyzes the potential environmental consequences resulting from the United States Air Force (Air Force) proposal to increase the use of depleted uranium (DU) munitions at the Nevada Test and Training Range (NTTR). The Air Force would increase the number of DU rounds authorized to be fired on Target 63-10 at NTTR by the 422 Test and Evaluation (422 TES) and 66th Weapons Squadrons (66 WPS) from 7,900 to 19,000 annually. The proposal would permit the Air Force to meet the test and training requirements of the 422 TES and 66 WPS at Nellis AFB. The existing authorization for DU expenditure on Target 63-10 is 7,900 rounds annually, a quantity established in 1998 in the *Final Environmental Assessment for Resumption of Use of Depleted Uranium Rounds at Nellis Air Force Range Target 63-10*. This quantity fails to fulfill current testing and training needs of the 422 TES and the 66 WPS.

This EA has been prepared by the Air Force, Headquarters Air Combat Command (HQ ACC) in accordance with the requirements of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, and AFI 32-7061 the Environmental Impact Analysis Process (EIAP), as promulgated in Title 32 of the Code of Federal Regulations (CFR) Part 989.

PURPOSE AND NEED FOR INCREASED USE OF DEPLETED URANIUM MUNITIONS AT NTTR

The Air Force has determined that the current expenditure of DU rounds at NTTR is not adequate for the test and training needs of the 422 TES and 66 WPS. To meet this goal, the proposed action would implement an increase in the amount of DU munitions authorized to be fired on Target 63-10 at NTTR.

The need for the proposed action stems from the necessity to meet combat training requirements. Advanced, sophisticated aircraft are only part of the combat readiness equation—fully trained, combat-ready aircrews also form an essential ingredient. Development, exercise, and validation of systems must occur to ensure the maintenance of military capabilities. The combat-proven training and testing resources at NTTR realistically simulate the modern combat environment and ensure the maximum potential for combat readiness, survival, and ultimately the best possible military operations capability. Target 63-10 at NTTR represents the only licensed air-to-ground DU munitions testing and training area in the United States for the Department of Defense (DoD).

In its combat role, the A-10 fires a combat mix consisting of 5 Armor Piercing Incendiary (API) or DU rounds and one High-Explosive Incendiary (HEI) round to sustain the operational combat effectiveness of the A-10 weapon system. The 422 TES and the 66 WPS must employ the 30-mm combat mix to meet all requirements.

The 422 TES is responsible for operational testing and evaluation of equipment and systems proposed for use by the combat air forces (CAF). Testing and evaluation must be conducted in as realistic an operational environment as possible to estimate the prospective system's operational effectiveness and operational capability. The 422 TES also develops and publishes new tactics for the CAF. The results of these tests and tactics directly benefit all CAF aircrews by providing them with operationally-proved hardware and software systems. The Operational Flight Program (OFP) testing by the 422 TES requires a total of 12,300 rounds to appropriately test gun delivery hardware and the A-10 Low Altitude Safety and Targeting Enhancement (LASTE) software upgrades that employ the 30-mm DU rounds. LASTE, which provides computerized weapons delivery solutions for all A-10 munitions, constitutes the most significant upgrade to the A-10 since its inception. It effectively doubles weapons delivery accuracy at double the previous standoff range from surface threats, thereby significantly increasing aircraft survivability and overall mission success. Currently, the 422 TES can provide less than one-third of this testing under existing authorizations for DU ammunition use.

Aircrews must train under conditions they would expect to encounter in combat, so realistic, quality training is essential; however, no CAF A-10 units fire 30-mm combat mix during peacetime training. Instead, they rely solely on ballistics, OFP, and tactics validation from the 422 TES, as well as on the Weapons Officer's brief Weapons School training to impart lessons learned to the unit. This training has not been accomplished consistently since 1993 due to two factors: DU use authorizations have been insufficient and the 422 TES has test priority with the limited numbers of DU rounds. The current DU authorization allows for the training of only five to ten pilots per year. In contrast, the requirement in the Weapons Instructor Course (WIC) defines a need to conduct DU employment during each student training course. For the total classes, this equates to 6,700 rounds of DU per year. Without an increase to 6,700 rounds of DU annually, the A-10 WIC students would not receive critical training in their primary weapon system, and hence, all A-10 pilots in the CAF would not fully understand the true capabilities and limitations of their aircraft armament.

PROPOSED ACTION AND ALTERNATIVES

In this EA, the Air Force considers three alternatives: The proposed action (Alternative A), Alternative B, and the No Action Alternative. The proposed action would increase the number of DU rounds fired annually to 19,000; Alternative B would increase the number of annual DU rounds to 26,400; and the No Action alternative would maintain the number of rounds set at 7,900.

The proposed action authorizes an increase in the annual use of DU rounds from 7,900 to 19,000 (and High Explosive Incendiary rounds from 1,600 to 3,800) to provide the 422 TES and the 66 WPS graduates with sufficient DU rounds to accomplish essential training requirements. The 422 TES needs to fire 12,300 rounds, and the 66 WPS training requires 6,700 rounds annually. The existing authorization of 7,900 DU rounds (4,150 for 422 TES and 3,750 for 66 WPS) does not meet current needs.

The 422 TES and 66 WPS DU employment is critical to the combat readiness of the A-10 weapon system. Since no operational A-10 units employ 30mm DU rounds, these two Nellis units constitute the only Air Force opportunity to exercise the entire employment chain, to include maintenance, weapons loading, ammunition, avionics, gun, pilot, and tactics in an unbroken loop.

The Air Force also assessed two alternatives to the proposed action: enhanced use of testing and training rounds for Tactics Development & Evaluation (TD&E) and Tactics Improvement Proposals (TIP) expenditure (Alternative B) and no action. Alternative B would authorize an additional 7,400 DU rounds to be fired on Target 63-10. These 7,400 rounds would support development and testing of A-10 tactics used by the TD&E and TIP units. The DU rounds needed by TD&E and TIP total 3,700 each, for a total expenditure of DU rounds of 26,400. Under the no action alternative, the Air Force would not increase the annual expenditure of DU rounds. No change from current conditions would occur as a result of implementing the no-action alternative.

MITIGATION MEASURES

In accordance with 32 CFR 989.22, the Air Force must indicate if any mitigation measures would be needed to implement the proposed action or any alternative selected as the preferred alternative under this environmental assessment. For the purposes of this EA, no mitigation measures are proposed to arrive at a finding of no significant impact if the proposed action or alternatives were selected for implementation.

SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

According to the analysis in this EA, implementation of the proposed action or alternatives would not result in significant impacts in any resource category. Implementing the proposed action or alternatives would not significantly affect existing conditions at NTTR or Target 63-10. Table ES-1 summarizes and compares the results of the analysis by resource category for each alternative.

Table ES-1 Comparison of Alternatives by Resource and Potential Environmental Consequences		
Proposed Action (Alternative A) Annual Increase to 19,000 Rounds	***Alternative B Annual Increase to 26,400 Rounds***	***No-Action (Alternative C) Maintain Annual use of 7,900 Rounds***
Air Quality		
• No increase in criteria air pollutants of CO, PM_{10}, $PM_{2.5}$, VOCs, SO_x, and NO_x. • Slightly more oxides of uranium would be released above the current levels, but maximum concentrations potentially extending off the DU Licensed Area and NTTR remains well below the standards for human health and safety. • Range workers and general public would not be exposed to concentrations close to levels potentially affecting human health.	• No increase in criteria air pollutants of CO, PM_{10}, $PM_{2.5}$, VOCs, SO_x, and NO_x. • Slightly more oxides of uranium would be released above the current levels, but maximum concentrations potentially extending off the DU Licensed Area and NTTR remains well below the standards for human health and safety. • Range workers and general public would not be exposed to concentrations close to levels potentially affecting human health.	• No increase in criteria air pollutants of CO, PM_{10}, $PM_{2.5}$, VOCs, SO_x, and NO_x. • Oxides of uranium are released during DU use. Even during the most intense use, concentrations remain well below the standards for human health and safety. The highest concentrations are in the vicinity of the target within the DU Licensed Area. • Range workers and general public are not exposed to concentrations close to levels potentially affecting human health.
Soils and Water Resources		
• Limited soil contamination would remain in close proximity (about 1,300 feet) to Target 63-10. • Isolated contamination around penetrators and fragments would remain within the DU Licensed Area. • Groundwater and surface waters lack contamination and would pose no potential risk to people.	• Soil contamination would remain in close proximity (about 1,300 feet) to Target 63-10. • Isolated contamination around penetrators and fragments would remain within the DU Licensed Area. • Groundwater and surface waters lack contamination and would pose no potential risk to people.	• The effects of the no-action alternative would remain unchanged for soil and water resources. • Isolated contamination around penetrators and fragments would remain within the DU Licensed Area. • Groundwater and surface waters lack contamination and would pose no potential risk to people.
Health and Safety		
• Potential health hazards for inhalation, ingestion, and skin contact would not occur due to lack of contact with potentially contaminated or toxic air, soils, and water.	• Potential health hazards for inhalation, ingestion, and skin contact would not occur due to lack of contact with potentially contaminated or toxic air, soils, and water.	• Potential health hazards for inhalation, ingestion, and skin contact would not occur due to lack of contact with potentially contaminated or toxic air, soils, and water.
Hazardous Materials and Waste		
• 19,000 total rounds would remain within current capacities to store, use, or dispose of DU.	• 26,400 total rounds would remain within current capacities to store, use, or dispose of DU.	• The current allotment of 7,900 rounds are within current capacities to store, use, or dispose of DU.

Table ES-1 Comparison of Alternatives by Resource and Potential Environmental Consequences (con't)		
Proposed Action (Alternative A) Annual Increase to 19,000 Rounds	***Alternative B Annual Increase to 26,400 Rounds***	***No-Action (Alternative C) Maintain Annual Use of 7,900 Rounds***
Biological Resources		
• The DU rounds would affect the existing target area and licensed area which currently lacks significant quantities of plants and wildlife, thus resulting in no impact. • 19,000 additional rounds at Target 63-10 would not likely impact the desert tortoise. • The Biological Opinion for the desert tortoise covers Target 63-10 for use of DU.	• The additional DU rounds would affect the existing target area and licensed area which currently lacks significant quantities of plants and wildlife, thus resulting in no impact. • 26,400 additional rounds at Target 63-10 would not likely impact the desert tortoise. • The Biological Opinion for the desert tortoise covers Target 63-10 for increased use of DU.	• Existing rounds affect the existing target area and licensed area which currently lacks significant quantities of vegetation and wildlife due to its historic use. • The Biological Opinion for the desert tortoise covers Target 63-10 for use of DU.

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CHAPTER 1

INTRODUCTION

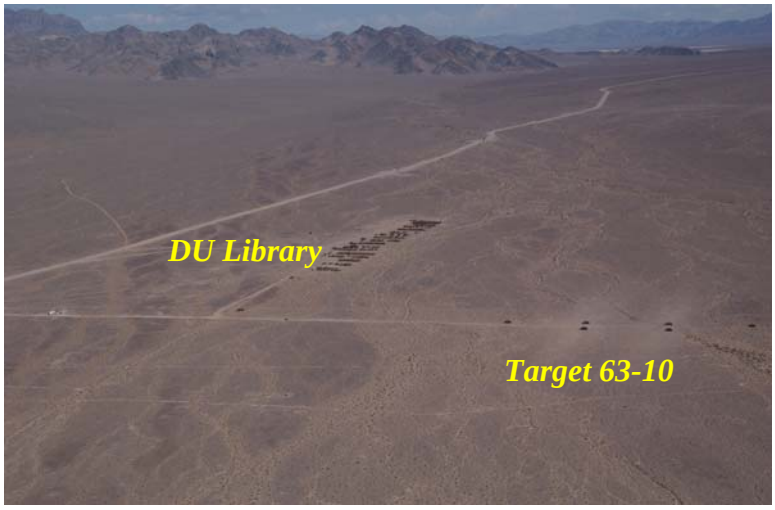
CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The United States Air Force (Air Force) proposes to increase the use of depleted uranium (DU) ammunition at the Nevada Test and Training Range (NTTR) in order to meet ongoing test and training requirements for A-10 aircraft. Currently, and over the past decade or more, authorizations for DU rounds have been insufficient to fulfill these requirements. Under the proposed action, the Air Force would increase the number of DU rounds authorized to be fired on Target 63-10 by the 422nd Test and Evaluation Squadron (422 TES) and 66th Weapons Squadron (66 WPS) from 7,900 to 19,000 annually. The Air Force is conducting this analysis to determine the potential environmental impacts of the proposed action and alternatives. In addition to the proposed action (i.e., 19,000 DU rounds per year), the Air Force analyzed two alternatives. The first alternative would involve enhanced use of DU rounds for Tactics Development and Evaluation (TD&E) and Tactics Improvement Proposals (TIP), resulting in firing of 26,400 DU rounds per year. No action would form the second alternative; the status quo would continue with firing of 7,900 DU rounds. The Air Force, Headquarters Air Combat Command (HQ ACC) prepared this EA in compliance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA, Air Force Instruction (AFI) 32-7061 Environmental Impact Analysis Process (EIAP), as promulgated in Title 32 of the Code of Federal Regulations (CFR) Part 989, and other applicable federal and state-delegated environmental legislation.

1.2 LOCATION OF THE PROPOSED ACTION

NTTR contains the only target area in the United States authorized for air-to-ground firing of DU rounds (Figure 1-1). The DU Licensed Area (Figure 1-2), located in Range 63, encompasses approximately 14 square miles including the active target array (Target 63-10) and the DU library, a holding area for used and new targets. Target 63-10 is a strafing target used only by A-10s. Currently, the target array covers about 1.5 acres and consists of a row of four tanks extending northwest to southeast with tanks spaced approximately 250 to 260 feet apart (Figure 1-3). To the south of this row, two tanks lie 80 to 90 feet away. Depending on target maintenance schedule and workload, the number of tanks can vary between two and eight in



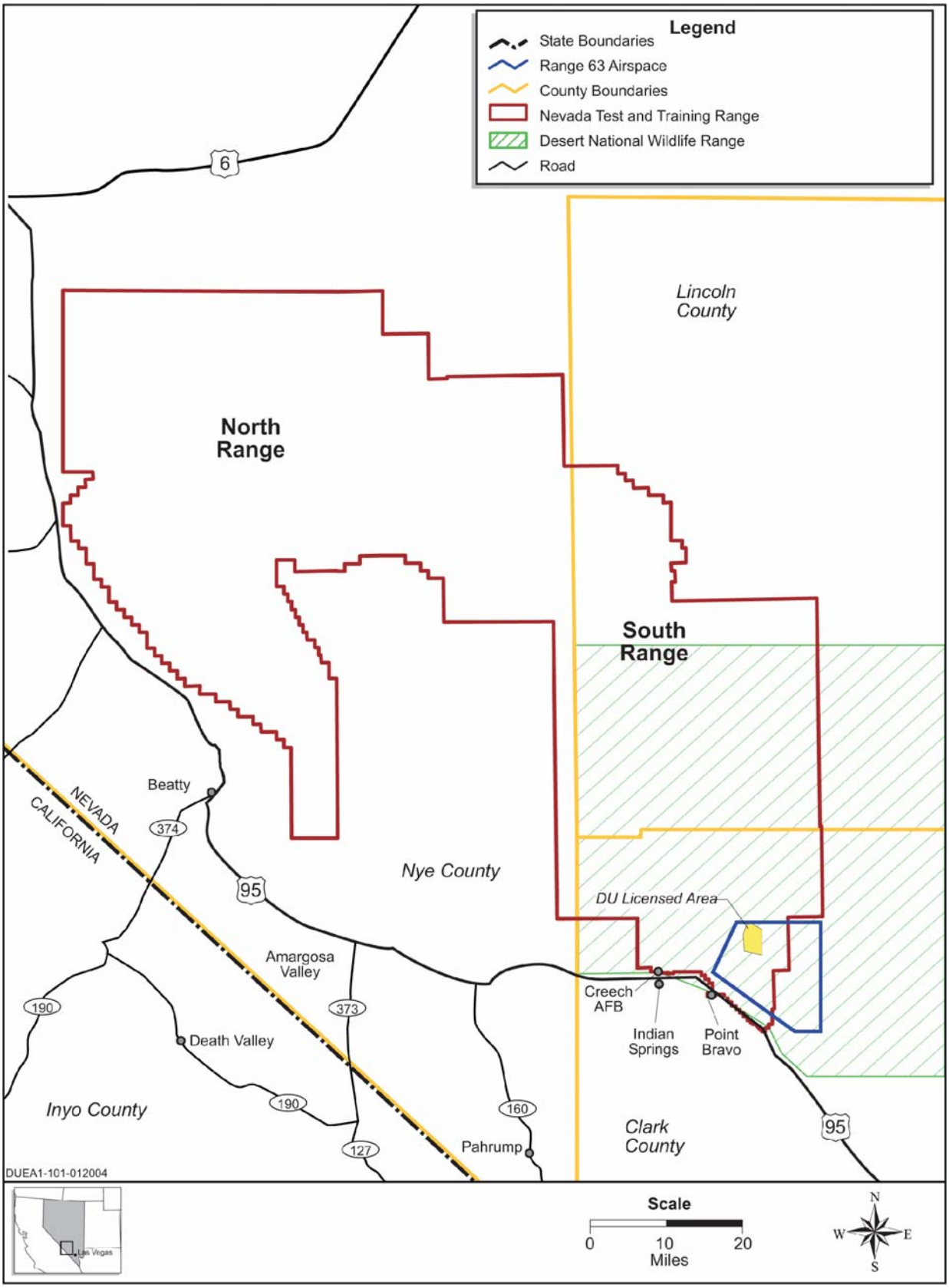


Figure 1-1 Nevada Test and Training Range

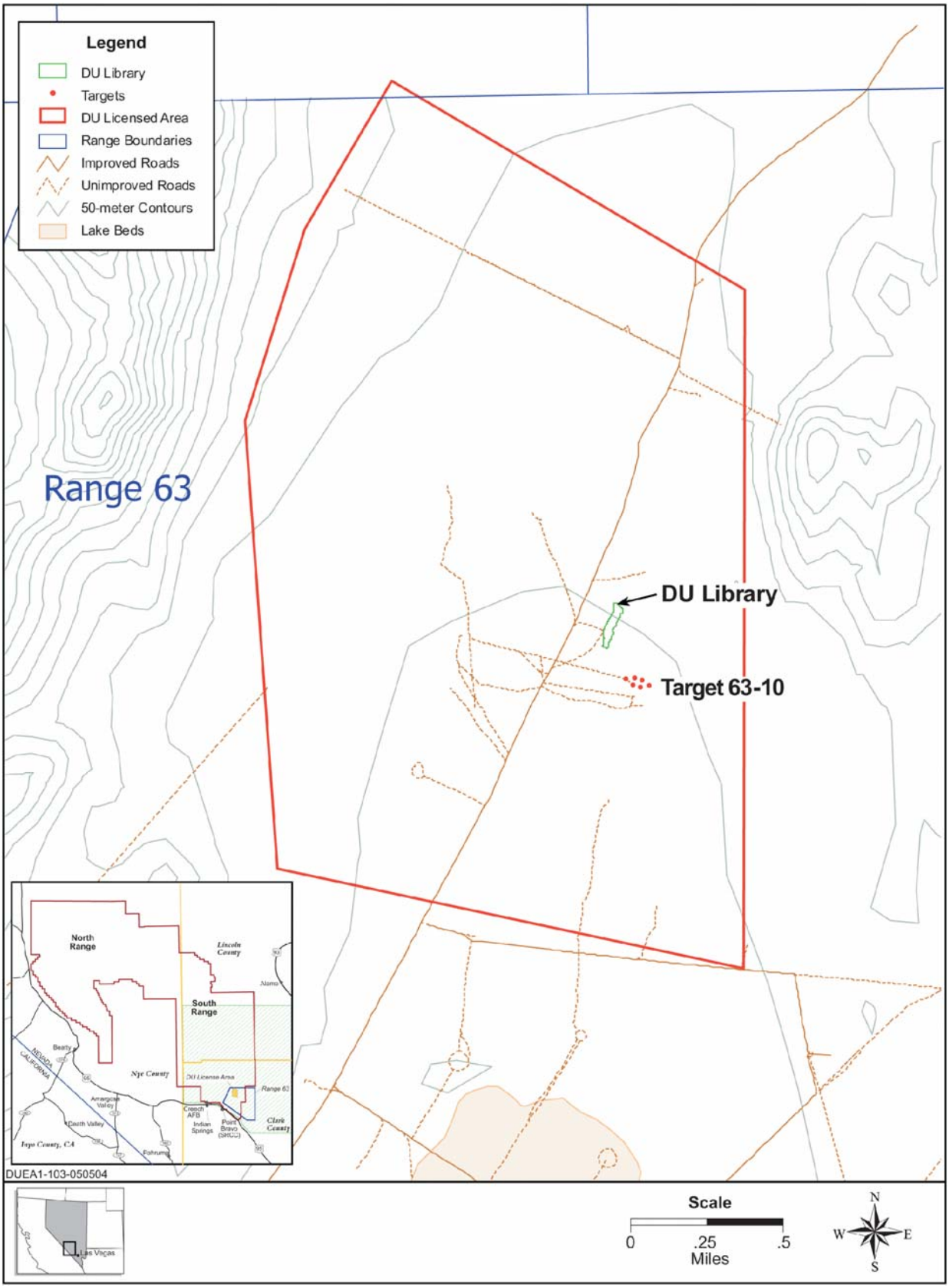


Figure 1-2 DU Licensed Area

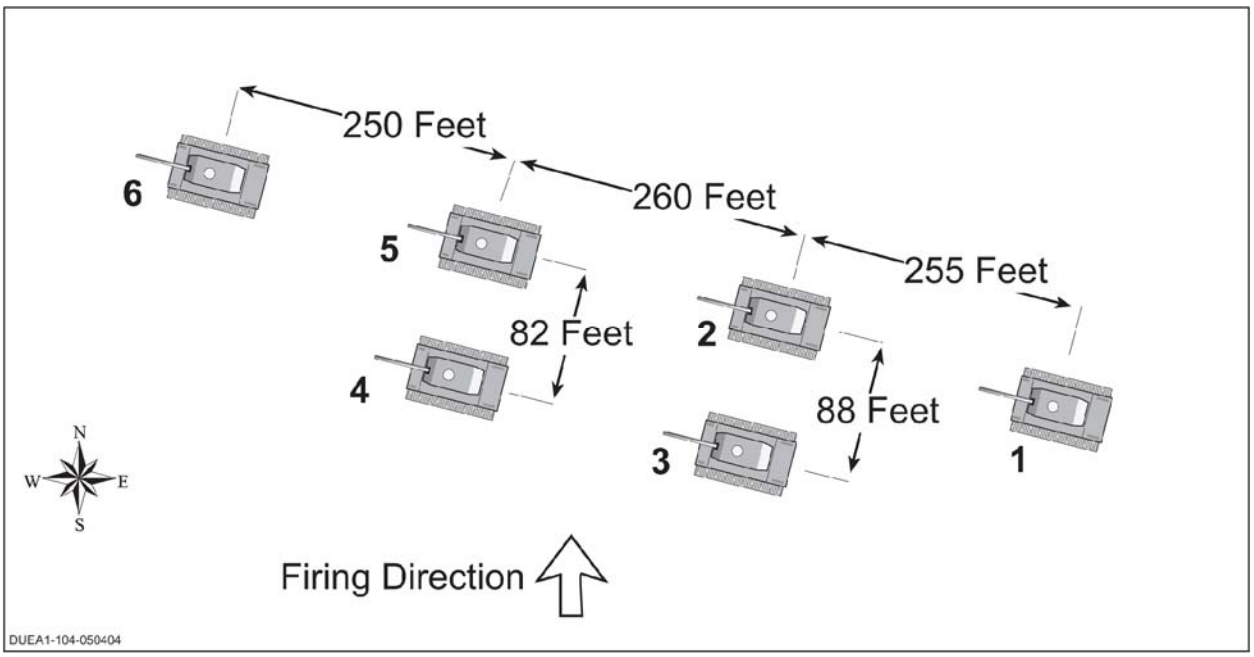


Figure 1-3 Target 63-10 Six-Vehicle Target Array

this general pattern and spacing. This area is approximately 2,000 feet east of the DU library, which contains not only new and used targets but tanks and vehicles that in the past have been fired upon with DU munitions.

NTTR consists of approximately 2.9 million acres in southern Nevada withdrawn from public use as a national test and training area for military equipment and personnel under Public Law (P.L.) 106-65. NTTR comprises two functional areas: the North Range and South Range, both of which are further divided into subranges. The DU Licensed Area and Target 63-10 lie within Range 63 of the South Range (refer to Figures 1-2 and 1-3), approximately 12 miles east-northeast of the town of Indian Springs, Nevada; 10 miles northeast of Point Bravo (NTTR boundary); 11 miles north of state correctional facilities; and within the Air Force managed portion of the Desert National Wildlife Range (DNWR).

1.3 BACKGROUND

1.3.1 DU Characteristics

DU predominantly results as a byproduct of the process of enriching natural uranium for use in nuclear reactors; reprocessing of spent nuclear fuel accounts for a minimal amount of DU (Military Analysis Network 2004). Natural uranium, a slightly radioactive metal present in most rocks and soils, consists primarily of a mixture of two isotopes: U-235 and U-238. Within a volume of natural uranium, U-235 and U-238 account for 0.7 and 99.3 percent, respectively. Since reactors require U-235 to produce

energy, processing of the uranium involves enrichment to obtain U-235 by removing most of the U-238. Processing converts U-238 into DU, a substance 40 percent less radioactive than natural uranium. With a half-life of 4.5 billion years and low radioactivity, little decay of DU materials occurs (Military Analysis Network 2004). A half life represents the time necessary for half of the radioactive element in a material to decay. However, the long half-life of DU neither implies radioactive potency nor potential for harm. Rather, as noted previously, DU emits less radioactivity than natural uranium and it decays very slowly (NRC 2002), so emissions of radioactivity are low. DU is used for ballast in ships, aircraft counterweights, x-ray shielding, and other purposes as well as for munitions.

1.3.2 DU Ammunition

DU ammunition provides the best armor penetrators, as demonstrated in the Gulf War. These armor-piercing incendiary rounds consist of a lightweight body containing a high-density DU penetrator. Offering speed, mass, and natural pyrophoric attributes that enhance incendiary effects, DU rounds perform exceptionally well against tanks and other armored vehicles. The capabilities of DU ammunition exceed that of competing materials, providing for a greater effective range.

1.3.3 DU Development and Deployment at NTTR

During the 1970s, the Air Force began researching, testing, and evaluating the applicability of high-density materials such as tungsten and DU for improved armor-penetrating munitions capable of defeating heavily armored targets. Tests demonstrated that DU offered superior performance to all other alloys. In 1975, the Air Force completed an Environmental Assessment (EA) entitled *Depleted Uranium (DU) Armor Penetrating Munition for the GAU-8 Automatic Cannon Development and Operational Test and Evaluation* (Air Force 1975). The EA analyzed the manufacturing, storage, use, and disposal of DU ammunition under a proposal to conduct operational tests and evaluations on targets at NTTR. In concluding that no aspect of the DU munitions proposal would adversely affect the environment (Air Force 1975), the Air Force began conducting ballistic tests at NTTR. Spanning about 10 months in 1976 to 1977 these tests employed 20-, 25-, and 30-milimeter (mm) DU ammunition in the GAU-8 automatic cannon developed by the Air Force specifically for use in the A-10 close air support aircraft. Based on these tests, the Air Force determined that the 30-mm round would best meet Air Force and A-10 mission needs (Global Security 2003).

Following selection of the 30-mm cannon, the Air Force recognized the need to establish an exclusive area to support testing, training, and development of the DU munitions and firing systems while ensuring national security and public safety. Existing ranges with available target areas, well-removed from the public, comprised the locations considered for DU munitions activities; Target 63-10 within the NTTR

South Range met these criteria. In 1982, the Nuclear Regulatory Commission (NRC) granted a license to the Air Force to use Target 63-10 for firing 30-mm DU rounds on targets "in quantities as needed for pilot training and tactical employment evaluation" (Air Force 1998a). DU testing and evaluation continued on Target 63-10 from 1982 until 1993 when the U.S. Fish and Wildlife Service (USFWS) requested the Air Force suspend use of DU due to concerns for vegetation and wildlife in the DNWR.

During the period spanning 1976 to 1977 and 1982 to 1993, the A-10s fired approximately 90,000 DU rounds at Target 63-10; an average of 7,500 rounds per year. While the USFWS offered no evidence that DU munitions used on Target 63-10 posed a threat to the environment, the agency's concerns prompted the Air Force to evaluate its potential effects in 1993. Realizing the critical need to continue DU munitions testing and training, Nellis Air Force Base (AFB) conducted a site assessment of soils and water in 1994 to determine the general locations and conditions of DU penetrators (i.e., spent munitions) and potential DU residues in an effort to address the USFWS concerns. In addition, Nellis AFB used these studies to develop a management approach for Target 63-10 (Air Force 1995). The results of the studies revealed no effects to soils, water, air quality, wildlife, or plants. When provided with these results, the USFWS agreed with the Air Force findings and DU use at Target 63-10 resumed (USFWS 1997).

The Air Force completed an EA for resuming DU use on Target 63-10 with a Finding of No Significant Impact (FONSI) in 1998 (Air Force 1998b). In 2000, the Air Force approved a management plan for Target 63-10 and the DU library and updated it in 2002 (Air Force 2002). By 2002, the Air Force resumed use of Target 63-10, the only air-to-ground gunnery range in the United States licensed for DU use. Analyzed levels of use totaled 7,900 30-mm DU rounds per year, an amount similar to that fired each year of use since the establishment of the target in the 1970s.

The NRC issued the Air Force a Master Materials License, granting the Air Force the regulatory authority to manage and regulate use of NRC licensed materials. Target 63-10 and the DU library comprise the locations where DU can be used in accordance with the Nellis AFB Radioactive Material (RAM) Permit, NV-30048-02/02AFP, as authorized by the Air Force Surgeon's General Radioisotope Committee (RIC). The RIC Secretariat, Air Force Medical Operations Agency, Radiation Protection Division (AFMOA/SGPR), handles the day-to-day RIC operations and issues RAM permits in accordance with AFI 40-201, Managing Radioactive Materials in the U.S. Air Force. The 99th Air Base Wing Commander (Nellis AFB) is ultimately responsible for activities conducted under the purview of this RAM permit. The Nellis AFB Bioenvironmental Engineering Flight (99 AMDS/SGPB) performs Radiation Safety

Officer (RSO) duties, and assists with management of required permit activities. The 98th Range Wing (98 RANW) manages and maintains Target 63-10 and the DU library. The Air Force Institute for Operational Health (AFIOH), when requested by Nellis AFB or AFMOA/SGPR, may conduct radiation surveys to assess the amount of radioactive contamination or to provide site specific guidance regarding waste disposal.

1.3.4 Use and Condition of DU Targets

Damage to a tank or armored vehicle target by a DU round can be caused from DU penetrator entries, ricochets, and penetrator splatter fragments. Under current levels of DU munitions use, the targets in the array are replaced every 4 to 7 years, or when test, training, and evaluation staff can no longer effectively evaluate the DU penetrator entry points, or the targets lose fidelity and realism. In special circumstances, the Air Force may replace targets more often to support weapons effect testing. Currently, there are approximately 180 tank and vehicle targets within the DU library manifest with varying degrees of contamination; however, many targets still retain sufficient fidelity to serve as replacements in the target array. This inventory should be sufficient to replace targets as needed under the proposed action, although increased DU firing may degrade targets more quickly.

1.3.5 Management and Disposal of DU at NTTR

The DU Management Plan for NTTR incorporates pertinent provisions of the National Environmental Policy Act, the Low-Level Radioactive Waste Policy Act, and NRC regulations that control the exposure to and disposal of DU. The 30-mm rounds of DU employed by A-10 aircraft at Target 63-10 are considered contaminated, low-level waste (LLW) because of their low-level radioactivity. The plan provides guidance for disposition and handling of LLW targets and target debris munitions residue (TDMR) (i.e., inert munitions, metal, wood, rubber) contaminated by DU rounds. The activities supporting this management plan include:

- ***Environmental Radiation Monitoring Program.*** This program was initiated in August 1998 to verify the current locations of DU, to determine if any DU migrated laterally or vertically, and to locate any detectable transmission of DU due to resuspension and wind dispersal outside of the original target footprint. The Air Force completed this monitoring in December 1998, and found no detectable migration of DU. After the area of concern was affected by flash flooding in 1999, it was monitored in April of 2000 by Brooks AFB Institute of Environmental, Safety, and Occupational Health Risk Assessment, Radiation Surveillance Division, Health Physics Branch (IERA/SDRH) personnel. This monitoring concluded that even after flash flooding, the DU had remained in the impact area, and had not moved downstream or off site. However, isolated DU penetrators and fragments occur throughout the DU Licensed Area resulting in contamination

immediately around the object. This verification monitoring is conducted biannually by IERA/SDRH (Air Force 2000b).

- ***Environmental Radiation Monitoring by the Permit RSO.*** The RSO conducts periodic environmental radiation monitoring within the target area, as well as within and outside of the DU Licensed Area.

- ***Annual Clean-Up of Target Areas.*** Annually, the Air Force conducts "Coronet Clean" at NTTR which involves clean-up of all targets including Target 63-10. Prior to the "Coronet Clean" operation, an explosive ordnance team sweeps the impact area for any unexploded ordnance. Then, trained technicians, under the direction and supervision of the 98 RANW contractor, 98 RANW personnel, or the Permit RSO, manually remove visible DU rounds and fragments, encompassing an area extending in a 1,000-foot radius around the target. The Air Force focuses clean-up within the 1,000-foot radius for two reasons. First, past surveys and experience have demonstrated that very few rounds occur beyond that distance. Second, the very low density of rounds or fragments fails to warrant the time and costs associated with clean-up. Using gloves, trained workers pick up rounds and fragments, label them, and seal them in the DU library. All clean-up operates in accordance with AFI 40-201, *Managing Radioactive Materials in the Air Force*. The collected material is coordinated through the Base RSO for proper disposition. Based on their training, workers are trained to leave the High Explosive Incendiary (HEI) rounds in place for safety reasons. If any doubt exists, the round is left in place. Additionally, intrusive methods (i.e., digging) are not used and only those rounds visible on the surface are gathered. In 2005, 350 pounds of DU rounds were picked up, the remainder either aerosolized or remains in the target area.

In addition to the Management Plan described above, two EAs (*Depleted Uranium Armor Penetrating Munition for the GAU-8 Automatic Cannon Development and Operational Test and Evaluation* [Air Force 1975], and *Resumption of Use of Depleted Uranium Rounds at Nellis Air Force Range Target 63-10, Final Environmental Assessment* [Air Force 1998b] analyzed DU use on biological and human resources at DU Target 63-10. Both assessments concluded that DU use on Target 63-10 would not adversely affect the environment and that DU contamination would remain localized in and near the target array.

In another EA, (Air Force 2005) accomplished more recently in March 2005, the Air Force at Nellis AFB completed an assessment for the disposal of DU-contaminated targets and TDMR. The proposed action implemented a suite of methods to declassify, decontaminate, and reuse targets elsewhere on NTTR, declassify and transport targets and TDMR for disposal to an approved, licensed LLW disposal facility, or transport classified targets to the Nevada Test Site (NTS). This EA also concluded no significant impact

to human health or the natural environment would be expected from implementation of the proposed action.

1.3.6 DU Studies

As noted previously, DU comprises the byproduct of the process where the highly radioactive isotopes of natural uranium are removed for use as nuclear fuel or nuclear weapons. Natural uranium is a slightly radioactive metal that is present in most rocks and soils as well as in many rivers and sea water. DU is weakly radioactive, but like other heavy metals, it can be toxic in high doses. DU's primary "hazard" is chemical toxicity, not low-level radioactivity. DU's effects on human health and the environment have been a topic of numerous scientific studies worldwide. Several conclusions pertinent to the proposed action can be drawn from myriad scientific studies:

- Natural uranium occurs throughout the environment.
- DU is 40 percent less radioactive than natural uranium.
- Civilian uses of DU include counterweights in aircraft, ballast in ships, and shielding in medical radiation therapy machines.
- As used in testing and training, DU penetrators do not pose a radiological contamination risk to humans, air, water, soils, plants, or animals.
- Potentially unhealthful concentrations of aerosolized DU remain in the immediate area of the target only during brief firing impact.
- DU, as employed at Target 63-10, does not adversely affect the environment and human health.

The following summarizes the results of general and NTTR-specific studies of DU use. In addition to the studies and reports summarized below, three EAs (Air Force 1975, 1998b, 2005) analyzed DU use on biological and human resources at DU Target 63-10. These assessments concluded that DU use on Target 63-10 would not adversely effect the environment and that concentrated DU contamination would remain localized in and near Target 63-10.

General

Long-Term Fate of Depleted Uranium at Aberdeen and Yuma Proving Grounds Phase I: Geochemical Transport and Modeling, June 1990 (Ebinger *et al.* 1990). Studies conducted at Aberdeen and Yuma Proving Grounds, two distinctly different environments, sought to develop an understanding of the distribution and transport of DU in soil and water contexts and to identify potential chemical property changes of DU. This study focused on determining if remediation of sites used for DU munitions training would be required. The conclusions indicated that while erosion and rain events could transport DU, further studies would be required to establish the probability and scope of such transport.

Long-Term Fate of Depleted Uranium at Aberdeen and Yuma Proving Grounds Phase II: Human Health and Ecological Risk Assessments, September 1996 (Ebinger *et al.* 1996). This study continued to seek further analytical data to answer Phase I study questions while probing potential DU migration into bay waters from Aberdeen Proving Ground. Results from the study indicated: 1) DU migrates very slowly in soil with erosion being the primary mode of DU transport; 2) rainfall events which result in flash flooding could potentially move DU fragments into channels towards larger water bodies; and 3) DU transport posed no adverse affects to ecosystems or humans.

U.S. Army Depleted Uranium Tests Ballistic Research Laboratory Test Site Environmental Assessment, November 1992 (DOE 1992a). Analysis of open-air and closed-tunnel testing at the NTS concluded DU-contaminated soil settles quickly with minimum dispersion. This 5-year study conducted by the Department of Energy (DOE) indicated that DU particles did migrate slightly downward in the soil, but over 95 percent of the original DU material left in the soil remained in the top 3 inches of the soil profile indicating minimal erosion and/or percolation of DU materials.

Gulf-War Studies. The possible influence of DU on human health and the environment has been studied for many years, but the 1991 Gulf War use of DU munitions gave rise to the latest and most comprehensive studies to date. As detailed later in Section 3.3, soil samples from some of the most contaminated battlefield sites, air samples from Kuwait and Saudi Arabia, and more than a decade of medical surveillance of the 1991 Gulf War veterans with DU-related injuries have identified no adverse toxicological effects related to the presence of DU.

Depleted Uranium in Kosovo, Post-Conflict Environmental Assessment, 2001 (UNEP 2001). In 2000, the United Nations Environmental Program (UNEP) conducted an assessment of potential effects of the use of DU munitions in the Kosovo conflict. The UNEP team examined 11 sites known to have been targets for DU munitions, collecting hundreds of samples of air, water, soils, milk, and vegetation. Sampling locations included sites with penetrators, as well as numerous locations in the surrounding area to test for contamination dispersal. After lab testing of the samples, UNEP concluded that the analyses of the samples revealed only low, insignificant levels of radioactivity. Furthermore, the results established that contamination had not migrated far from the penetrators or into soil profiles, groundwater, and vegetation. Cows did not uptake DU contamination nor did DU affect milk. The study revealed there are no concerns or impacts regarding toxicity, including heavy metals. Although UNEP adopted a cautious approach, it indicated that the health and environmental risks from DU are insignificant.

Target 63-10 and the DU Library

Report on Target Refurbishment on Range 63, Nellis Air Force Base, Nevada, October 1992 (Air Force 1993). The Armstrong Laboratory Health Physics Function took air and radiation samples during efforts to move two tank targets from Target 63-10 to the DU library. According to Nellis AFB procedures, all

site personnel were equipped with air samplers, protective clothing, respirators, and gloves. The air monitoring results indicated DU contamination remained localized to the immediate target area and no significant airborne DU contamination occurred during target movement activities.

Depleted Uranium Site Assessment Range 63 – Nellis Range Complex, 1994 (Air Force 1995). This study examined potential migration of DU particles through two scenarios: 1) natural wind dispersion and DU transport during target replacement and 2) heavy equipment disturbance of surrounding soils and surface water migration during thunderstorm events. Initial concerns about potential inhalation of dust from ground disturbance activities associated with target replacement proved unfounded. Use of proper handling procedures and breathing apparatus ensured more than adequate protection. In addition, the study confirmed the extreme density of DU particulates and oxides reduced the dispersion via wind or surface water.

Radiological Scoping Survey of Range 63-10, Nellis Air Force Base, Nevada, December 2001 (AFIERA 2001). Brooks AFB conducted a radiological soil survey of approximately 250 acres to determine the extent of DU contamination and migration in the soil. DU contamination located approximately 1,970 feet from the center of the target array was limited to DU rounds and target fragments. The analysis found little or no migration of DU in the soil in the areas outside of the target array, confirming conclusions reached in prior studies of the site. Indeed, generalized soil contamination diminished rapidly with distance from the target array, and little to none was observed 350 feet from the target.

Summary Conclusions

The past DU studies and environmental analyses concluded that limited DU migration could occur chiefly through soil erosion, site disturbance, or rain events. Based on this set of studies, results indicate that DU contamination settles in the soil with minimum dispersal or exists around penetrators or fragments, no evidence of DU migration to groundwater resources exists, and radiological contamination remains concentrated within the target array.

1.4 PURPOSE AND NEED FOR INCREASED DU USE AT NTTR

The purpose of the proposed action is to meet the test and training requirements of the 422 TES and 66 WPS at Nellis AFB. To accomplish this purpose, the Air Force would increase the annual authorization of DU rounds from 7,900 to 19,000. The existing authorization for DU expenditure on Target 63-10 is 7,900 rounds annually. This quantity was established in 1998 in the *Final Environmental Assessment for Resumption of Use of Depleted Uranium Rounds at Nellis Air Force Range Target 63-10* (Air Force 1998b) and does not reflect current testing and training needs of the 422 TES and the 66 WPS.

The 422 TES needs to fire 12,300 rounds, and the 66 WPS training needs require 6,700 rounds annually, while the current authorization yields only 4,150 for the 422 TES and 3,750 for the 66 WPS.

The need for the proposed action stems from the necessity to meet combat requirements. Advanced, sophisticated aircraft are only part of the combat readiness equation—fully trained, combat-ready aircrews also form an essential ingredient. Development, exercise, and validation of systems must occur to ensure the maintenance of military capabilities. As these systems are proven effective or suitable, the Air Force develops tactics to integrate and improve their operational employment. Subsequently, and for the life of the aircraft in the inventory, the Air Force tests and perfects the tactics to maximize combat capability. Then, before aircrews enter combat, they receive training in the use of these tactics and technologies against the targets and defensive threats that they can expect to encounter. The combat-proven training and testing resources at NTTR realistically simulate the modern combat environment and ensure the maximum potential for combat readiness, survival, and ultimately the best possible military operations capability.

In its combat role, the A-10 fires a combat mix consisting of 5 Armor Piercing Incendiary (API) or DU rounds and one HEI round to sustain the operational combat effectiveness of the A-10 weapon system. The 422 TES and the 66 WPS must employ the 30-mm combat mix to meet all requirements. Current force structure plans project the A-10 to remain in the Air Force inventory for almost 30 more years. Several factors support the need for this testing and training at NTTR.

- The GAU-8 30-mm cannon is the A-10's primary weapon;
- Armor (e.g., tanks) is the primary target;
- 30-mm DU provides the primary weapons effect against this armor target set; and
- Target 63-10 at NTTR represents the only licensed air-to-ground DU munitions testing and training area in the United States for the Department of Defense (DoD).

Both the 422 TES and WS need to fulfill these requirements. The 422 TES is responsible for operational testing and evaluation of equipment and systems proposed for use by the combat air forces (CAF). Testing and evaluation must be conducted in as realistic an operational environment as possible to estimate the prospective system's operational effectiveness and operational capability. The 422 TES also develops and publishes new tactics for the CAF. The results of these tests and tactics directly benefit aircrews in Air Combat Command, Pacific Air Forces, and United States Air Forces in Europe by providing them with operationally proved hardware and software systems. The Operational Flight Program (OFP) testing by the 422 TES requires a total of 12,300 rounds to appropriately test gun delivery hardware and the A-10 Low Altitude Safety and Targeting Enhancement (LASTE) software upgrades that employ the 30-mm DU rounds. LASTE, which provides computerized weapons delivery solutions for all A-10 munitions, constitutes the most significant upgrade to the A-10 since its inception. It effectively doubles weapons delivery accuracy at double the previous standoff range from surface threats, thereby significantly increasing aircraft survivability and overall mission success.

Weapons testing, including ballistic flight test, is an integral part of the constant improvement cycle of weapons systems. The ballistic characteristics of the DU round differ significantly from surrogate training rounds. Increases in close air support combat missions require highly accurate ballistic software, but this is unachievable with current DU testing limitations. The Air Force uses Target practice (TP) and HEI rounds when testing or training does not require the ballistic character of DU rounds. Heavier DU rounds fly toward targets differently. A TP round is made of steel and uses the same type casing as the DU round. HEI rounds also use the same type casing as a DU round. Neither TP rounds nor HEI rounds are suitable surrogates for API, due to their different weight, shape, and resultant differing ballistics. These differences become exaggerated at the longer, more survivable ranges allowed by the advent of LASTE. Operational flight testing needs to be accomplished to verify proper ballistic solutions and variances. Currently, the 422 TES can provide less than one-third of this testing under existing authorizations for DU ammunition use.

Aircrews must train under conditions they would expect to encounter in combat, so realistic, quality training is essential; however, no CAF A-10 units fire 30-mm combat mix during peacetime training. Instead, they rely solely on ballistics, OFP, and tactics validation from the 422 TES, as well as on the Weapons Officer's brief Weapons School training to impart lessons learned to the unit. A critical linchpin of this system is an unbroken learning chain of classroom academics and realistic live employment of all A-10 primary munitions. This training has not been accomplished consistently since 1993 due to two factors: DU use authorizations have been insufficient and the 422 TES has test priority with the limited numbers of DU rounds. The current DU authorization allows for the training of only five to ten pilots per year. In contrast, the requirement in the Weapons Instructor Course (WIC) defines a need to conduct DU employment during each student training mission. For the total classes, this equates to 6,700 rounds of DU per year. Without an increase to 6,700 rounds of DU annually, the A-10 WIC will not receive critical training in their primary weapon system, and hence, all A-10 pilots in the CAF will not fully understand the true capabilities and limitations of their aircraft armament.

CHAPTER 2

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

CHAPTER 2
DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Air Force proposal to increase the expenditure of DU rounds fired on Target 63-10. The proposal would permit the 422 TES and the 66 WPS to become fully proficient and familiar with all facets of the characteristics of DU munitions. Under the proposed action (Alternative A[1]), the Air Force would increase the annual number of DU rounds from the existing authorization of 7,900 DU rounds to 19,000 (12,300 rounds for the 422 TES and 6,700 rounds for 66 WPS training use).

In addition to the proposed action, the Air Force analyzed two alternatives. Alternative B would authorize an additional 7,400 DU rounds to be fired on Target 63-10. These 7,400 rounds are necessary for the development and testing of A-10 tactics used by the TD&E and TIP units at Nellis AFB. The DU rounds needed by TD&E and TIP would total 3,700 each. Under Alternative B, the Air Force would authorize a total annual expenditure of 26,400 DU rounds. As required by NEPA and CEQ, Alternative C consists of no action. Under Alternative C (no action), the Air Force would not increase the annual expenditure of DU rounds. No change from current conditions (i.e., 7,900) would occur as a result of implementing the no-action alternative.

2.1 ALTERNATIVE IDENTIFICATION PROCESS

The purpose and need for the action drove the alternative identification process. This process considered three alternatives:

- Relocate the DU testing and training programs;
- Use another material for the ammunition; and
- Modify the amount of DU ammunition expended.

The following addresses each of these alternatives. As this assessment demonstrates, viable and reasonable alternatives are limited.

Relocate DU Testing and Training Programs. As established by the purpose and need, the Air Force needs to increase the use of DU rounds to ensure combat readiness of the A-10 weapon system. Without this increase, A-10 aircrews risk mission failure. Thus, any alternative needs to achieve the goal of providing adequate DU rounds for testing by the 422 TES, and training by the 66 WPS for A-10 aircrews. To achieve this goal at a location other than Nellis AFB and NTTR would not be reasonable. First, the elements of the 422 TES and 66 WPS that conduct DU testing and training represent the sole practitioners of these activities. No other CAF peace time units fire DU. Second, these units are unique and integral to the overall testing and training programs based at Nellis AFB. Separating the A-10 elements of these

[1] Hereafter referred to as the proposed action.

programs would result in a loss of synergy and effectiveness. Third, only the 422 TES and 66 WPS at Nellis AFB are authorized to employ the DU rounds. No other unit at other locations can provide employment tactics to units by way of WIC graduates. Lastly, Target 63-10 at NTTR comprises the only target in the United States licensed for air-to-ground firing of DU. It offers proximity to Nellis AFB, the 422 TES, and 66 WPS for A-10 test and training. Moving the testing and training programs elsewhere would require development, authorization, and management of a new DU target area. Targets would need to be acquired and subsequently disposed of in an authorized manner. Such expenditures would not be reasonable and would cause delays in the program. For these reasons, an alternative location for firing DU rounds was not viable.

Use of Other Materials. DU is ideal for use in armor penetrators. These solid metal projectiles have the speed, mass, and physical properties to perform exceptionally well against armored targets. As described earlier, testing showed that DU provides a substantial performance advantage, well above other competing materials. This allows DU penetrators to defeat an armored target at a significantly greater distance than tungsten penetrators or high explosive anti-tank rounds because of improved ballistic properties. When they strike a target, tungsten penetrators blunt while DU exhibit a self-sharpening property. DU ammunition routinely provides a 25 percent increase in effective range over traditional kinetic energy rounds. Thus, an alternative material to the DU would not meet the need and the Air Force eliminated it from consideration.

Modify the Amount of DU Ammunition Expended. As demonstrated in the discussion of purpose and need, current authorizations for DU rounds fail to fulfill test and training requirements. Indeed, the current authorization for 7,900 DU rounds constitutes only 42 percent of the basic test and training requirements. Any increase less than the 19,000 DU rounds needed to meet the requirements would continue to result in limitations to critical A-10 test and training programs. By failing to meet these needs, such an alternative would not be reasonable to carry forward.

Authorization for DU rounds beyond the 19,000 would meet the need for and provide support of TD&E and TIP programs and fulfill current needs. While the TD&E and TIP programs are not specific requirements at this time, these activities may become integrated into A-10 testing and training. Therefore, an alternative including both the basic test and training requirements, as well as TD&E and TIP programs, meets the test of reasonableness and warrants detailed analysis.

Alternatives Carried Forward for Detailed Analysis. The Air Force identified the proposed action, a further increase in DU expenditure for TD&E and TIP testing alternative (Alternative B), and the no-action alternative (Alternative C) as alternatives warranting further analysis. The proposed action, increase DU authorization to 19,000 rounds, fulfills all current test and training requirements. Alternative B fulfills the requirement for testing and training by the 422 TES and the 66 WPS and adds the option of further testing by tactics units, TD&E and TIP. Under the no-action alternative, no increase would occur

at this time, and the need for this action would not be met. Table 2-1 provides an overall comparison of the quantities of DU and HEI rounds expended under each alternative.

Table 2-1 Baseline and Proposed Use of DU Rounds/Combat Mix at Target 63-10

	DU Rounds	*HEI Rounds*	*Total Combat Mix*
Proposed Action (Alternative A)	19,000	3,800	22,800
Alternative B	26,400	5,280	31,680
No Action/Baseline (Alternative C)	7,900	1,600	9,500

2.2 PROPOSED ACTION

The Air Force has determined that the current expenditure of DU rounds at NTTR is not adequate for the test and training needs of the 422 TES and 66 WPS. To meet this goal, the proposed action would implement an increase in the amount of DU munitions authorized to be fired on Target 63-10 at NTTR (refer to Figure 1-2). Under the proposed action, the Air Force would increase the annual use of 30-mm DU rounds in a combat mix at NTTR Target 63-10 (refer to Table 2-1). As noted previously, combat mix contains armor-piercing incendiary DU rounds mixed with HEI rounds in a 5 to 1 ratio. This proposal would increase total combat mix rounds from 9,500 to 22,800 annually, and authorize an increase in the annual use of DU rounds from 7,900 to 19,000. Use of HEI rounds would expand from 1,600 to 3,800. These increases would provide the 422 TES and the 66 WPS graduates with sufficient DU rounds to accomplish essential training requirements. The 422 TES needs to fire 12,300 DU rounds, and the 66 WPS training needs require 6,700 DU rounds annually. Overall, these authorizations would represent a 140 percent increase in the use of DU rounds.

By implementing the proposed action, the Air Force proposes to enable 422 TES aircrews to appropriately test gun delivery hardware/software upgrades that employ the 30-mm DU rounds. The 422 TES would continue its primary A-10 OFP test activities and expand them to fulfill all requirements. OFP testing of all software upgrades to the A-10 LASTE requires analysis for all weapons delivery modes on a biennial basis with additional testing typically occurring during the interim years. OFP testing includes High Angle Strafe (HAS) conducted at five slant ranges and four dive angles, with low angle strafe (LAS) conducted at three slant ranges and two dive angles. Combined, these tests generate 26 data points to characterize software and system performance (Table 2-2). Six repetitions are required at each test point to achieve a 90 percent confidence level for reliability. Each repetition fires 66 combat mix rounds for a total output of 8,600 DU and 2,442 HEI rounds. Additionally, testing validates code changes in the software, typically occurring between major OFP testing years. However, it can be accomplished within the same fiscal year as OFP testing. Experience and engineering estimates demonstrate that at least 11 test points are required to accomplish the additional testing using the same methodology as OFP testing, thereby generating a DU requirement of 3,700 rounds annually. Therefore, to fulfill the maximum annual OFP and additional testing requirements, the 422 TES would need to fire 12,300 DU rounds. Timing and duration of testing events would continue to vary throughout the year.

Depending upon the testing regime, the amount of passes and repetitions performed on any given day could differ. However, the nature of testing tends to limit the amount of ammunition fired at any single time. Furthermore, testing events would actually occur on relatively few days per year.

Table 2-2 Annual DU Test and Training Requirements – Alternative A (Proposed Action)

Activity	*Test Points/ Sorties*	*Passes Required*	*Combat Mix Rounds per Pass*	*Total Rounds Fired*	*DU (Combat Mix)*	*HEI*	*DU Rounds Requirement* [1]
OFP Testing	37	6	66	14,652	12,210	2,442	12,300
A-10 Weapons School	16	5	100	8,000	6,667	1,333	6,700
Total				**22,652**	**18,877**	**3,775**	**19,000**

[1] Rounded up to nearest 100

The proposed action would also permit aircrews from the 66 WPS to train in the A-10 with their primary weapon system–the 30-mm GAU-8/A Gatling gun–against their primary target (i.e., armored vehicles and tanks). Current limits on DU authorizations make this requirement unachievable. Since DU comprises the primary munition of the A-10 in a combat environment, the A-10 WIC syllabus requires DU employment during one student training mission. Under the proposed action, the 66 WPS would produce ten graduates per year. To achieve this result, the students would fly a total of 16 sortie-operations per year. During each sortie-operation, five passes at Target 63-10 would be made, with roughly 100 rounds of combat mix expended per pass. Given the total of 500 rounds of combat mix per sortie-operation, and the 5 to 1 ratio of DU to HEI in the combat mix, the 66 WPS would expend an annual total of 6,700 DU and 1,333 HEI rounds. The duration and timing of training activities using DU ammunition would vary within a given year and over the years. On the low end of the spectrum, a single sortie-operation would perform its five passes at the target in a day, firing 500 rounds. Although actual firing would take only a few seconds, the passes would occur over a period of several minutes. At the high end, a multi-ship (4 aircraft) operation could fire approximately 2,000 to 3,000 rounds over the course of an hour. Still, the maximum number of rounds fired during a single pass would remain 500.

Increased use of DU rounds would not measurably alter sortie-operations on NTTR or for Range 63. Current sortie-operations for all aircraft on NTTR range from 200,000 to 300,000 annually, with total A-10 sortie-operations ranging from about 9,700 to 14,500 per year. Total annual A-10 use of Range 63 varies from 1,139 to 1,708 sortie-operations with less than 3 percent involved in firing DU rounds. Under the proposed action, the number of sortie-operations would not noticeably increase over baseline levels. At a maximum, sorties operations on Target 63-10 could increase by about 1.5 percent, but they would be derived from other similar test and training activities on Range 63. The 422 TES and 66 WPS currently fly a similar number of sortie-operations in Range 63, but do not expend as much DU ammunition.

2.3 ALTERNATIVE B

Alternative B would enhance testing by annually increasing the use of DU by 18,500 rounds, with 30-mm HEI accounting for 3,680 rounds of the increase. This alternative would result in a 234 percent increase in DU rounds and a total of 31,680 rounds of combat mix (26,400 DU and 5,280 HEI) being expended on the target (Table 2-3). This alternative would meet the test and training requirements identified for the proposed action and also allow additional testing by TD&E and TIP. TD&E develops, evaluates, and disseminates tactics to support A-10 units. Tactics are the procedures and/or techniques used to effectively employ aircraft and weapons to gain an advantage over the enemy. TD&E and TIP work consistently to detect and correct tactical deficiencies that are critical to the effectiveness of combat aircraft. DU requirements for TD&E and TIP vary with each test, but the Air Force estimates that 3,700 rounds would be needed for each program. As noted for the proposed action, Alternative B would not measurably alter total sortie-operations at NTTR or on Range 63. Enhanced use of DU ammunition could increase sortie-operations at Target 63-10 by about 1.5 to 3 percent in a given year. However, these sortie-operations would be derived from similar A-10 activities already conducted on Range 63.

Table 2-3 Enhanced Annual DU Test and Training Requirements – Alternative B

Activity	*Test Points/Sorties*	*Passes Required*	*Combat Mix Rounds per Pass*	*Total Rounds Fired*	*DU (Combat Mix)*	*HEI*	*DU Requirement*[1]
OFP Testing	37	6	66	14,652	12,210	2,442	12,300
TD&E	11	6	66	4,356	3,630	726	3,700
TIP	11	6	66	4,356	3,630	726	3,700
A-10 Weapons School	16	5	100	8,000	6,667	1,333	6,700
Total				**31,364**	**26,077**	**5,227**	**26,400**

[1] Rounded up to nearest 100

2.4 NO-ACTION ALTERNATIVE (ALTERNATIVE C)

In conformance with CEQ regulations (40 CFR 1502.1(d)), this EA also analyzes the no-action alternative. Under the no-action alternative (Alternative C) there would be no change in current operations associated with Target 63-10, and DU use would continue to be expended at 7,900 rounds annually for testing and training (refer to Table 2-1).

2.5 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

This EA examines the potential environmental impact of increasing the authorization for DU ammunition on Target 63-10 at NTTR. The analysis considers the potential effects of the proposed action, and compares those to current conditions under the no-action alternative. This EA also analyzes an additional

alternative: enhanced use of DU at NTTR. The steps involved in the EIAP used to prepare this EA are outlined below.

1. **Announce that an EA will be prepared.** A Notice of Intent was published January 24, 2006, in the *Federal Register*.

2. **Conduct scoping.** Scoping was the first step in identifying relevant issues to be analyzed in depth and eliminating issues that were not relevant. For this process, comments were solicited from the public in the region associated with the proposed action. This includes individuals who had expressed interest in previous Nellis AFB actions; local governments; federal and state agencies; American Indian tribes; and interest groups. During the week of January 24th, 2006, the Air Force sent out Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) letters to announce the Air Force's proposal and planned scoping meetings and to request input from government agencies (Appendix A contains the IICEP correspondence). Section 2.5.1 provides further information on the scoping process associated with this EA.

3. **Prepare a draft EA.** The first comprehensive document for public and agency review is this draft EA. After relevant issues were identified in scoping, the environmental impacts of each alternative, including the no-action, were analyzed. Results are described in this draft EA available on the World Wide Web at http://www.nellis.af.mil/pa.htm. and www.a7zpintegratedplanning.org.

4. **Announce that the draft EA has been prepared.** The Air Force placed an advertisement in the *Las Vegas Review Journal* on June 23, 2006 announcing the draft EA availability and public comment period.

5. **Provide a public comment period.** The goal during this process is to solicit comments concerning the analysis presented in the draft EA. The 30-day public comment period began with the date of notification of the document availability in the *Las Vegas Review Journal*.

6. **Prepare a final EA.** Following the public comment period, a final EA is prepared. This document is a revision (if necessary) of the draft EA, includes consideration of public comments, and provides the decisionmaker with a comprehensive review of the proposed action and alternatives and their potential environmental impacts.

7. **Issue a Finding of No Significant Impact.** The final step in the EIAP is signature of a FONSI, if the analysis supports this conclusion, or a determination that an Environmental Impact Statement would be required for the proposal.

2.5.1 Public Involvement

Scoping. The Air Force held scoping meetings in Las Vegas and Indian Springs (January 31 and February 1, 2006, respectively). An advertisement was placed a week before the meetings in the *Las Vegas Review Journal* and described the proposal and alternatives. The meetings, conducted in an open-house format were held from 6:30 p.m. to 8:30 p.m. A total of eight persons attended the two meetings, with a total of three comments received during the 30-day scoping period. The comments addressed the chemical composition of DU and whether it contained any plutonium, what percentage of rounds hit the targets, and to what depth the rounds penetrated the ground. These comments received consideration in the preparation of the draft EA.

Public Comment for draft EA. A notice announcing the public comment period of the draft EA was published on 23 June 2006 allowing for a 30 day public comment period. The document was sent to those persons which provided comments during scoping and also sent to local, state and federal agencies which may be interested in the proposed action. The comment period closed on 24 July 2006 and one letter was received from the Clark County Department of Air Quality and is provided in Appendix A of this document. No other comments were received.

2.5.2 Permit Requirements

This EA has been prepared in compliance with the National Environmental Policy Act, other federal statutes, such as the Clean Air Act (CAA), the Clean Water Act (CWA), Endangered Species Act (ESA), and the National Historic Preservation Act (NHPA), Executive Orders (EOs), and other applicable statutes and regulations. Table 2.4 provides other federal statutes and regulations that may apply to this proposal.

Table 2-4 Other Major Environmental Statutes, Regulations, and Executive Orders Applicable to Federal Projects

Environmental Resource	*Statutes*
Air	Clean Air Act of 1970 (PL 95-95), as amended in 1977 and 1990 (PL 91-604); USEPA, Subchapter C-Air Programs (40 CFR 52-99)
Noise	Noise Control Act of 1972 (PL 92-574) and Amendments of 1978 (PL 95-609); USEPA, Subchapter G-Noise Abatement Programs (40 CFR 201-211)
Water	Federal Water Pollution Control Act (FWPCA) of 1972 (PL 92-500) and Amendments; Clean Water Act of 1977 (PL 95-217); USEPA, Subchapter D-Water Programs (40 CFR 100-145); Water Quality Act of 1987 (PL 100-4); USEPA, Subchapter N-Effluent Guidelines and Standards (40 CFR 401-471); Safe Drinking Water Act (SDWA) of 1972 (PL 95-923) and Amendments of 1986 (PL 99-339); USEPA, National Drinking Water Regulations and Underground Injection Control Program (40 CFR 141-149)
Biological Resources	Migratory Bird Treaty Act of 1918; Fish and Wildlife Coordination Act of 1958 (PL 85-654); Sikes Act of 1960 (PL 86-97) and Amendments of 1986 (PL 99-561) and 1997 (PL 105-85 Title XXIX); Endangered Species Act of 1973 (PL 93-205) and Amendments of 1988 (PL 100-478); Fish and Wildlife Conservation Act of 1980 (PL 96-366); Lacey Act Amendments of 1981 (PL 97-79)
Wetlands and Floodplains	Section 401 and 404 of the Federal Water Pollution Control Act of 1972 (PL 92-500); USEPA, Subchapter D-Water Programs 40 CFR 100-149 (105 ref); Floodplain Management-1977 (EO 11990); Emergency Wetlands Resources Act of 1986 (PL 99-645); north American Wetlands Conservation Act of 1989 (PL 101-233)
Cultural Resources	National historic Preservation Act of 1966 (16 USC 470 et seq.) (PL 89-865) and Amendments of 1980 (PL 96-515) and 1992 (PL 102-575); Protection and Enhancement of the cultural Environment-1971 (EO 11593); Indian Sacred Sites-1966 ((EO 13007); American Indian Religious Freedom Act (AIRFA) of 1978 (PL 94-341); Antiquities Act of 1906; Archaeological Resources Protection Act (ARPA) of 1979 (PL 96-95); Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (PL 101-601)
Solid/Hazardous Materials and Waste	Resource Conservation and Recovery Act (RCRA) of 1976 (PL 94-5800), as Amended by PL 100-582; USEPA, subchapter I-Solid Wastes (40 CFR 240-280); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 USC 9601) (PL 96-510); Toxic Substances Control Act (TSCA) (PL 94-496); USEPA, Subchapter R-Toxic Substances Control Act (40 CFR 702-799); Federal Insecticide, Fungicide, and Rodenticide Control Act (40 CFR 162-180); Emergency Planning and Community Right-to-Know Act (40 CFR 300-399)
Environmental Justice	EO 12898-Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations; Protection of Children from Environmental Health Risks and Safety Risks (EO 13045)

2.6 MITIGATION MEASURES

In accordance with 32 CFR 989.22 the Air Force must indicate if any mitigation measures would be needed to implement the proposed action or any alternative selected as the preferred alternative under this

environmental assessment. For purposes of this EA, no mitigation measures are proposed to arrive at a finding of no significant impact if the proposed action were implemented at NTTR.

2.7 SUMMARY OF IMPACTS

This EA provides an analysis of the potential environmental impacts resulting from implementing the proposed action or alternative. Eleven resource areas were considered for analysis for the proposed action and alternatives. Of these, five resource areas were evaluated in detail to identify potential environmental consequences: air quality; soils and water resources; health and safety; hazardous and radioactive materials and waste; and biological resources. Section 3.1 details the resource areas not analyzed that would have no potential for being impacted by the proposed action and alternatives. Table 2-5 below summarizes and compares the potential impacts for the proposed action and alternatives. As this summary demonstrates, neither the proposed action nor either alternative would result in significant impacts.

Table 2-5 Comparison of Alternatives by Resource and Potential Environmental Consequences

Proposed Action (Alternative A) ***Annual Increase to 19,000 Rounds***	***Alternative B*** ***Annual Increase to 26,400 Rounds***	***No-Action (Alternative C)*** ***Maintain Annual use of 7,900 Rounds***
Air Quality		
• No increase in criteria air pollutants of CO, PM_{10}, $PM_{2.5}$, VOCs, SO_x, and NO_x. • Slightly more oxides of uranium would be released above the current levels, but maximum concentrations potentially extending off the DU Licensed Area and NTTR remains well below the standards for human health and safety. • Range workers and general public would not be exposed to concentrations close to levels potentially affecting human health.	• No increase in criteria air pollutants of CO, PM_{10}, $PM_{2.5}$, VOCs, SO_x, and NO_x. • Slightly more oxides of uranium would be released above the current levels, but maximum concentrations potentially extending off the DU Licensed Area and NTTR remains well below the standards for human health and safety. • Range workers and general public would not be exposed to concentrations close to levels potentially affecting human health.	• No increase in criteria air pollutants of CO, PM_{10}, $PM_{2.5}$, VOCs, SO_x, and NO_x. • Oxides of uranium are released during DU use. Even during the most intense use, concentrations remain well below the standards for human health and safety. The highest concentrations are in the vicinity of the target within the DU Licensed Area. • Range workers and general public are not exposed to concentrations close to levels potentially affecting human health.

Table 2-5 Comparison of Alternatives by Resource and Potential Environmental Consequences		
Proposed Action (Alternative A) Annual Increase to 19,000 Rounds	***Alternative B Annual Increase to 26,400 Rounds***	***No-Action (Alternative C) Maintain Annual use of 7,900 Rounds***
Soils and Water Resources		
• Limited soil contamination would remain in close proximity (about 1,300 feet) to Target 63-10. • Isolated contamination around penetrators and fragments would remain within the DU Licensed Area. • Groundwater and surface waters lack contamination and would pose no potential risk to people.	• Soil contamination would remain in close proximity (about 1,300 feet) to Target 63-10. • Isolated contamination around penetrators and fragments would remain within the DU Licensed Area. • Groundwater and surface waters lack contamination and would pose no potential risk to people.	• The effects of the no-action alternative would remain unchanged for soil and water resources. • Isolated contamination around penetrators and fragments would remain within the DU Licensed Area. • Groundwater and surface waters lack contamination and would pose no potential risk to people.
Health and Safety		
• Potential health hazards for inhalation, ingestion, and skin contact would not occur due to lack of contact with potentially contaminated or toxic air, soils, and water.	• Potential health hazards for inhalation, ingestion, and skin contact would not occur due to lack of contact with potentially contaminated or toxic air, soils, and water.	• Potential health hazards for inhalation, ingestion, and skin contact would not occur due to lack of contact with potentially contaminated or toxic air, soils, and water.
Hazardous Materials and Waste		
• 19,000 total rounds would remain within current capacities to store, use, or dispose of DU.	• 26,400 total rounds would remain within current capacities to store, use, or dispose of DU.	• The current allotment of 7,900 rounds are within current capacities to store, use, or dispose of DU.
Biological Resources		
• The DU rounds would affect the existing target area and licensed area which currently lacks significant quantities of plants and wildlife, thus resulting in no impact. • 19,000 additional rounds at Target 63-10 would not likely impact the desert tortoise. • The Biological Opinion for the desert tortoise covers Target 63-10 for use of DU.	• The additional DU rounds would affect the existing target area and licensed area which currently lacks significant quantities of plants and wildlife, thus resulting in no impact. • 26,400 additional rounds at Target 63-10 would not likely impact the desert tortoise. • The Biological Opinion for the desert tortoise covers Target 63-10 for increased use of DU.	• Existing rounds affect the existing target area and licensed area which currently lacks significant quantities of vegetation and wildlife due to its historic use. • The Biological Opinion for the desert tortoise covers Target 63-10 for use of DU.

CHAPTER 3

DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

CHAPTER 3

DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ANALYSIS APPROACH

NEPA requires focused analysis of the areas and resources (e.g., air quality) potentially affected by an action or alternative. It also indicates that an environmental assessment should consider, but not analyze in detail, those areas or resources not potentially affected by the proposal. Therefore, an EA should not be encyclopedic; rather, it should try to be succinct. This EA focuses on those resources that would be affected by increased use of DU munitions on the NTTR Target 63-10.

CEQ regulations (40 CFR Parts 1500-1508) for NEPA also require an EA to discuss impacts in proportion to their significance and present only enough discussion of other than significant issues to show why more study is not warranted. The analysis in this EA considers the current conditions of the affected environment and compares those to conditions that might occur should any of the alternatives be implemented.

Affected Environment

Evaluation and analysis of the proposed action and alternatives indicate that exposure of the environment to DU contamination and associated effects forms the driver for potential impacts. No other aspects of the proposed action or alternatives pose an issue. Therefore, the affected environment analyzed in this EA centers on Target 63-10 and the localized resources contained within and adjacent to the area.

Resources Analyzed

Table 3-1 presents the results of the process of identifying resources considered in this EA. Based on evaluation of the affected environment and information derived through scoping, this assessment evaluates, in detail, air quality; soils and water resources; health and safety; hazardous materials and waste; and biological resources. These resources have shown to be potentially affected by implementation of the proposed action and alternatives. An explanation of resources eliminated from further analysis follows the table.

Table 3-1 Resources Analyzed in the Environmental Impact Analysis Process		
Resources	***Potentially Affected by DU Contamination***	***Analyzed in this EA***
Air Quality	Yes	Yes
Soils and Water Resources	Yes	Yes
Health and Safety	Yes	Yes
Hazardous Materials and Waste	Yes	Yes
Biological Resources	Yes	Yes
Airspace Management/Operations	No	No
Cultural Resources	No	No
Socioeconomics/Environmental Justice	No	No
Transportation	No	No
Noise	No	No
Land Management and Use	No	No

Both the resources analyzed and those excluded have been addressed in previous documents, including the *Depleted Uranium Management Plan, Nevada Test and Training Range Target 63-10* (Air Force 2000), *Environmental Assessment for Resumption of Use of Depleted Uranium Rounds at Nellis AFR* (Air Force 1998b), *Integrated Natural Resources Management Plan Nellis AFB, Nellis AFR* (Nellis AFB 1999), *Inventory for Rare, Threatened, Endangered, and Endemic Plants and Unique Communities on Nellis Air Force Bombing and Gunnery Range, Clark, Lincoln, and Nye Counties, Nevada* (The Nature Conservancy 1997), *Renewal of the Nellis Air Force Range Land Withdrawal Legislative Environmental Impact Statement* (Air Force 1999), *Memorandum of Understanding DE-GM08-98NV13457, Department of Energy and Nellis AFB* (Air Force 1998a), *NTTR Depleted Uranium Target Disposal Environmental Assessment* (Air Force 2005).

Resources Eliminated from Further Analysis

The Air Force assessed numerous resources (refer to Table 3-1) that, in accordance with CEQ regulations, warranted no further examination in the EA. The following describes the rationale for this approach.

Airspace Management/Operations: Increased use of DU rounds would not measurably alter sortie-operations on NTTR or for Range 63 under the proposed action and/or alternatives. Based on an evaluation of historic use of NTTR, sortie-operations on NTTR range from 200,000 to 300,000 annually, with A-10 sortie-operations ranging from about 9,700 to 14,500 per year. Currently, A-10 use of Range 63 varies from 1,139 to 1,708 sortie-operations with less than 3 percent involved in firing DU rounds, while activities over Target 63-10 may increase slightly (1.5 to 3 percent), total sortie-operations for Range 63 or NTTR would not change. The additional DU firing activities on Range 63 would be derived from existing sortie-operations. Additional sorties from Nellis AFB would not increase. Therefore, this resource has been eliminated from further analysis.

Cultural Resources. Target 63-10 has been a strafing target for DU rounds, HEI rounds, and target practice rounds since 1974. Prior to 1974, the target existed, but records do not indicate whether it was used for strafing or conventional bombs, but it is believed that both were used on the target. The impacts from such long-term use make it unlikely that any pre-existing resources would be intact. Efforts to identify and evaluate cultural resource properties for a previous proposal affecting Target 63-10 were initiated, in accordance with 36 CFR 800.4, in an existing data review by the Nellis Archaeologist/ Cultural Resource Manager in May 1997 (Air Force 2005). No cultural resources surveys have been conducted in or near the Range 63 target area. In those portions of this area where there are no impacts (i.e., well away from Target 63-10), there is low-to-medium potential for the presence of lithic debris scatters, presumably associated with opportunistic hunting and gathering activities. The sites probably represent short-term use locales, and would not likely be considered to be properties eligible for nomination to the National Register of Historic Places (NRHP) (Air Force 1998b). Given this factor, the small size of the DU rounds, and the focus of firing on and around the disturbed target array, the probability of impacts to cultural resources would be negligible. No ground-disturbing activities other than penetration by rounds and clean-up by hand would occur as a result of the proposed action or alternatives. The Nevada State Historic Preservation Office (SHPO) has previously agreed with this assessment (Air Force 2005). Therefore, the implementation of the proposed action or alternatives would not affect cultural resources.

Nellis AFB initiated a Native American Program in 1996 as a foundation for government-to-government consultation. Activities have included Annual Meetings, NTTR field trips, participation in professional meetings, and the formation in 1999 of a Document Review Committee that reads and comments on cultural resources reports and environmental assessments prior to SHPO reviews. In a review of a pervious document that assessed impacts at Target 63-10 (Air Force 2005), the committee recommended that the consolidated group of tribes and organizations accept the findings of the EA.

Socioeconomics/Environmental Justice. Socioeconomics focuses on the general features of the local economy that could be affected by the proposed action or alternatives. Because no new jobs would be created or eliminated by implementation of the proposed action or alternatives, nor would the affected area experience any economic growth or loss through implementation of the proposed action or alternatives, this resource has been eliminated from further discussion.

Environmental justice addresses disproportionate effects of a federal action on low-income or minority populations. Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* ensures the fair treatment and meaningful involvement of all peoples regardless of race, color, national origin, or income with respect to development, implementation, and enforcement of environmental laws, regulations, and policies. The existence of disproportionately high and adverse impacts depends on the nature and magnitude of the effects identified for each of the individual resources. The DU licensed area is a closed, secure site situated well away (more than 10 miles) from communities

of any kind. As such, no potential to affect people of any ethnicity or income level would exist. Since neither minority nor low-income groups would be affected disproportionately by implementation of the proposed action or alternatives, environmental justice was eliminated from further analysis.

Transportation. Transportation would not be affected by the proposed action or alternatives. Transportation for target disposal was analyzed in *Nevada Test and Training Range Depleted Uranium Target Disposal Environmental Assessment* (Air Force 2005). No part of the proposed action or alternatives employs or influences transportation or the current procedures for range clean-up. These procedures would not change in any way with implementation of the proposed action or alternatives. Targets currently last up to 2 or 3 years, so increased DU use might require more rapid replacement. This situation could increase the number of trips to the DU library and between the target area and library. However, the few additional annual trips would fall well within the range of activities on NTTR and would be consistent with the findings of the previous environmental assessment.

Noise. Noise is often defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, diminishes the quality of the environment, or is otherwise annoying. Response to noise varies by the type and characteristics of the noise source, distance from the source, receptor sensitivity, and time of day. Noise can be intermittent or continuous, steady or impulsive, and it may be generated by stationary or mobile sources. Noise generated from activities associated with the proposed action or alternatives would not measurably change the local noise environment. The annual increase in A-10 ammunition expenditures on Target 63-10 would increase impulsive noise from the GAU-8 cannon. However, the rate of fire of the A-10's cannon would keep the noise brief and localized. The increases in use would add only a few minutes of this noise per year. Since Target 63-10 lies well away from any communities, the change would be insignificant. This minor, brief increase would not be noticed in an environment already affected by hundreds of similar aircraft operations and ordnance deliveries that occur daily at NTTR.

Land Management and Use. Land management and use of Target 63-10 would not change from existing use since the DU-licensed area falls within land withdrawn for military purposes and has supported military activities for decades. The proposed action and Alternative B both represent an increase in similar activities and materials that have been in use since the 1970s. Effects to this resource under the proposed action or alternatives would not change the existing conditions; therefore, they are not analyzed in this EA.

3.2 AIR QUALITY

For this analysis, air quality must be considered relative to standard criteria pollutants and to DU oxides. Understanding air quality for each of these types of emissions requires knowledge of: 1) applicable regulatory requirements; 2) types and sources of air quality pollutants; 3) location and context of the affected area; and 4) existing setting.

3.2.1 Affected Environment

Standard Criteria Pollutant Emissions

Regulatory Requirements

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. The CAA and its subsequent amendments (CAAA) established the National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 and 2.5 microns (PM_{10} and $PM_{2.5}$), and lead (Pb). These federal NAAQS limits (Table 3-2) represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare with a reasonable margin of safety.

Based on measured ambient criteria pollutant data, the United States Environmental Protection Agency (EPA) designates all areas of the U.S. as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. An area that is currently in attainment, but was formerly a nonattainment area is termed a maintenance area. An area is often designated as unclassified when there are insufficient ambient criteria pollutant data for the EPA to form a basis for attainment status. Unclassified areas are typically rural or remote, with few sources of air pollution. While Clark County is still considered in nonattainment for CO, the county has not experienced any exceedence of nearly 6 years and is currently seeking a re-designation by the EPA to a maintenance status for CO.

The CAA requires each state to develop a State Implementation Plan (SIP) which is its primary mechanism for ensuring that the NAAQS are achieved and/or maintained within that state. According to plans outlined in the SIP, designated state and local agencies implement regulations to control sources of criteria pollutants. The CAA provides that federal actions in nonattainment and maintenance areas do not hinder future attainment with the NAAQS and conform with the applicable SIP (i.e., Nevada SIP). There are no specific requirements for federal actions in unclassified or attainment areas. However, all federal actions must comply with all state and local regulations.

Table 3-2 Clark County, State of Nevada, and National Ambient Air Quality Standards

		Clark County Standards	*Nevada Standards*[A]	*NAAQS*[B]	
	AVERAGING TIME	CONCENTRATION CENTER	CONCENTRATION CENTER	PRIMARY CENTER[C,D]	SECONDARY CENTER[C,E]
Ozone (O_3)	8 Hours	157 μg/m^3 (0.08 ppm)	157 μg/ m^3 (0.08 ppm)	157 μg/ m^3 (0.08 ppm)	Same as Primary
	1 Hour	235 μg/ m^3 (0.12 ppm)	235 μg/ m^3 (0.12 ppm)	235 μg/ m^3 (0.12 ppm)	Same as Primary
Ozone-Lake Tahoe Basin, #90		--	190 μg/ m^3 (0.10 ppm)	--	--
Carbon Monoxide (CO) less than 5,000 ft above MSL	8 Hours	10 mg/m3 (9.0 ppm)	10 mg/m3 (9.0 ppm)	10 mg/ m^3 (9.0 ppm)	None
Carbon Monoxide at or greater 5,000 ft above MSL		--	6.67 mg/ m^3 (6.0 ppm)		
Carbon Monoxide at any elevation	1 Hour	40 mg/ m^3 (35 ppm)	40 mg/ m^3 (35 ppm)	40 mg/ m^3 (35 ppm)	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	100 μg/ m^3 (0.05 ppm)	100 μg/ m^3 (0.05 ppm)	100 μg/ m^3 (0.05 ppm)	Same as Primary
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	80 μg/ m^3 (0.03 ppm)	80 μg/ m^3 (0.03 ppm)	80 μg/ m^3 (0.03 ppm)	None
	24 Hours	365 μg/ m^3 (0.14 ppm)	365 μg/ m^3 (0.14 ppm)	365 μg/ m^3 (0.14 ppm)	
	3 Hours	1,300 μg/ m^3 (0.5 ppm)	1,300 μg/ m^3 (0.5 ppm)	None	1,300 μg/ m^3 (0.5 ppm)
Particulate Matter PM_{10}	Annual Arithmetic Mean	50 μg/ m^3	50 μg/ m^3	50 μg/ m^3	Same as Primary
	24 Hours	150 μg/ m^3	150 μg/ m^3	150 μg/ m^3	
Particulate Matter $PM_{2.5}$[F]	Annual Arithmetic Mean	15 μg/ m^3	15 μg/ m^3	15 μg/ m^3	Same as Primary
	24 Hours	65 μg/ m^3	--	65 μg/ m^3	
Lead (Pb)	Quarterly Arithmetic Mean	1.5 μg/ m^3	1.5 μg/ m^3	1.5 μg/ m^3	Same as Primary
Hydrogen Sulfide (H_2S)	1 Hour	--	112 μg/ m^3 (0.08 ppm)	--	--
Visibility	Observation	In sufficient amount to reduce the prevailing visibility to less than 30 miles when humidity is less than 70 percent	--	--	--

Notes *μg/m = micrograms per cubic meter of air; ppm = part per million by volume.*
A: These standards must not be exceeded in areas where the general public has access.
B: These standards, other than for ozone and those based on annual averages, must not be exceeded more than once per year. The ozone standard is attained when the expected number of days per calendar year with a maximum hourly average concentration above the standard is equal to or less than one.
C: Concentration is expressed first in units in which it was adopted and is based upon a reference temperature of 25° C and a reference pressure of 760 mm of mercury. All measurements of air quality must be corrected to a reference temperature of 25° C and a reference pressure of 760 mm of Hg (1,013.2 millibars); ppm in this table refers to ppm by volume, or micromoles of regulated air pollutant per mole of gas.
D: National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.
E: National secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a regulated air pollutant.
F: Final regulatory procedures were announced in 2004, the entire state of Nevada is in attainment for this criteria pollutant. However, all air emissions inventory for 2003 do not include calculation of this criteria pollutant since no ruling has been reached.
Source: CCAQM 2004 and NDEP 2004.

The CAA also establishes a national goal of preventing degradation or impairment in any federally-designated Class I area. As part of the Prevention of Significant Deterioration (PSD) program, mandatory Class I status was assigned by Congress to all national parks, national wilderness areas, memorial parks greater than 5,000 acres and national parks greater than 6,000 acres. In Class I areas, visibility impairment is defined as a reduction in visual range and atmospheric discoloration. Stationary sources, such as industrial complexes, are typically an issue for visibility within a Class I PSD area.

Types and Sources of Air Quality Pollutants

Pollutants considered in the analysis for this EA comprise the criteria pollutants measured by state and federal standards. These include SO_2 and other compounds (i.e., oxides of sulfur or sulfur oxide [SO_x]), volatile organic compounds (VOCs), which are precursors to (indicators of) O_3; nitrogen oxides (NO_x), which are also precursors to O_3 and include NO_2 and other compounds; CO and PM_{10}. The types of activities associated with the proposed action and alternatives generate emissions primarily from aircraft and the aerosolization of DU upon impact to the target. Airborne emissions of hydrogen sulfide (a state-regulated pollutant), lead, and $PM_{2.5}$ are not included because there are no known significant sources for these emissions in the region, nor any anticipated under the proposed action or alternatives.

Location and Context of Affected Area

The most focused aspects of the proposed action and Alternative B occur within a single general area centered on Target 63-10 within the South Range of NTTR. This portion of NTTR (refer to Figure 1-2) lies approximately 50 miles northwest of Las Vegas and 12 miles northeast of Indian Springs. The affected area within NTTR consists of unpopulated lands lacking notable sources of emissions situated north of Las Vegas Valley Hydrographic Basin 211 within Clark County. This basin officially defines the boundaries of the Las Vegas Valley. The valley is situated on the edge of the Mojave Desert, experiences a typical arid climate, and covers approximately 500 square miles. While not encompassing the affected area of the proposed action and alternatives, this valley is in CO, 8-hour ozone, and PM_{10} nonattainment, particularly in the city of Las Vegas (CCAQM 2004). However, Indian Springs is in attainment for all criteria pollutants (CCAQM 2004).

Existing Air Quality Setting

With the exception of its very southern tip nearest Las Vegas, the NTTR is unclassified for state and federal air quality standards. Target 63-10 and the DU library lie within this unclassified area. For this reason, neither the EPA nor the Clark County and Nevada SIPs identify any air quality issues for the area encompassing the 63-10 target array. However, criteria pollutant emissions are examined under the proposed action and alternatives due to the proximity of the affected environment to the nonattainment areas.

Baseline Emissions for NTTR

NTTR covers approximately 2.9 million acres and is composed of dozens of ranges, hundreds of target areas and complexes, and numerous facilities. Target 63-10 lies within Range 63 (refer to Figure 1-2) located in the southern extreme of the NTTR South Range. Stationary source emissions at NTTR originate primarily from on-range facilities equipment and ground maintenance found at Creech AFB, Point Bravo, Silver Flag Alpha, Tonopah Test Range, Tonopah Electronic Combat Range, and Tolicha Peak Electronic Combat Range. Total emissions at the NTTR are presented in Table 3-3. NTTR contributes less than 1 percent to the total CO, VOCs, PM_{10}, and SO_2 emissions and approximately 11 percent of NO_x emissions in Clark County.

Table 3-3 Baseline Air Emissions (tons/year)

	CO	***VOCs***	***NO_x***	***SO_x***	***PM_{10}***
Nellis AFB	18.316	27.150	34.584	3.73	33.404
Creech AFB	0.109	8.197	0.506	0.931	0.035
NTTR	4.88	3.44	22.07	16.81	3.02

Source: 2004 Air Emissions Inventory (Nellis AFB 2004a,b,c) for: a) Nellis Main Base; b) Creech AFB (formerly Indian Springs Air Force Auxiliary Field and includes Point Bravo and Silver Flag Alpha); and c) NTTR (includes Tonopah Test Range, Tolicha Peak Electronic Combat Range, and Tonopah Electronic Combat Range).

No PSD Class I areas lie within 50 miles of Target 63-10. The closest Class I Area to Target 63-10 is Death Valley National Park, which overlaps the California/Nevada border, about 60 miles from Target 63-10. Zion National Park, in Utah, and Grand Canyon National Park in Arizona, are over 200 miles east of the proposed action and alternatives. The combination of low total emissions from NTTR operations and the distance to the PSD Class I area, indicates that visibility is not impaired, especially since most emission sources (aircraft) are mobile and transitory.

DU Emissions

In addition to the more traditional NEPA air quality analyses involving criteria air pollutants, DU use can also emit airborne DU oxides. DU oxides are formed when the bullet penetrates a target and burns upon impact. The oxides formed are predominately U_3O_8 and UO_3 and are considered nearly insoluble. Like traditional air quality analyses, assessment of emissions from DU use requires knowledge of:
1) applicable regulatory requirements; 2) types and sources of air quality pollutants; 3) location and context of the affected area; and 4) existing setting.

Regulatory Requirements

Regulatory requirements for DU oxide emission focus on inhalation hazards and exposure to humans. When assessing contamination concentration levels to a potentially-exposed party, the regulatory exposure limit varies upon the type and duration of the party exposed. Regulatory requirements afford

the general public a greater level of protection than an employee working around a substance for an entire work shift, since the latter must use protective measures to prevent exposure risks. Similarly, these measures provide more protection than received by an employee occasionally exposed only for short periods of time. For the general public, the Agency for Toxic Substances and Disease Registry (ATSDR) uses standards known as minimum risk levels (MRL) for populations potentially exposed to a contaminate. Workers operating routinely in an atmosphere regularly exposed to DU oxides employ Occupational Safety and Health Administration (OSHA) standards. These standards reflect that such personnel are subject to exposure only at work and only for an 8-hour shift while employing protective measures. Under these conditions, the standard consists of the OSHA permissible exposure level (PEL), an 8-hour time weighted average. Finally, personnel subject to short-term exposures of less than 15 minutes and fewer than four times a day use higher standards called Short Term Exposure Limits (STEL).

In addition to exposure, the chemical properties of the contaminate must also require consideration. In the case of oxides of uranium, a key property is whether the chemical is soluble in water or insoluble. Insoluble compounds do not dissolve in water and when they enter the body are more easily expelled than soluble compounds. Because of the body's ability to reject insoluble compounds, ATSDR applies a higher standard to insoluble compounds than those used for soluble compounds. However, DU produces predominantly (between 92 and 100 percent) insoluble oxides of uranium, so MRLs for insoluble compounds represent the most important consideration with regard to human health and safety.

ATSDR's MRL for intermediate exposure to insoluble uranium oxides is 8 micrograms per cubic meter ($\mu g/m^3$). This measure (8 $\mu g/m^3$) represents a conservative standard for the nature of DU-oxide generating activities at Target 63-10, reflecting an intermediate exposure over an 8-hour period for between 14 days and less than 364 days. However, as described in Chapter 2, the Air Force would fire DU rounds over a duration ranging from a few minutes to an hour. With a firing rate of 3,900 rounds per minute, the 30-mm cannon on the A-10s would fire for only seconds at a time during test and training operations. Given these factors, this standard is used for the analysis of potential exposure to the general public in the affected area.

This analysis must also consider range workers on NTTR. Although safety procedures preclude the presence of workers near the target during firing, they may be in the general area. OSHA has developed standards more applicable to those working around aerosolized uranium. However, the OSHA standard is 250 $\mu g/m^3$ for insoluble uranium. Range workers are composed of active duty military, civilian employees, and contracted personnel.

The aerosolized U_3O_8 and UO_3 are considered insoluble by ATSDR (ATSDR 1999) and many other studies. Insoluble compounds do not dissolve in water and when they enter the body, they are more easily expelled than soluble compounds. While most reports indicate that uranium oxides are insoluble, some cite that the oxides are partially soluble by the fluid of the lungs, but take a very long time to

dissolve. For comparison purposes, the ATSDR's MRL is 4 µg/m^3 for intermediate exposure to soluble oxides of uranium and the OSHA standard for workers is 50 µg/m^3.

Types and Sources of DU Air Pollutants

Among the physical characteristics that make the DU round a valued weapon are its high density and low melting point which allow it to penetrate hardened steel burn readily. The pyrophoric round hitting a target heats up sufficiently to combust upon impact. The phenomenon produces air emissions in the form of oxides of DU. The most common oxides emitted include U_3O_8 and UO_3 with lesser amounts of U_4O_9 and a small amount of a hydrated form of UO_3 (Parkhurst *et al.* 2004).

Typically, 10 to 35 percent of the DU round aerosolizes upon impact, of the amount aerosolized, 60 to 69 percent falls within the respirable particle range (Harley *et al.* 1999). The density of uranium particles is over seven times that of soil (Harley *et al.* 1999); larger particles would not stay in suspension for long periods of time. Smaller particles could remain suspended for some time in relatively still air. Calculations indicate the larger particles would settle in about 40 seconds to several minutes; medium-sized particles would settle within an hour or two; and the real fine-sized particles could, under unique calm conditions, remain suspended for over a day.

Location and Context of Affected Area

The context of DU air quality is the source of the air pollutant and the location of potential receptors. Figure 3-1 shows the location of the source, Target 63-10 and the potential receptors. The general pubic is not allowed on NTTR, so the closest off-range receptors are the correctional facilities along highway US-95. The next closest is the town of Indian Springs. Range workers may be found closer to Target 63-10, but for safety reasons are not allowed on Range 63 while weapons are being fired. Range 63-BB, Box Canyon Staging Area, and Point Bravo are the nearest areas where range workers are allowed when DU is being deployed.

Existing DU Air Quality Setting

To calculate the potential concentration of 8 µg/m^3 to reach the nearest location of the general public, the Air Force used a basic dispersion model. The concentration level would be the highest during periods of the most intense usage. Inputs to the dispersion calculations apply the highest expected usage within an hour period. It should be recognized that dispersion modeling represents a complex problem due to atmospheric variability. Appendix B provides a detailed description of the atmospheric variability and the dispersion model.

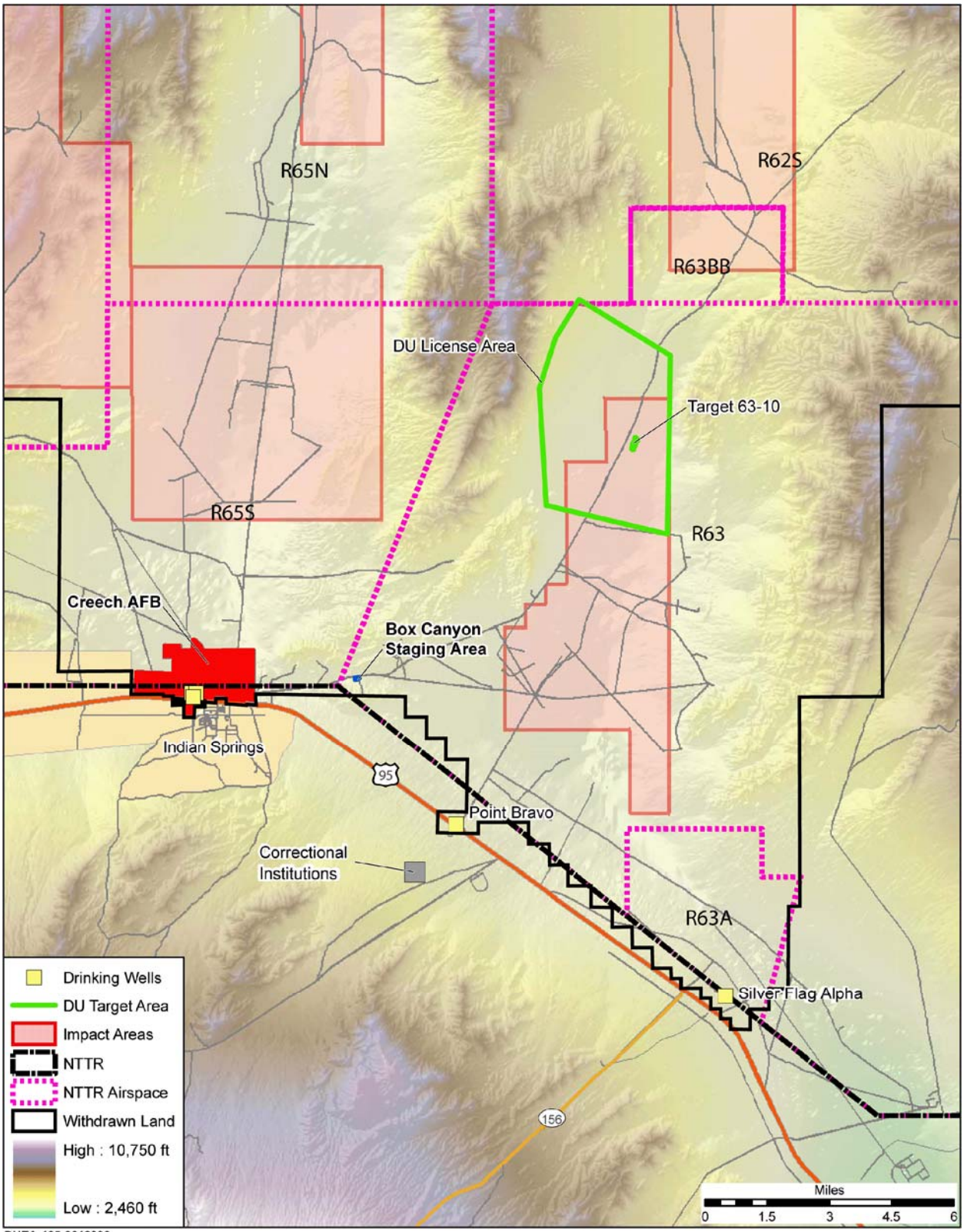


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Figure 3-1 DU Target and Receptor Locations

Firing at Target 63-10 varies in intensity between testing and training, thereby affecting the potential amount of uranium oxides dispersed. While A-10 testing and training both fire at the target array in a sequential and orderly fashion, training activities represent the most intensive. The 30-mm cannon the A-10 uses for DU can fire a rapid number of rounds, but is limited to short durations because of the heat involved and the recoil effect of the gun. The gun is theoretically capable of firing 3,900 rounds per minute, but the rapid firing heats up the barrels such that the gun can only be used in 1 to 3 second bursts (about 100 to 200 rounds at any one time). Testing requires controlled conditions to set a test parameter, fire, and measure results before testing the next parameter. WPS training requires students to fire the weapons under the tutelage of an instructor, limiting the number of possible rounds that can be simultaneously shot at the target.

To this point in time, the current maximum usage of DU was 2,978 rounds of DU for testing purposes. During the Gulf War, about 10 percent of DU rounds fired from the A-10 hit the target. On NTTR, the hit rate would be about the same, but to be conservative, a hit rate of 25 percent is used. Typical aerosolization rates range from 10 to 35 percent. Using 3,000 DU rounds, a hit rate of 25 percent, and an aerosolization rate of 35 percent, the Air Force modeled baseline conditions. This modeling also used the worst case atmospheric conditions—light winds blowing directly toward the recipient. The model applied a 5-mile per hour wind speed and assumed three general wind directions: those toward Indian Springs, Box Canyon, and Point Bravo, and toward Range 63-BB. Each of these represents an independent calculation since wind cannot blow more than one direction simultaneously. To simulate the average height of a tank, the model used an emission plume from a 10-foot tall "smoke stack."

The Air Force also assessed exposure to range workers using the same dispersion model and assumptions, but comparing the dose to the OSHA standard of 250 $\mu g/m^3$. The locations of range workers relative to Target 63-10 while DU is being fired include Range 63-BB, Box Canyon Staging Area, and Point Bravo. Range 63-BB lies 5.2 miles north of the DU target, with Box Canyon 8.6 miles to the southwest and Point Bravo 9.8 miles south of the target.

Results show the concentration at any site where potential recipients could occur remain well below any regulatory limit. Table 3-4 shows the locations, concentrations regulatory limits, and the difference between the regulatory limits and existing conditions. It should be noted, however, that these are modeled conditions and assumes the wind is blowing directly towards the recipient. Since the direction to each recipient differs, and the wind cannot blow in multiple directions at the same time, only those individuals in the direction of the wind would receive any exposure. The others would not be subject to any exposure.

Table 3-4 Potential Concentration Under Baseline Conditions					
Location	***Wind Direction***	***Distance (meters/miles)***	***Concentration ($\mu g/m^3$)***	***Regulatory Limit ($\mu g/m^3$)***	***Difference from limit***
Indian Springs	WSW	18,650/11.6	0.32	8	25 times less
Correctional Institutions	SSW	16,841/10.5	0.39	8	20 times less
Point Bravo	SSW	15,841/9.8	0.44	250	570 times less
Box Canyon	WSW	13,893/8.6	0.57	250	440 time less
Range 63-BB	NNE	8,425/5.2	1.5	250	164 times less

The concentrations are based on already conservative hit rates and dispersion rates. If the hit rate is doubled to fifty percent and the dispersion rate doubled to 70 percent, the concentration would increase by fourfold. At Indian Springs the concentration would be 1.56, or five times less than the regulatory limit. For the low proportions of soluble uranium oxides, concentrations would remain considerably below the soluble standards of 4 $\mu g/m^3$ and 50 $\mu g/m^3$ for the public and worker exposure levels, respectively.

3.2.2 Environmental Consequences

Air emissions resulting from the proposed action and alternatives were evaluated in accordance with federal, state, and local air pollution standards and regulations. Air quality impacts from a proposed action would be significant if they:

- increase ambient air pollution concentrations above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally-mandated Class I area.

The approach to the air quality analysis was to estimate the increase in emission levels due to the proposed action at NTTR Range 63. According to EPA General Conformity Rule in 40 CFR Part 51, Subpart W, any proposed federal action that has the potential to cause violations in a NAAQS nonattainment area must undergo a conformity analysis. A conformity analysis is not required if the proposed action occurs within an attainment area. Since Las Vegas is in nonattainment status for CO, 8-hour ozone, and PM_{10}, a conformity determination must be performed if project emissions exceed the *de minimis* threshold for CO (100 tons per year), 8-hour ozone (NO_x at 100 tons per year and VOCs at 50 tons per year), and PM_{10} (70 tons per year).

No conformity analysis is needed for the proposed increase of DU rounds since it is not located in an area of nonattainment or maintenance for criteria pollutants. Furthermore, the proposed increase of DU rounds would not involve any construction, grading, or other stationary or mobile sources that may increase criteria air pollutants. The primary air quality concern is of the aerosols created by the impact of the DU rounds to a hardened target causing the round to exceed the melting point of DU.

There are no PSD Class I areas within the vicinity of the proposed action, therefore, the DU emissions would not adversely impact visibility.

Air quality impacts from aerosolized depleted uranium are based upon the potential exposure of the public and range workers to inhalable quantities of oxides of uranium. Potential impacts depend greatly on the intensity of use of the DU. Concentrations during the few times of intense firing of DU would be the greatest. However, as established previously, DU would, in fact, be fired during a few intense periods per year rather than at a steady pace.

Proposed Action (Alternative A)

As noted above, the proposed action would not involve increased vehicle traffic, construction, or other activities likely to increase criteria pollutants. For this reason, no impact to standard air quality emissions would occur. Similarly, the increase in firing of DU rounds would not increase the potential for dispersal of DU-oxides, above 8 $\mu g/m^3$, beyond the limits of NTTR and into inhabited areas. Rather, the intensity of firing over a concentrated period of time would not change from current conditions.

Given these factors, and if the 66 WPS wished to train all of the students in one class at one time, the most intensive training mission could involve firing of around 4,000 rounds of combat mix over an hour or so (i.e., 4 aircraft each make 5 passes at the target firing 100 rounds per pass and repeating within the hour). This equates to 3,350 DU rounds. Using this improbable scenario, it is possible to estimate the potential dispersion of DU oxides. Table 3-5 shows the potential concentrations resulting from the proposed action.

Table 3-5 Potential Concentration Under the Proposed Action

Location	*Direction*	*Distance (meters/miles)*	*Concentration ($\mu g/m^3$)*	*Regulatory Limit ($\mu g/m^3$)*	*Difference from limit*
Indian Springs	WSW	18,650/11.6	0.36	8	22 times less
Correctional Institutions	SSW	16,841/10.5	0.44	8	18 times less
Point Bravo	SSW	15,841/9.8	0.49	250	510 times less
Box Canyon	WSW	13,893/8.6	0.64	250	391 times less
Range 63-BB	NNE	8,425/5.2	1.7	250	147 times less

The aerolized concentrations of DU would be much lower than any regulatory limit even assuming very conservative hit rates and dispersion rates. Additionally, the wind would have to be consistently blowing directly at inhabitants for this to occur. Finally, the calculations assume the rounds would all be fired within a 1-hour period. In fact, 61,000 DU rounds (over three times the proposed action) would need to be fired in an hour, under the right wind conditions, to cause an exceedence of the ATSDR standard to reach the correctional institutions. As previously mentioned, these data compare to the insoluble

standards, even comparisons to the soluble standards indicate the levels would be well below the limits of 4 µg/m^3 and 50 µg/m^3 for the public and workers, respectively.

As such, the potential concentrations of aerosolized DU-oxides would remain well below any applicable regulatory standard for either the public or range workers. If all of the DU rounds were fired using this intense regime, the maximum concentrations listed in Table 3-5 could only occur less than six times per year and still remain below any applicable regulatory standard.

Alternative B

Since the additional TIP and TDE activities would not increase, intensity of firing over a concentrated period of time relative to levels described under the proposed action, the impacts would be the same as those described for the proposed action. Alternative B could, however, increase the number of times per year that intensive firing might occur to a maximum of eight times per year.

No-Action Alternative

Under the no-action alternative, increased expenditure of DU on Target 63-10 would not occur. The Air Force would not increase use of DU beyond current levels. Baseline emissions for NTTR would remain unchanged through implementation of this alternative and DU rounds would not create a concentration of DU-oxides sufficient enough to cause a 8 µg/m^3 plume to extend into inhabited areas. The concentrations for the no-action alternative are listed in Table 3-4 and the highest concentration is 20 times less than the regulatory standard. The current maximum number of rounds used has been 3,000 rounds in one day, this could only occur two and a half times per year under the current allocation.

3.3 SOILS AND WATER RESOURCES

Soils consist of unconsolidated materials subject to erosion and loss from wind, water, and mechanical forces. Water resources include surface water and groundwater. The analysis in this EA addresses potential adverse effects to soil and water resources in the immediate vicinity of the Target 63-10 from activities associated with DU.

3.3.1 Affected Environment

Soils

The DU-licensed area, located in the southern part of Three Lakes Valley, covers approximately 14 square miles. Soils consist mostly of sand and small rock, with alluvial terrain transected by natural arroyos running throughout. Some of the arroyos reach up to 1 meter in depth. Soils on NTTR have not

been mapped; however, general descriptions of soils series are available from the United States Department of Agriculture (USDA), Natural Resource's Conservation Service (NRCS 1985, 2000, 2004).

Soils typically found in mountainous portions of NTTR consist of the following: St. Thomas series, consisting of shallow, well-drained soils that formed in colluvium and residuum from limestone and dolomite (NBMG 1997). These soils generally occur on hills and mountains with 8 to 75 percent slopes. The Crosgrain and Arizo soils series are the primary soil types of the fan piedmonts. The Crosgrain series are shallow, well-drained soils that formed in mixed alluvium on ballenas (old fan piedmonts) with slopes 4 to 30 percent. The Arizo series are very deep, excessively drained soils that formed in mixed alluvium on recent alluvial fans, with slopes of 0 to 15 percent. The basin floors generally consist of Mazuma series soils. The Mazuma series are very deep, well drained soils that formed in alluvium and lacustrine materials from mixed rock sources. Mazuma soils occur on fan skirts and alluvial flats, with slopes of 0 to 15 percent. The DU library and Target 63-10 both occupy a shallow alluvial slope. The alluvial soils that dominate the fan basins are subject to wind erosion, with fine-grained materials often entrained into the airstream and resulting in fugitive dust (Air Force 1999). Slight slopes in the area, combined with rare but sometimes powerful localized thunderstorms, can result in soil erosion. However, down-gradient from Target 63-10 area lies a large closed playa that retains erosional material.

A 1994 Air Force study (Air Force 1995) examined the potential extent and migration of DU-contaminated soil particles at Target 63-10 and within the target strafe fan. The study revealed that contamination centered in the immediate area of Target 63-10. Patterns derived from the study indicate that DU and its oxides settled rapidly and close to the target area (i.e., about 350 feet). Similarly, sampling revealed no downward setting of DU in the soil profile and the small washes contained no traces. Immediately beyond this area, and further, the soil contained low and ever-decreasing quantities consistent with background levels of radiation.

In 2000, an extensive radiological characterization survey of Target 63-10 was performed to determine the extent of DU contamination and downward migration in the soil (Air Force 2000b). The survey was performed using plastic scintillation gamma radiation detectors to determine and map the location of DU fragments. The northern half of the target area contained the greatest amount of penetrators and fragments. For the most part, intact penetrators were detected at a depth of less than 12 inches, with only a small fraction of the penetrators being detected at a foot in depth. On Target 63-10, outside the target array, approximately 90 percent of the penetrators were fully intact at a depth of no more than 6 inches. This indicates no fragmentations or pyrophoric reaction to produce oxides.

Contamination was clearly present around the immediate area of the penetrators, but the spatial spread of contamination was minimal. This minimal contamination seemed especially unusual in the washout areas of Target 63-10 where the spread of contamination would theoretically be most probable. Data demonstrated that the washouts were virtually clean; other than finding random penetrators, the study

noted no elevated DU counts in the washout areas. From the survey data collected, the analysis estimated that beyond about 350 feet from the target array, contamination levels dramatically decreased. However, as described below, isolated penetrators and fragments occur throughout the DU Licensed Area.

In 2004, another DU migration study (Abell 2004) focused on the impact zone surrounding the target array, as it contained the highest concentration of spent DU rounds. Study results from the southern washes showed the erosional dispersion of DU decreased exponentially with distance from the target array as might be expected in a streambed. Evidence of DU contamination extended downstream approximately 1,300 feet.

Overall, these studies of DU contamination in the soil at and near Target 63-10 demonstrate limited horizontal and vertical dispersion by wind or water erosion. The primary affected area lies within 1,300 feet of the target array, which is more than 10 miles from the border of NTTR, and about 10 to 12 miles from the nearest potential receptor.

These studies, however, focused on describing the contiguous soil contamination around the target area and its potential to spread outward. Some fragments exist down-stream from the target area, and, on occasion, a DU round misses the target or ricochets away from the target area. Some of these rounds or fragments have been found farther away than 1,300 feet from the target, but still within the DU Licensed Area. Isolated pockets of contamination around each of the individual rounds or fragments occur, but since they are individual rounds, the soil contamination remains limited. Low contamination levels characterize these small areas because a single round or fragment of a round comprises the contributor to contamination.

Water

The scarcity of surface water resources on NTTR is attributed to a dry regional climate characterized by low precipitation, high evaporation, low humidity, and wide extremes in daily temperatures. Average precipitation depends mainly on elevation and ranges from 4 inches on the valley floor to about 20 inches in the mountain areas. The affected environment lies within an arid valley setting where the annual rainfall seldom exceeds 8 inches (Air Force 1998c). With the exception of locally intense thunderstorms that can produce flash flooding, much of the warm weather precipitation is lost to the atmosphere through evaporation and transpiration.

Within the NTTR, the availability of moisture in excess of evaporation and transpiration is so limited that few perennial surface water features are present (Air Force 1997). With the exception of man-made ponds and catchments, the only perennial surface water comes from springs that form where ground water intersects the surface. The springs flow for short distances on the ground surface, which is underlain by bedrock. Most surface water is temporarily present as a result of ponding in low permeability playas and

as ephemeral channel flow from infrequent precipitation and snowmelt runoff. Playas are not major recharge zones due to the low infiltration potential. Most surface water that reaches the playas is lost through evaporation. The DU Licensed Area and DU library contain no springs, man-made ponds, or perennial water courses; a few small, ephemeral arroyos transect the area (Air Force 1997).

Criteria for water quality within the State of Nevada are contained in the Nevada Administrative Code (NAC), Chapter 445A.119, and apply to existing and designated beneficial uses of surface water bodies. Water quality standards are driven by the beneficial uses of specific water bodies. Beneficial uses include agriculture (irrigation and livestock watering), aquatic life, recreation (contact and non-contact), municipal or domestic supply, industrial supply, and wildlife propagation. There is a three-tiered system of beneficial use designation of surface water resources within the NAC depending upon the size of the water body.

1. Major water bodies or rivers are specifically designated by name (in some cases by reach) and are assigned numeric standards (NAC Sections 445A.145 to 445A.225) or thresholds as well as anti-degradation criteria.
2. Smaller water bodies are classified (i.e., Class A, B, C, and D) as to the condition of the waters "as affected by discharges relating to the activities of man." Water quality standards are specified for each of the water classifications (NAC Sections 445A.124 to 445A.127).
3. Other surface waters are protected by generic standards that apply to all waters of the state (NAC Section 445A.121).

Due to the rare and transient occurrence of surface water within the affected area of the Target 63-10, there are no bodies of surface water present that are designated for specific beneficial uses (i.e., categories 1 or 2 above). All surface water (e.g., ephemeral streams) within NTTR, including the small arroyos noted in affected areas, are regulated under the standards applicable to all waters of the state (i.e., category 3). Since none of the existing activities at Target 63-10 or the DU Licensed Area involves discharges to these ephemeral arroyos, no additional classification applies.

The State of Nevada has adopted drinking water standards established by the EPA, under the Safe Drinking Water Act. The Nevada Department of Health regulates drinking water quality for public supply systems. Drinking water standards consist of maximum contaminant levels (MCLs) established for various water quality constituents. Primary MCLs are established to protect against adverse health effects and are enforced for public drinking water supplies. Secondary MCLs are established for aesthetic reasons such as taste, color, or odor and are not enforceable on public drinking water supplies. Thresholds are established for selected constituents that, if exceeded by a specified percentage of samples (based on the number of people served), require treatment of the water source prior to distribution to users of the supply system. Testing of wells down-gradient from the DU-license area showed no contamination from DU (Air Force 2002).

Nevada's groundwater typically occurs in unconsolidated deposits of sand, gravel, silt, and clay that partly fill the many basins. Principal groundwater sources derive from the alluvial-fill aquifer underlying the Las Vegas Valley. Groundwater in this area lies hundreds of feet below the surface (personal communication, Larry Koch 2006). A nearby well revealed groundwater at 345 feet below the surface. Wells located in the northwest part of the valley serve the Las Vegas Valley Water District, while those in the northern end of the valley serve North Las Vegas. None of these wells lie closer than 10 miles from Target 63-10. Wells 62-1 and 106-2 provide water to Creech AFB and wells 2278-1 and 2362-1 provide water to Point Bravo and Silver Flag Alpha, respectively (Air Force 1998c). A 1994 site assessment and drinking water samples from these wells demonstrate no migration of DU into groundwater or wells (Air Force 1995). Both shallow and deep groundwater yielded no traces of DU, with radiation at normal background levels (NEL various dates). Furthermore, the amount of groundwater recharge in NTTR depends upon precipitation, evapotranspiration, permeability of the surface soils, and vegetation. The greatest opportunity for groundwater recharge tends to apply in areas of permeable surface materials during periods when precipitation is in excess of evapotranspiration. However, because evaporation normally exceeds precipitation rates from 51- to 65-inches annually on NTTR (Eakin *et al.* 1976), negligible recharge occurs on valley floors. As noted above, drinking water sampling on and near Target 63-10 revealed no infiltration of DU.

3.3.2 Environmental Consequences

The results of the numerous surveys show that most of the potentially affected land remains at background levels of radiation. Elevated count rates result from actual penetrator particles, not the migration of the radioisotopes themselves. Soil analysis indicates little or no migration of DU in the soil. While the 2004 survey showed detectable contamination at 1,300 feet downstream, this location lies far enough away from Point Bravo at 10 miles, Indian Springs at nearly 12 miles, and the correctional institutions at more than 10 miles, to not comprise a hazard or issue for the people at those locations. Otherwise, isolated penetrators and fragments occur throughout the DU Licensed Area, but do not cause widespread soil contamination. Continued clean-up of DU rounds during the annual "Coronet Clean" program would further reduce potential for impacts.

Proposed Action (Alternative A)

Despite more than doubling the amount of DU rounds fired, the proposed action would not significantly increase the amount of soil contamination because the contamination would tend to remain limited to a small area surrounding the target array (i.e., 1,300 feet). Studies have shown that contamination does not migrate from the local site even though isolated penetrators and fragments exist elsewhere in the DU Licensed Area. For similar reasons, surface and groundwater resources would not be adversely impacted through implementation of the proposed action. The area for miles surrounding the Target 63-10 and South Range lacks springs or surface water sources. Furthermore, past monitoring has demonstrated no

adverse effects on groundwater, and downward migration of contamination would not reach the depth of groundwater.

Alternative B

For the same reasons cited under the proposed action, the enhanced authorization of DU rounds would not adversely impact soils or water resources. Based on past study results, the long-term presence of the targets would not change the dispersal or accumulation of DU.

No-Action Alternative

Soil and water resources at Target 63-10 would remain unchanged relative to baseline conditions under the no-action alternative. The Air Force would not increase the amount of DU munitions authorized on NTTR at this time.

3.4 HEALTH AND SAFETY

Health and safety, for this EA, address potential exposures of the general public and range personnel to DU and associated materials. An exposure pathway is the way chemicals may enter a person's body to cause a health effect. It includes all the steps between the release of a chemical and the population exposed: 1) a chemical release, 2) chemical movement, 3) a place where people can come into contact with the chemical, 4) a route of human exposure, and 5) a population that could be exposed. The predominant environmental pathways of concern stemming from the DU Licensed Area include surface water, soil, air migration, and groundwater. DU contaminants (chemicals or radioactive materials) released into the environment have the potential to cause harmful health effects. However, a release does not always result in exposure. People can only be exposed to a chemical contaminant if they come into contact with that contaminant. If no one comes into contact with a contaminant, then no exposure occurs, and thus no health effects could occur. At NTTR, the Air Force prevents the general public from entering the range, thus precluding direct access to the source of most DU contaminants and areas where contaminants move through the environment. This lack of access becomes important in determining whether people could come into contact with the contaminants. Although in the case of radioactive contamination, exposure can occur without direct contact; but access restrictions also prevent exposure.

The route of a contaminant's movement is the pathway (e.g., air, water, soil). As mentioned above, the exposure pathways at NTTR that were analyzed involve air migration, surface water, groundwater, and soil. Exposure can occur by breathing, drinking, or by skin contact with a substance containing the chemical contaminant. Exposure to radiation can occur by being near the radioactive material.

Primary health and safety issues center on low-level radiation and heavy metals exposure. These exposures are chiefly associated with inhalation hazards and to a lesser extent, ingestion. Materials of concern include DU and DU oxides (ATSDR 1999).

3.4.1 Affected Environment

Overall, the health risks associated with using DU for testing and training are minimal and include risks associated with handling, transporting, and storing DU munitions. Such risks fall within current safety and health standards controlled by the Air Force radiation protection program.

DU contamination (i.e., DU and DU oxides) can occur at Target 63-10 in the following forms: as particulate matter that has become mixed with ground materials; as aerosolized DU oxides from impacts to hardened targets; as contamination fused with target and TDMR surfaces; and as material in the form of expended ammunition lodged in the target. The DU contamination itself is weakly radioactive, (40 percent of natural uranium) emitting principally alpha particles during the decay process. Alpha particles are unable to penetrate clothing or skin but have the potential to enter the body through open wounds or hand-to-mouth activities (ORISE 2004). Beta and gamma particles are also emitted from DU contaminated materials; however, the emissions are considered negligible (ORISE 2004).

DU or any other radioactive substance is measured in picocuries. A picocurie is a measure of the radioactive decay over a unit of time. While a picocurie is a measurement of radioactivity of a substance, the biological measure of radiation, known as roentgen equivalent in man/mammals (rem), describes absorbed doses of radiation. Direct exposure to the skin from holding a DU penetrator yields about 0.2 rem (or 200 millirem [mrem]) per hour from beta and gamma radiation (DoD 2000).

Several studies have been performed at Target 63-10 and the DU library to assess the potential for worker exposure to DU in the course of disturbance activities. A study completed in 1992 (Air Force 1993) under the oversight of the Air Force Armstrong Laboratory Health Physics Function analyzed the worker exposure potential using personal air samplers to determine the extent of respirable hazards. Workers for the study were engaged in the refurbishment of two DU targets within Target 63-10. The results of this study indicated that measurable radioactive contamination was considerably lower than the allowed derived air concentration (DAC) of 0.09 picocuries per liter of air. None of the individuals monitored during the study activities had measurable contamination on their respirators, and little contamination on their protective clothing and equipment. The study concluded that no significant airborne DU contamination hazard existed (Air Force 1993).

The DU Management Plan (Air Force 2002) outlines basic policies for management of Target 63-10, incorporating pertinent provisions of NEPA, the Low-level Radioactive Waste Policy Act, and the NRC regulations that control DU disposal. The Air Force conducts periodic environmental radiological

monitoring programs to verify the current location of DU which includes surface monitoring, soil samples, and an air monitoring programs. In 2001 and 2002, the Air Force conducted an air monitoring program to determine whether DU contaminated soil would get resuspended in air. Monitoring stations were located at various areas and distances from the target and left in place for several months. None of the monitoring results yielded elevated levels of radiological contamination.

Potential toxic effects of DU as a heavy metal represent a greater concern. The toxicity characteristics of DU are similar to other heavy metals such as lead, cadmium, nickel, cobalt, and tungsten. When DU is internalized in the body, the soluble components migrate throughout the body and uranium concentrates in the bone, kidney, and liver. The kidney is the most sensitive organ to DU toxicity and has been broadly accepted as the critical organ for uranium toxicity (Ebinger *et al.* 1990). When the uranium enters the body, it binds with bicarbonate and proteins. This binding action helps prevent soluble uranium from interacting with most body tissues. However, when the bicarbonate-uranium complex enters the kidney, it can potentially damage the kidney tissues. Since only Air Force and Air Force managed personnel can access NTTR or Target 63-10, limited opportunities for exposure exist. Existing procedures for these personnel used at Target 63-10 prevent the types of contact and exposure needed to cause toxic intake (Air Force 2002).

While DU has been deployed for decades at NTTR, the 1991 Gulf War comprised the first battlefield use of DU munitions. The resulting effects have given rise to the latest and most comprehensive studies to date. As described below, these and other studies concluded the potential for health effects from external DU exposure during combat operations remains similar to that defined for peacetime operations.

United States Armed Forces fired a total of 320 tons of DU projectiles during the Gulf War. This amount included larger armored tank rounds and 30-mm rounds from A-10s. Despite this quantity, the perceived dangerous levels of aerosolized uranium contaminating the battlefield proved not to reflect reality. When DU hits a target, small fragments can break off, burn, and produce uranium aerosols. However, the DU round's entire mass does not aerosolize; commonly, 10 to 35 percent of penetrators aerosolize. There are differences between tank rounds and 30-mm rounds fired from A-10s. The Army fired 9,552 DU tank rounds (approximately 50.55 tons) while A-10s fired 783,514 30-mm DU rounds (DoD 2000) (approximately 259 tons). The tank rounds were much more likely to hit their intended target than the 30-mm rounds, although the exact number of 30-mm rounds that struck targets in the Gulf War remains unknown. Combat simulations conducted before the Gulf War indicated only a small percentage of the A-10 aircraft rounds (less than 10 percent) actually hit the target. The smaller caliber DU munitions fired from aircraft can miss the target entirely, hit the target and ricochet, or embed in the target without penetrating. Each of these circumstances leaves the penetrator almost entirely intact and produces little or no aerosol or fine particles. Soils samples from some of the most contaminated sites (i.e., Iraqi Tank Yard, where captured Iraqi equipment was stored; and Camp Doha, site of the explosion and fire of unexploded munitions, including DU tank rounds) (Camp Doha 1991) revealed the highest amount of

total uranium measured as 7.81 picocuries of DU per gram of soil (pCi/g). This concentration falls substantially below the NRC's maximum permissible contamination limit of 35 pCi/gs for unrestricted public access (USACHPPM 1999). By comparison, the Agency for Toxic Substances and Disease Registry reports the typical *natural* concentration of uranium in soil is 2 pCi/g (ATSDR 1999).

In addition, 216 air samples from Kuwait and Saudi Arabia were also collected and radiologically analyzed in 1991 by the U.S. Army Center for Health Promotion and Preventive Medicine to determine airborne contaminant levels caused by the Kuwait oil fires. The report concluded that the airborne concentrations of uranium were not a health concern, and were well below U.S. regulatory limits for the general public.

After more than a decade of medical surveillance of the 1991 Gulf War survivors of DU-related injuries, no adverse toxicological effects related to the presence of DU have been identified (McDiarmid *et al.* 2004) Similarly, a Baltimore Veterans Affairs (VA) DU Follow-up Program has not reported any findings of clinically significant health effects related to exposure to DU, even in the highly exposed soldiers with embedded shrapnel. The VA has reported that while these veterans have definite medical afflictions resulting from their wartime injuries, they exhibit none of the known clinical manifestations seen in other (civilian) overexposed groups from uranium's chemical or radiological toxicity. Though these studies do not answer every question about the possible effects of exposure to DU fragments, follow-up studies have not produced any observable adverse health effects attributable to DU's chemical toxicity or low-level radiation in the evaluated veterans.

3.4.2 Environmental Consequences

Health and safety analysis of potential exposure to DU must consider increased DU particles in the air, soil, and water, and also evaluate range clean-up and target replacement.

Proposed Action (Alternative A)

Based on the nature of operations, rate of aerosolization, and particle dispersion, air migration would be the most likely pathway for DU transmission. However, due to the extreme density of DU particulates and its oxides, resulting in relatively quick settling of these particulates, transmission to the nearest receptor is unlikely, as shown in the dispersion analyses in Section 3.2.1. Sufficient concentrations of aerosolized contaminates to pose a health risk would not extend to inhabited areas. Dispersion even under the most conservative standards would not carry concentrations of DU-oxides above 8 $\mu g/m^3$ near humans at Point Bravo, correctional institutions, Indian Springs, and Range 63-BB. Thus, the inhalation pathway of DU contamination poses no threat to the general public, nor to Air Force or contractor range personnel.

DU munitions, residue, and contamination affect the soils around the target array. DU contains radioisotopes of concern, primarily U238 and its decay products, also known as byproducts. As DU undergoes radioactive decay, a chain of products (Table 3-6) is formed as a result of one by-product itself decaying to another element; in turn, the byproducts decay further until finally reaching a stable lead.

Table 3-6 U-238 Decay Series

Isotope	***Half-Life***	***Radiation***
Uranium-238	4.5×10^9 years	α[1]
Thorium-234	24 days	β[2]
Protactinium-234	1.2 min.	β
Uranium-234	2.5×10^5 years	α
Thorium-230	7.7×10^4 years	α
Radium-226	1600 years	α
Radon-222	3.8235 days	α
Polonium-218	3.05 min.	α
Lead-214	26.8 min.	β
Bismuth-214	19.9 min.	β
Polonium-214	1.5×10^{-4} sec.	α
Lead-210	22 years	β
Bismuth-210	5 days	β
Polonium-210	140 days	α
Lead-206	stable	

Notes: [1]alpha radiation; [2]beta radiation
Source: Wikipedia 2005

In addition to the decay chain elements, the DOE has reported that the DU stock it provided to DoD for manufacturing armor plates and munitions may contain trace levels (a few parts per billion) of transuranics (neptunium, plutonium, and americium). Transuranics are radioactive elements with higher atomic numbers (more protons and electrons) than uranium. To verify the level of transuranics in the DU stock material received from DOE, the Army tested representative samples from various batches of DU stock used to manufacture DU armor plate. From a radiological perspective, the transuranic contamination in DU armor contributed an additional 0.8 percent to the radiation dose from the DU itself. This represents an insignificant addition considering the very low radiological hazard associated with the primary material, DU. As such, the implications for NTTR are minimal since the quantities of transuranics are so small, they add very little to the radiation dose from DU itself. Both DOE and DoD concluded that measures designed to protect personnel from the DU itself are more than adequate to protect them from the trace quantities of transuranics.

As discussed in section 3.3 Soils and Water, the ingestion of DU contaminants through groundwater forms an unlikely pathway, because of NTTR's arid environment, deep groundwater, and lack of contamination below the penetrators. High evaporation rates and tight soil greatly limit infiltration. These factors and the lack of contamination in area wells demonstrate that DU is unlikely to contaminate NTTR groundwater. Additionally, vertical DU migration is minimal and the depth to groundwater is

substantial. Thus, this pathway poses a minimal ingestion potential to the public and Air Force and contractor range personnel.

Neither radiological nor chemical contamination would increase to unacceptable levels for Air Force and contractor personnel working at Target 63-10 due to the proposed action. Holding a DU penetrator next to bare skin would yield about 0.2 rem per hour. Cleaning up DU rounds during the Coronet Clean process requires range workers to pick up DU rounds lying on the ground. Range workers are required to wear protective equipment including gloves and respirators (Air Force 2000a). Rounds are picked up by hand and placed in a bucket for subsequent disposal. If a worker were to use an unprotected hand (no gloves) and assuming reaching down, picking up a round, and placing into a bucket would take about 3 seconds; a worker would have to pick up 1,200 rounds in one hour to receive 0.2 rem per hour radiation exposure. Since DU is primarily an alpha emitter, a gloved hand (as required) would receive almost no radiation. The dose limit to an extremity for a worker is 50 rem per year; therefore, a worker would have to pick up 300,000 rounds to reach this level of exposure. In reality, the small number of rounds that could actually be picked up would present no health risk as a result of clean-up activities associated with Target 63-10, and clean-up would not occur more frequently with the proposed increase use of DU rounds. Although the occupational dose limit for skin exposure to beta radiation is 50 rem per year (10 CFR 20) all protection measures (i.e., protective clothing and respirators) for worker safety would continue to be implemented to further reduce the health risk to on-site personnel. Other range personnel and contractors would not be exposed because access to the DU Licensed Area is limited to only those authorized to that location.

Furthermore, the Air Force would continue to enforce occupational safety requirements at Target 63-10 during clean-up activities. Personnel would employ proper hygiene practices, such as thoroughly washing hands before eating to reduce the risk of ingestion hazards. To limit external exposure and contamination from entering the body through open wounds, personnel touching DU-contaminated materials are required to wear gloves. It is also required that all vehicles, boots, gloves, respirators, and other equipment used during operations are brushed lightly to rid the surface of clinging dust particles from the site (AFIOH 2003).

As under the current DU expenditure authorization, frequency of target refurbishment and replacement would not increase with the proposed action (personal communication, Schofield 2005). Handling of replacement targets from the DU library would require the use of heavy equipment and trucks. This activity may produce disturbance and potential re-introduction of contaminated particulate matter from the ground surface, depending on meteorological conditions at the time. As discussed in Section 3.2, air quality, such particulate matter would not migrate far from its origin, so impacts would remain minor. Required use of respiratory protective equipment by on-site workers would prevent any inhalation exposures associated with the movement of heavy equipment and trucks at the site. Moreover, personnel exposures would be brief. All activities would be conducted in accordance with the Radioactive Material

Permit NV-30048-02/02 AFP; AFI 40-201; AFI 13-212 *Range Planning and Operations;* and the DU Management Plan (Air Force 2002) to minimize any risks to human health and safety.

Alternative B

Health and safety effects from Alternative B would be similar to Alternative A. Greater quantities of DU use under Alternative B would not increase health and safety impacts. Soil and water migration remain low due to similar factors found in Alternative A, and the frequency of range clean-up would remain the same. Air Force and contractor personnel exposure would not increase, nor would there be an increase of exposure to the public. All protective measures required for Alternative A would still be enforced, resulting in minimal impacts to the health and safety of range personnel. No impacts to the general public are anticipated due to the negligible potential for contaminants to migrate through the air, water, and/or soil to the nearest receptor more than 10 miles away.

No-Action Alternative

Under the no-action alternative, the current level of DU use on Target 63-10 would still require range clean-up and target replacement. The health and safety effects to the public and Air Force personnel would remain negligible.

3.5 HAZARDOUS AND RADIOACTIVE MATERIALS AND WASTE

Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation and Liability Act; the OSHA; and the Emergency Planning and Community Right-to-Know-Act. The RCRA defines hazardous waste as any solid, liquid, contained gaseous or semisolid waste, or any combination of waste that could pose a substantial hazard to human health or the environment. Hazardous materials have been identified in AFI 32-7086 *Hazardous Materials Management*, to include any substance with special characteristics that could harm people, plants, or animals when released. Waste may be classified as hazardous because of its toxicity, reactivity, ignitability, or corrosiveness. In addition, certain types of waste are listed or identified as hazardous in 40 CFR 261.

3.5.1 Affected Environment

Hazardous materials associated with Target 63-10 include heavy metals constituting principally DU and DU oxides. Other materials at the DU Licensed Area may include residual petroleum, oils, and lubricants within out-of-service target vehicles; batteries and fluids; and lead and chromium. While existing NTTR procedures require removal and appropriate disposal of such materials prior to acceptance of a target at the DU library, old targets may contain some of these materials (personal communication, Schofield 2003). The Air Force estimates that the quantities of such materials are minimal and pose no immediate

environmental concern (Air Force 2005). When encountered, the Air Force removes and processes these materials in accordance with existing, approved procedures for NTTR. There are no active environmental restoration program sites located on or adjacent to Target 63-10 (Air Force 1999). In addition, a previous EA (Air Force 2005) and FONSI addressed issues of hazardous waste associated with the targets.

The DU library contains DU and other materials within the targets themselves, and localized contamination is present on the ground surface and in the near subsurface horizon in the form of particulate matter and debris (refer to Section 3.3 Soil and Water). Various studies (Air Force 1995, UNEP 2001) have evaluated the extent of contaminant migration, both vertically and laterally, through air, soil, and water pathways. These studies demonstrated the persistence of DU contamination to resist movement over time and established a baseline dataset of contamination concentration and location. At Target 63-10 and DU library (contained within the DU Licensed Area), the established baseline is in the immediate area of the DU library and target array. DU contamination is generally contained within 350 feet from the target array (Air Force 1995), but detectable levels have migrated approximately 1,300 feet downstream (Abell 2004).

3.5.2 Environmental Consequences

The magnitude of potential impacts associated with hazardous materials and wastes depends on the toxicity, transportation, storage, and disposal of these substances. Hazardous materials and hazardous waste impacts are considered adverse if the storage, use, transportation, or disposal of these substances substantially increases the human health risk or environmental exposure. An increase in the quantity or toxicity of hazardous materials and/or hazardous waste handled by a facility may also signify a potentially adverse effect, especially if a facility was not equipped to handle the new waste streams.

Proposed Action (Alternative A)

Implementation of the proposed action would result in minimal effects. The increased use of DU would not generate new waste streams or introduce new materials. Target refurbishment and replacement frequency might increase minimally, but all current safety procedures and policies regarding handling and movement of DU contaminated items would be strictly enforced. The Air Force assessed these impacts previously (Air Force 2005). Storage of additional DU rounds at Nellis AFB would be accommodated under the existing NRC permit and no change to current storage and handling procedures would be required.

The additional rounds expended due to the proposed action would increase the number of rounds lying on the ground for range workers to remove during annual Coronet Clean activities. Existing manpower would be able to remove additional rounds using existing handling and disposal procedures. A minimal

increase or weight and volume of DU rounds would not impact the existing capability to store and dispose of DU at Nellis AFB.

Alternative B

Implementation of Alternative B would result in the same minimal effects as the proposed action. Hazardous materials management practices would remain the same as under current operations.

No-Action Alternative

The no-action alternative would continue existing levels of DU expenditures on Target 63-10 and current range clean-up schedules. This alternative would not change the status quo, and therefore, would not pose any adverse effects if it were implemented.

3.6 BIOLOGICAL RESOURCES

Biological resources encompass plant and animal species and the habitats within which they occur. Plant species are often referred to as vegetation and animal species are referred to as wildlife. Habitat can be defined as the area or environment where sufficient and necessary resources and conditions exist to support a plant or animal (Hall *et al.* 1997). Biological resources addressed in this EA include vegetation, wildlife, special-status species, and waters of the U.S. including wetlands occurring within Target 63-10 and the DU library.

3.6.1 Affected Environment

As noted previously, the affected environment for biological resources consists of the area within Target 63-10 (refer to Figure 1-2). Baseline biological resources data came from previous studies such as the *Renewal of the Nellis Air Force Range Land Withdrawal, Legislative Environmental Impact Statement* (Air Force 1999) and *Integrated Natural Resource Management Plan for Nellis Air Force Base, Nevada* (Nellis AFB 1999), rare species and wetlands surveys, and site photographs. The Nellis AFB biologist examined the area for evidence of desert tortoise (personal communication, Turner 2004); however, the Air Force conducted no biological field studies for this EA. Long-term (20 years) use of Target 63-10 has disturbed the area substantially, thereby altering its original habitat.

Vegetation

Vegetation includes all existing terrestrial plant communities. The affected environment for vegetation includes only those areas subject to ground disturbance at Target 63-10. NTTR overlaps two distinct ecoregions: the Mojave Desert to the south and the Great Basin Desert to the north. The Mojave Desert is lower and warmer, receiving most of its precipitation as rain, whereas the Great Basin Desert is higher

and colder, receiving more snow. The transition between the two deserts occurs very broadly along the 37th parallel (Air Force 1999). As a result, most of the South Range, including the Target 63-10, lies within the Mojave Desert, whereas most of the North Range transitions to the Great Basin Desert.

The native vegetation of NTTR consists primarily of desert scrub communities at low- to mid-elevations with mixed shrub and woodland communities at mid- to upper-elevations. Montane shrub communities dominate the highest elevations except for small patches of forest vegetation, which are limited to the highest mountain peaks and ridgelines. Some vegetation communities are strongly limited to, and may even be considered indicators of, either the Mojave or Great Basin Desert, whereas others are transitional or occur in both deserts where conditions are suitable (Air Force 1999).

The South Range of NTTR lies in the northeastern portion of the Mojave Desert. Vast areas of the basins and bajadas of the Mojave Desert, below approximately 4,000 feet, commonly support a scrub community dominated by creosote bush (*Larrea tridentate*) and white bursage (*Ambrosia dumosa*). Additional species include saltbushes, ephedras (*Ephedra* spp.), brittlebush (*Encelia virginensis*), desert mallow (*Sphaeralcea ambigua*), cacti, and Mojave yucca (*Yucca shidigera*). Joshua trees (*Yucca brevifolia)* occur and often form a distinctive Mojave Desert woodland community at upper elevations. Where soils are alkaline and clayey, such as valley bottoms and dry lake beds (playas), four-wing saltbush (*Atriplex canescens*), cattle-spinach (*A. polycarpa*), and shadscale (*A. confertifolia*) dominate the saltbush community. The saltbush community is especially prevalent in a broad transition zone between the Mojave Desert and Great Basin. Mixed scrub vegetation typical of the Mojave Desert occurs at Target 63-10 (elevation 3,200 feet), where several associations including creosote bush, white bursage, saltbush, and Joshua tree can be distinguished (Nellis AFB 1999).

Target 63-10 lies within a zone generally characterized by creosote habitat, with white bursage and saltbush as other common species. However, operations and storage have substantially disturbed the area, effectively eliminating most of the native habitat and plants. A study at Target 63-10 (Air Force 1995) conducted by the USFWS attempted to assess the potential for animal species to “uptake” and absorb DU through resuspension of contaminated dusts or ingestion of contaminated vegetation but the scarcity of plants and animals proved difficult for the USFWS to draw a conclusion. Another study (Hanson *et al.* 1976) conducted by Los Alamos Scientific Laboratory analyzed DU contamination in plants and mammals. The study data emphasized resuspension of respirable particles as a contamination mechanism for small mammals and in varying degrees for plants. Other studies (Leggett and Harrison 1995, Voegtlin and Hodge 1953, Tannenbaum 1951) were conducted to determine absorption rates of varying forms of

ingested uranium and indicated lower absorption rates with decreased solubility of the uranium compound. The low solubility of DU used at Target 63-10 indicates a low absorption rate in plants and animals (Air Force 1995).

Wildlife

Wildlife includes all vertebrate animals (i.e., fish, amphibians, reptiles, birds, and mammals) with the exception of those identified as threatened, endangered, or sensitive species. Wildlife also includes those bird species protected under the federal Migratory Bird Treaty Act. Assessment of a project's effects on migratory birds places an emphasis on "Species of Concern" as defined by Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds.* Additional assessment of potential impacts to migratory birds that are regionally rare occurs under the special-status category. Due to the presence of the Great Basin and Mojave deserts, the transition zone between them, and the desert springs and riparian areas of the region, NTTR encompasses diverse habitats which support varied and locally abundant animal communities. The range of wildlife supported by this great diversity of habitat, and commonly found within NTTR, includes over 30 species of reptiles, 60 species of mammals, and over 240 species of birds (Air Force 1999).

Wildlife within the area encompassing Target 63-10 and the DU Licensed Area includes species that are primarily associated with Mojave desert scrub and woodland habitats. Common mammals of the South Range include coyote (*Canis latrans*), badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus californicus*), and desert kit fox (*Vulpes macrotis)*. These species can be found in all habitat types in low numbers, predominately in areas without heavy human disturbance. Mule deer (*Odocoileus hemionus*), mountain lion (*Felis concolor*), and bobcat (*Lynx rufus*) occur in the mountains of the South Range, well away from Target 63-10 (Air Force 1999).

Common small mammals include white-tailed antelope squirrel (*Ammospermophilus leucurus*), Merriam's kangaroo rat (*Dipodomys merriami*), long-tailed pocket mouse (*Chaetodipus formosus*), cactus mouse (*Peromyscus eremicus*), and southern grasshopper mouse (*Onychomys torridus*). These rodent species are normally found in loose sandy soils in areas with creosote bushes whereas the canyon mouse (*Peromyscus crinitus*) and desert woodrat (*Neotoma lepida*) are associated with rocky soils, canyons, and Joshua trees.

A bird survey in 1996 documented the presence of 114 avian species on NTTR (Nellis AFB 1999). These species range from common ravens (*Corvus corax)* and cactus wrens (*Campylorhynchus brunneicapillus*) to raptors, including peregrine falcons (*Falco peregrinus*). The report summarized avian use of the desert scrub and higher elevation woodland communities as relatively low through much of the year, particularly for wintering and breeding. Springs and ponds supported the greatest number of birds, although the

wetland habitat makes up only a small proportion of NTTR. No springs, ponds, or wetlands exist within at least 5 miles of Target 63-10.

Reptiles are especially adapted to drought conditions and extreme temperatures and are, therefore, well represented in the South Range. The most notable reptile species found in the Mojave creosote scrub habitat is the desert tortoise (*Gopherus agassizii*). Lizard species include side-blotched lizard (*Uta stansburiana*), Western whiptail (*Cnemidophorous tigris*), and others. Snakes include the coachwhip (*Masticophis flagellum*), Great Basin gopher snake (*Pituophis catenifer deserticola*), and the Mojave green rattlesnake (*Crotalus scutulatus scutulatus*).

Several bat species are documented on the range in an NTTR-commissioned bat survey report (Air Force 1999). Six species of bats have been documented on NTTR. These included long-legged myotis (*Myotis volans*), fringe-tailed myotis (*Myotis thysanodes*), California myotis (*Myotis californicus*), western pipistrelle (*Pipistrellus hesperus*), Townsend's big-eared bat (*Corynorhinus townsendii*), and pallid bat (*Antrozous pallidus*). The California myotis was the most widespread and commonly observed species and was found in all habitats that were sampled.

As noted previously, long-term disturbance created degraded habitat in and around Target 63-10. Therefore, this specific area supports minimal wildlife and/or diversity.

Special-Status Species

Special-status species (i.e., threatened, endangered, or sensitive species) are defined as those species considered rare or in danger of becoming extinct and listed as threatened, endangered, or proposed as such, by the USFWS and/or Nevada Department of Wildlife. Protection of sensitive biological resources is accomplished through the federal Endangered Species Act (ESA), which protects federally-listed threatened and endangered plant and animal species. The State of Nevada also protects plant and animal species listed through the Nevada Revised Statutes and regulations set forth in the NAC. Although not protected by the ESA, species of concern deserve consideration early in the planning process to help avoid future conflicts that could cause their listing. Additionally, the Nevada Natural Heritage Program maintains a database of state species of concern. Species discussed in this section are state- and federally-listed, or proposed for listing as threatened or endangered, or species of concern, and are known or expected to occur on NTTR. Appendix C contains lists of these special-status species. The only resident special-status species known to occur near the target array is the federally threatened desert tortoise (Air Force 2003b).

The South Range of NTTR lies within the extreme northern limits of desert tortoise geographical extent. The NTTR falls within the Coyote Spring Desert Wildlife Management Area, which has been designated as part of the recovery units based on the Desert Tortoise (Mojave Population) Recovery Plan, however,

the South Range represents a small percentage of the available desert tortoise habitat within the Northeastern Mojave Recovery Unit. The NTTR is not part of the designated critical habitat areas (USFWS 2003). Designated recovery units contain both "suitable" and "unsuitable" habitat. Some areas within NTTR, such as the impact zones, where Target 63-10 is located, consist of areas considered "unsuitable" or highly disturbed. These areas do not contain nesting, sheltering, or foraging habitat for desert tortoise (USFWS 2003).

Within the affected area several factors influence the potential presence and/or quality of desert tortoise habitat. First, the target array includes the effects of substantial past and ongoing disturbance as a result of authorized range use. Second, the USFWS stated in a 2003 Biological Opinion (USFWS 2003) those areas in NTTR such as the defined impact zones are considered "unsuitable" desert tortoise habitat or highly disturbed. Third, there are no designated "recovery areas" for the desert tortoise in the South Range (USFWS 2003).

The low- to very-low probability of desert tortoise within Target 63-10 is supported by several desert tortoise surveys that have been conducted on the NTTR South Range (Air Force 2003c). These surveys have shown that Range 63 clearly lies near the northern limits of the desert tortoise range. In this area, population densities are generally lower and populations tend to be "patchy" (Revegetation Innovations 1992). Surveys of the South Range have shown a range of density from 1 to 45 desert tortoise per square mile, but areas near to the target array were estimated to support a population of less than ten tortoises per square mile (USFWS 2003).

In summary, the accumulated results of these surveys establish that the area encompassing Target 63-10 manifests a minimal (at most) potential to support desert tortoise. Most of the habitat is already disturbed, and that over the 12-year period of surveys, no evidence has shown improvement of the habitat quality or increase in tortoise population density. As such, the surveys support the USFWS 2003 Biological Opinion that continued training activity at NTTR would not jeopardize the continued existence of the desert tortoise and would not likely destroy or adversely modify designated critical habitat.

This USFWS programmatic Biological Opinion, issued on June 17, 2003 also concluded that training activities at NTTR would not jeopardize the continued existence of the desert tortoise or destroy or adversely modify critical habitat. The Opinion indicated measures to be taken to minimize desert tortoise mortality or harassment and destruction of habitat. These measures include: a maximum speed limit of 25 miles per hour for all regular vehicle travel; no off-road travel with the exception of Explosive Ordnance Disposal; removal of desert tortoise from areas of impact by a qualified biologist; development of an approved vegetation rehabilitation plan; and a tortoise education program to be given to employees working in tortoise habitat.

Wetlands and Waters of the United States

Wetlands comprise special category habitats considered sensitive and protected by Section 404 of the CWA and Executive Order 11990 *Protection of Wetlands*. They include jurisdictional and non-jurisdictional wetlands. Jurisdictional wetlands are those defined by the United States Army Corps of Engineers (USACE) and EPA as those areas that meet all the criteria defined in the USACE's *Wetlands Delineation Manual* (USACE 1987). Wetlands are generally associated with drainages, stream channels, and water discharge areas (natural and man-made). Arroyos, playas, ephemeral channels, and wetlands constitute waters of the U.S. and may be subject to regulations under Section 404 of the CWA if their use, degradation, or destruction could affect interstate or foreign commerce. No wetlands of any kind occur within or near Target 63-10; however, a formal wetlands delineation has not been accomplished for the NTTR.

A range-wide survey (Nellis AFB 1997b) has been conducted for water sources and there are no known waters of the U.S. located within the affected area for the proposed action at NTTR. However, USACE does not recognize this study as a delineation of jurisdictional waters and any project with the potential of affecting jurisdictional waters would require delineation and a Section 404 permit.

Surface water sources are extremely limited on NTTR, and none occur within or near the affected area. Those few water sources in the South Range lie in the mountains or are man-made. Not all playas and other potentially seasonally or ephemerally wet areas have been systematically investigated. However, as these sites are largely unvegetated, they would not qualify as jurisdictional wetlands. Most of NTTR's surface waters have been subjected to modification by humans and heavily impacted by wild horses, limiting their value to wildlife (Air Force 1997a).

3.6.2 Environmental Consequences

Determination of the magnitude of potential impacts to biological resources is based on: 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Analysis of potential impacts focuses on whether and how increased DU munitions and target replacement activities may affect biological resources.

Proposed Action (Alternative A)

Potential sources of impacts to biological resources include air-to-ground DU testing and training activities at Target 63-10. Since the affected environment consists of disturbed vegetation and habitat lacking water sources or wetlands, only a negligible potential for impacts exists. Vehicles used for

clean-up operations might impact area vegetation, but the effect would be negligible since the activity would be brief and localized; the clean-up areas represent previously disturbed land, and no native habitats would be affected.

Localized increases in contaminant concentrations in the soil, attributable to the use of explosive ordnance, have been detected at NTTR bombing targets (Nellis AFB 1997a). This phenomenon is highly localized in the degraded areas where ordnance delivery occurs. This also applies to DU use. These areas do not provide food or habitat resources likely to attract wildlife, nor are there obvious mechanisms that would transport contaminants into other areas where food chain effects might be more likely. Hence, potential toxicity to wildlife due to contamination is not considered a significant risk on NTTR at present.

Due to the very limited occurrence of plant and animal species in and around Target 63-10, conclusions could not be drawn regarding the risks and biological effects associated with DU exposure to small mammals. However, as with humans, there appears to be no pathway (i.e., water, air, and/or soils) for exposure potential.

The proposed action would increase the number and intensity of rounds used on the target, but would not expand the target area. Thus, there would be no additional impacts to migratory birds or other wildlife to the proposed action.

No sightings of the threatened desert tortoise have been recorded in the area around Target 63-10 and the general habitat conditions for the species in the target array are poor. The Air Force does not expect to adversely affect desert tortoise populations or their recovery. Several factors support this assessment:

1. While the potentially affected area falls within the habitat range of the desert tortoise, the USFWS does not consider this area to be critical habitat. In addition, the potentially affected area within NTTR (South Range) lies at the northern limits of the tortoise range where population densities are “patchy” (Revegetation Innovations 1992).
2. Due to past disturbance and ongoing training activities, the affected area consists of unsuitable habitat (USFWS 2003). Target 63-10 lies within an existing ordnance impact zone and exhibits substantial disturbance.
3. Numerous surveys throughout the valley, where Target 63-10 is located, indicate that desert tortoise populations are low (1 to 3 tortoise per square mile) to very low (0 tortoise per square mile).

The potential for impacting jurisdictional waterways would not occur as a result of the proposed action because there would be no additional ground-disturbing activities associated with the proposed increase use of DU.

Alternative B

For Alternative B, enhanced DU authorizations, the Air Force would not change the frequency of target replacement or range clean-up operations. There would be no increase in vehicle impacts. Studies established a negligible potential for DU uptake into plants and animals under existing conditions and therefore, little or no change to current effects is anticipated. Overall, the impacts due to Alternative B would be the same as those for the proposed action.

No-Action Alternative

Under the no-action alternative, no change to existing conditions for vegetation, wildlife, or species of concern would occur at this time. Annual clean up of DU penetrators from the ground surface would continue.

CHAPTER 4

CUMULATIVE EFFECTS, IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

CHAPTER 4

CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.1 CUMULATIVE EFFECTS

CEQ regulations stipulate that the cumulative effects analysis within an EA should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR Part 1508.7). Assessing cumulative effects involves defining the scope of the other actions and their interrelationship with the proposed action and alternatives, if they overlap in space and time. Cumulative effects are most likely to arise when a proposed action is related to other actions that occur in the same location or at a similar time. Actions geographically overlapping or close to the proposed action and alternatives would likely have more potential for a relationship than those farther away. Similarly, actions coinciding in time with the proposed action and alternatives would have a higher potential for cumulative effects.

To identify cumulative effects, three fundamental questions need to be addressed:

1. Does a relationship exist such that affected resource areas of the proposed action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
2. If one or more of the affected resource areas of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?
3. If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

4.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the time in which the effects could occur. Since the potential impacts of the proposed action are focused on Target 63-10 and vicinity, the cumulative effects analysis includes the boundary of the affected area for the proposed action. An action not occurring within or near this area is not considered in the analysis. The time frame for cumulative effects starts in 2006 when increased DU munitions use would begin. For purposes of this analysis, public documents prepared by federal, state, and local government agencies were the primary sources of information for identifying reasonable foreseeable actions.

Past and Present Actions

NTTR is an active military range that undergoes continuous change in mission and in training requirements. This process of change is consistent with the United States defense policy that the Air Force must be ready to respond to threats to American interests throughout the world. The following summarizes past and present actions occurring within the NTTR and in proximity to Range 63A:

- In 1997, the Air Force expanded combat ground and security forces training at Silver Flag Alpha (Ranges 63A, 63, and 65S) and Creech AFB (formerly Indian Springs Air Force Auxiliary Field. Areas of disturbance were limited to previously disturbed areas on the ranges (Nellis AFB 1997a)

- In 2002, the Air Force approved construction of military operations in urban terrain (MOUT) facility encompassing approximately 97 acres at Silver Flag Alpha, with additional facilities constructed at Creech AFB in Indian Springs, Nevada (Air Force 2003b). The MOUT training complex provides a simulated urban airbase environment for security forces ground training. The existing MOUT village was upgraded and an air base (air traffic control tower and hangars) constructed and completed in 2005. Academic and lodging/dining facilities were evaluated as part of this proposal but have not been funded.

- In 2003, construction of a high-technology test and training complex (HTTC) encompassing 946 acres on Range 62 was approved by the Air Force (Air Force 2003b). The HTTC provides a realistic urban environment for United States and allied aircrew training. Construction of the HTTC began in 2004 and is scheduled to conclude in 2008.

- In 2003, the Air Force proposed and initiated the implementation for a force structure change that added up to 48 medium- and high-altitude Predator unmanned aerial vehicles to the current inventory of 40 Predators at Creech AFB and added 143 personnel to Nellis AFB (Air Force 2003a). Part of this proposal included construction of a new dining facility that would support increased student levels proposed by the Expeditionary Readiness Training proposal.

- In 2005, the Air Force implemented a suite of tools to dispose of DU-contaminated targets and Target Debris Munitions Residue from Target 63-10 and the DU library at NTTR (Air Force 2005). This action includes strict handling, transport, and disposal measures which are defined by permits, regulations, and guidelines from the Air Force, DOE, NRC, Department of Transportation, DoD, EPA, and transport requirements for the State of Nevada.

- The Air Force proposes to implement a full Wing Infrastructure Development Outlook (WINDO) program of infrastructure improvements for Nellis AFB. The proposed action consists of implementing 631 WINDO projects at Nellis AFB, NTTR and associated facilities, Creech AFB,

and Tonapah Test Range that include repair, maintenance, installation, renovation, construction, and demolition (Nellis AFB 2006).

No known past and/or present actions were identified, that when combined with the proposed action or alternatives would result in any cumulative effects. All past and present actions at NTTR resulting from Air Force activities involving use of the range and airspace would not change from those described in the *Nellis Renewal Legislative Environmental Impact Statement* (Air Force 1999.)

Reasonably Foreseeable Actions

Actions potentially relating to the cumulative effects for the proposed NTTR increased DU munitions use could include those of the DoD, DOE, Department of the Interior, and local counties. The Air Force proposes to beddown 36 F-35 aircraft to establish the F-35 Force Development Evaluation and Weapons School at Nellis AFB. The beddown would begin in fiscal year 2009 reaching the full complement in 2019. An increase of annual airfield operations at Nellis AFB and munitions, chaff, and flare utilization in NTTR airspace would occur under the F-35 proposal.

The Air Force also proposes to expand the Expeditionary Readiness Training course student capacity at the Security Forces Regional Training Center at Creech AFB, NV. This proposed action would build additional academic and administrative facilities, improve and install water storage, sewage, and septic systems, and upgrade several of the firing ranges at Silver Flag Alpha. There would be an increase in training staff, vehicle traffic between Creech AFB and Silver Flag Alpha, and other infrastructure improvements. The increased student capacity would be phased over a year, beginning in late summer 2006 and concluding in the winter 2007.

In addition, the 2005 DoD Base Realignment and Closure (BRAC) Commission has recommended realignment of aircraft for Nellis AFB. Currently, the final BRAC report calls for a gain of five aircraft (loss of 13 F-16s and a gain of 18 F-15s) at the base. This realignment must begin by 2007 and be evaluated under EIAP. As the proposal stands now, there would be no noticeable increase in annual airfield operations at Nellis AFB or munitions, chaff, and flare utilization in NTTR airspace as a result of the realignment.

The Department of Energy completed an environmental impact statement for the NTS in Nye County and in July 2002, President Bush signed a bill for development of the Yucca Mountain site as a repository for disposal of spent nuclear fuel and high-level radioactive waste. Following NRC review and approval, construction could be completed and operations could commence by 2010. While the NTS underlies NTTR airspace, the activities associated with the Yucca Mountain site (at more than 50 miles to the west) are not likely to impact Target 63-10 and/or NTTR operations, and would thus not result in any cumulative impacts when combined with the proposed action.

These reasonably foreseeable actions, when evaluated with the proposed action would not generate additive cumulative effects to the region. None would overlap with or add to the effects proposed action or alternatives because implementation of the proposed action and alternatives would result in temporary or very minor impacts to the resources analyzed, it is not anticipated that the proposed action or alternatives, when combined with other future proposed actions, would have a negative cumulative effect on other resources.

4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA requires that environmental analysis include identification of any irreversible and irretrievable commitment of resources which would be involved in the proposed action or alternatives should any be implemented. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects this use could have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural resource).

For the increased DU use proposal, most resource commitments are neither irreversible nor irretrievable. Most impacts, such as air emissions from mobile sources (i.e., aircraft) would be long lasting, but negligible. Training operations could affect environmental resources through the consumption of nonrenewable resources, such as jet fuel. Personal and contract vehicles used by personnel at Range 63A, as well as those maintaining Target 63-10, consume fuel, oil, and lubricants. The amount of these materials used would not likely exceed that currently used by these individuals for maintaining the target array. As such, neither the proposed action nor the alternatives would not increase consumption of these resources.

CHAPTER 5

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CHAPTER 6

PERSONS AND AGENCIES CONTACTED

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CHAPTER 7

LIST OF PREPARERS AND CONTRIBUTORS

CHAPTER 7
LIST OF PREPARERS AND CONTRIBUTORS

James Campe, *Environmental Analyst*
B.S., Naval Architecture and Offshore Engineering, University of California, 1986
Years of Experience: 18

Christina Cummings, *Production Coordinator*
A.A.S., Administrative Office Technology, Boise State University, 1999
Years of Experience: 6

Cathy Doan, *Environmental Analyst*
B.S., English, Central Michigan University, 1980
M.A., Human Resources Development, Webster University, 1985
Years of Experience: 10

Lesley Hamilton, *Health and Safety; Hazardous and Radioactive Materials and Waste*
B.A., Chemistry, Mary Baldwin College, 1988
Years of Experience: 15

Chareé D. Hoffman, *Land Use, Recreation, Visual*
B.S., Biology, Christopher Newport University VA, 1999
Years of Experience: 7

Michael Lucas, *Noise*
B.S., Physics, Moravian College, 1981
M.S., Mechanical Engineering, Lehigh University, 1983
M.S., Fluid Dynamics, Von Karman Institute, 1985
Years of Experience: 15

Isla Nelson, *Document Production*
B.A., Anthropology, Boise State University, 2001
Years of Experience: 6

Dana Novak, *Soils and Water*
B.S., Environmental Science, Ohio State University, 1997
Years of Experience: 6

Kevin J. Peter, *Project Manager*
B.A., Anthropology, Pomona College, 1975
M.A., Anthropology, Washington State University, 1986
Years of Experience: 27

Kathy L. Rose, *Public Involvement, Air Quality*
B.A., Political Science/German, University of Massachusetts/Amherst, 1980
M.A., International Relations, George Washington University, 1983
M.S., Forest Resource Management, University of Idaho, 1996
Years of Experience: 10

Teresa Rudolph, *Cumulative and Cultural Resources*
B.A., Anthropology, Florida State University, 1975
M.A., Anthropology, Southern Illinois University, 1981
Years of Experience: 26

Rick Spaulding, *Biological Resources*
B.A., Biology, University of California, 1982
M.S., Wildlife and Fisheries Science, University of Arizona, 1996
Years of Experience: 17

APPENDIX A

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

Increased Depleted Uranium Use at Nevada Test and Training Range
IICEP Distribution List

The Honorable Oscar Goodman
Mayor of Las Vegas
City Hall
400 E. Stewart Ave.
Las Vegas, NV 89101

The Honorable Michael Montandon
Mayor of North Las Vegas
City Hall
2200 Civic Center Drive
North Las Vegas, NV 89030

Mr. Douglas Selby, City Manager
City of Las Vegas
400 E. Stewart Ave.
Las Vegas, NV 89101

Mr. Gregory Rose, City Manager
City of North Las Vegas
2200 Civic Center Drive
Las Vegas, NV 89030

Clark County Board of Commissioners
Attn: Ms. Yvonne Atkinson Gates, Commissioner
P.O. Box 551601
Las Vegas, NV 89155

Clark County Board of Commissioners
Attn: Mr. Tom Collins, Commissioner
P.O. Box 551601
Las Vegas, NV 89155

Clark County Board of Commissioners
Attn: Ms. Lynnette Boggs McDonald, Commissioner
P.O. Box 551601
Las Vegas, NV 89155

Clark County Board of Commissioners
Attn: Mr. Chip Maxfield, Commissioner
P.O. Box 551601
Las Vegas, NV 89155

Clark County Board of Commissioners
Attn: Mr. Rory Reid, Commissioner
P.O. Box 551601
Las Vegas, NV 89155

Clark County Board of Commissioners
Attn: Ms. Myrna Williams, Commissioner
P.O. Box 551601
Las Vegas, NV 89155

Clark County Board of Commissioners
Attn: Mr. Bruce Woodbury, Commissioner
P.O. Box 551601
Las Vegas, NV 89155

Clark County Manager
Attn: Mr. Thom Reilly
Clark County Government Building
500 S. Grand Central Parkway, 6th Floor
Las Vegas, NV 89155

The Honorable Shelley Berkley
U.S. Congresswoman, District 1
2340 Paseo Del Prado, Suite D-106
Las Vegas NV 89102

The Honorable Jim Gibbons
U.S. Congressman, District 2
600 Las Vegas Blvd.
Las Vegas, NV 89101

The Honorable Jon Porter
U.S. Congressman, District 3
2501 North Green Valley Parkway, Suite 112-D
Henderson, NV 89014

Indian Springs Town Advisory Board
P.O. Box 12
Indian Springs, NV 89018

The Honorable John Ensign, U.S. Senator
Lloyd George Federal Building
333 Las Vegas Blvd. South, Suite 8016
Las Vegas, NV 89101

The Honorable Harry Reid, U.S. Senator
Lloyd George Federal Building
333 Las Vegas Blvd. South, Suite 8016
Las Vegas, NV 89101

Nye County Board of Commissioners
Attn: Ms. Roberta Carver, Commissioner
HCR 60 Box 5400
Round Mountain, NV 89045

Increased Depleted Uranium Use at Nevada Test and Training Range
IICEP Distribution List

Nye County Board of Commissioners
Attn: Ms. Patricia Cox, Commissioner
1510 E. Basin
Pahrump, NV 89060

Nye County Board of Commissioners
Attn: Ms. Joni Eastley
Commissioner Vice-Chair
P.O. Box 1729
Tonopah, NV 89049

Nye County Board of Commissioners
Attn: Mr. Gary Hollis, Commissioner
1510 E. Basin
Pahrump, NV 89060

Nye County Board of Commissioners
Attn: Ms. Candice Trummell
Commissioner Chairperson
1510 E. Basin
Pahrump, NV 89060

The Honorable Kenny Guinn, Governor
555 East Washington Ave., Suite 5100
Las Vegas, NV 89101

DEPARTMENT OF THE AIR FORCE

DEC 7 2005

MEMORANDUM FOR The Honorable Oscar Goodman
Mayor of Las Vegas
City Hall
400 E. Stewart Ave
Las Vegas NV 89101

FROM: HQ ACC/A7ZP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

SUBJECT: Increasing Depleted Uranium Use at the Nevada Test and Training Range

1. The United States Air Force is in the initial stages of preparing an environmental assessment to analyze potential environmental impacts from increasing the annual amount of depleted uranium (DU) rounds fired by A-10 aircraft at Target 63-10 on the Nevada Test and Training Range (NTTR). Under the proposed action, the Air Force will increase the number of DU rounds fired per year from 9,500 to 19,000 DU in order to accommodate annual training requirements and perform testing for tactics development. A map of Target 63-10 is attached.

2. The Environmental Assessment (EA) will comply with the National Environmental Policy Act of 1969, and scoping meetings will occur at the following locations to initiate the process:

Las Vegas, Nevada – 31 January 2006, 6:30-8:30 p.m., Sunrise Library, 5400 Harris Ave.

Indian Springs, Nevada – 1 February 2006, 6:30-8:30 p.m., Indian Springs Community Center, 719 West Gretta Lane

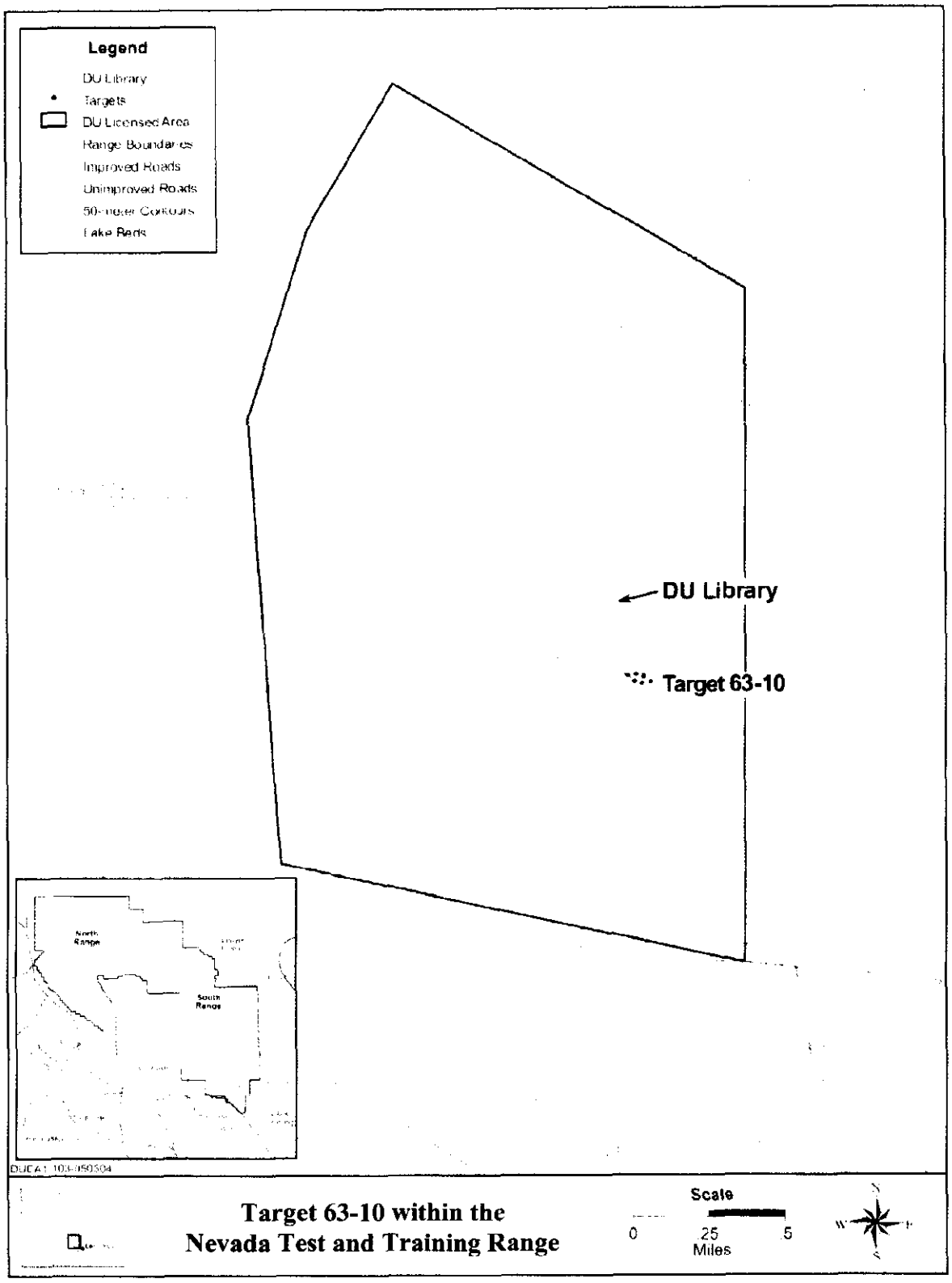
3. These meetings offer the interested public an opportunity to talk one-on-one with Air Force representatives about the proposal, alternatives, and the analysis process, and enable the public and other governmental agencies to comment on environmental issues and concerns associated with the proposal, or recommend additional alternatives we might consider and analyze in the EA. If our EA process warrants an Environmental Impact Statement (EIS), we will consider comments from the scoping period within it.

4. Please provide us your input regarding general and specific issues or areas of concern for the environmental analysis to address. Also, if your office is aware of any new activities at or near our site at NTTR appropriate for our cumulative impact analysis, please identify the activity and provide a point of contact. Though we will consider comments received at any time during the environmental process to the extent possible, we'd appreciate comments by 15 February 2006.

5. Our HQ ACC point of contact for the EA is Mr. Donald Calder, (757) 764-9334, or the Nellis AFB Environmental Office at 99 CES/CEV, 4349 Duffer Drive, Ste 1601, Nellis AFB, NV 89191.

LARRY H. DRYDEN, P.E.
Chief, Planning Branch (A7ZP)

Attachment:
Map of NTTR Target 63-10



Target 63-10 within the Nevada Test and Training Range

Increased Depleted Uranium Use at Nevada Test and Training Range
IICEP Distribution List

Mr. Richard Arnold
Tribal Chairman, Pahrump Paiute Tribe
P.O. Box 3411
Pahrump, NV 89041

Mr. Felton Bricker
Tribal Representative, Fort Mojave Tribe
10489 McDowell Circle
Mohave Valley, AZ 86440

Ms. Vivienne Caron-Jake
Tribal Representative, Kaibab Band of
Southern Paiutes
P.O. Box 68
Fredonia, AZ 86022

Mr. Maurice Frank-Churchill
Tribal Representative, Yomba Shoshone Tribe
HC 61 Box 6208
Austin, AZ 89310

Ms. Gaylene Moose
Tribal Representative, Bishop Paiute
Indian Tribe
P.O. Box 173
Big Pine, CA 93513

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

DEC 20 2005

MEMORANDUM FOR Mr. Richard Arnold
Tribal Chairman, Pahrump Paiute Tribe
P.O. Box 3411
Pahrump, NV 89041

FROM: HQ ACC/A7ZP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

SUBJECT: Increasing Depleted Uranium Use at the Nevada Test and Training Range

1. The United States Air Force is in the initial stages of preparing an Environmental Assessment (EA) for Nellis Air Force Base to analyze potential environmental impacts from increasing the annual amount of depleted uranium (DU) rounds fired by A-10 aircraft at Target 63-10 on the Nevada Test and Training Range (NTTR). In October 2004, the Document Review Committee reviewed an environmental assessment to conduct the disposal of DU targets and debris. This is a separate project for an authorization to increase the quantity. Under the proposed action, the Air Force will increase the number of DU rounds fired per year from 9,500 to 19,000 in order to accommodate annual training requirements and perform testing for tactics development. A map of Target 63-10 is attached. Although the proposal does not involve construction, an evaluation of the potential effects to cultural resources and subsequent coordination would be conducted by Keith Myhrer, Nellis AFB Archaeologist. The Document Review Committee, of which you are a member, will have an opportunity to review the draft EA.

2. The environmental assessment will comply with the National Environmental Policy Act of 1969, and scoping meetings will occur at the following locations to initiate the process:

Las Vegas, Nevada – 31 January 2006, 6:30-8:30 p.m., Sunrise Library, 5400 Harris Ave.

Indian Springs, Nevada – 1 February 2006, 6:30-8:30 p.m., Indian Springs Community Center,719 West Gretta Lane

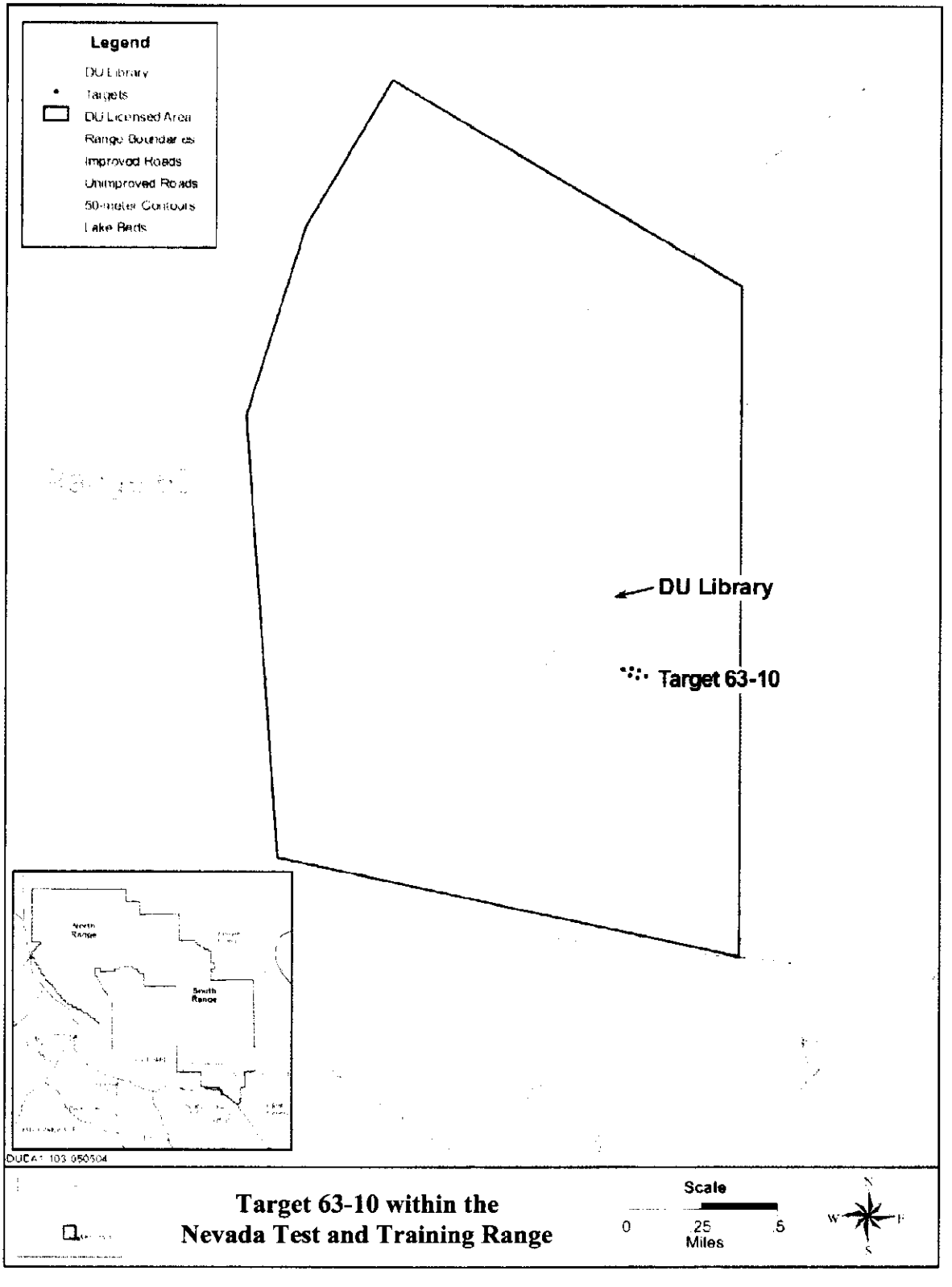
3. These meetings offer the interested public an opportunity to talk one-on-one with Air Force representatives about the proposal, alternatives, and the analysis process, and enable you to comment on environmental issues and concerns associated with the proposal, or recommend additional alternatives we might consider and analyze in the EA. If our EA process warrants an Environmental Impact Statement (EIS), we will consider comments from the scoping period within it.

planning to undertake, or recently completed any new activities appropriate for our cumulative impact analysis, please identify the activity and provide a point of contact. Though we will consider comments received at any time during the environmental process to the extent possible, we request comments be sent by 15 February 2006.

5. Please forward your inputs to Donald Calder, our HQ ACC Project Manager for this proposal at the above address by 15 February 2006. If you have any questions about the proposal, contact him at (757) 764-6156, or the Nellis AFB point of contact, Mr. Keith Myhrer at (702) 652-9365. Mr. Myhrer's address is 99 CES/CEV, 4349 Duffer Drive, Ste 1601, Nellis AFB, NV 89191.

LARRY H. DRYDEN, P.E.
Chief, Planning Branch (A7ZP)

Attachment:
Map of NTTR Target 63-10


Legend
DU Library
Targets
DU Licensed Area
Range Boundaries
Improved Roads
Unimproved Roads
50-meter Contours
Lake Beds
DU Library
Target 63-10
North Range
South Range
DUCA: 103 050504
Target 63-10 within the
Nevada Test and Training Range
Scale
0
.25
.5
Miles
N
W
E
S

Increased Depleted Uranium Use at Nevada Test and Training Range
IICEP Distribution List

Nevada State Clearinghouse
Department of Administration
Attn: Mr. Michael Stafford
209 E. Musser St., Room 200
Carson City, NV 89701

Nevada Division of Environmental Protection
Capitol Complex
Attn: Mr. Allen Biaggi, Administrator
333 W. Nye Lane, Room 138
Carson City, NV 89706

Nevada Division of Emergency Management
2525 S. Carson St.
Carson City, NV 89711

Nevada Dept. of Conservation and
Natural Resources
Attn: Mr. R. Turnipseed, Director
123 W. Nye Lane, Room 230
Carson City, NV 89706

Nevada Department of Wildlife
4747 Vegas Drive
Las Vegas, NV 89108

Bureau of Land Management
Las Vegas Field Office
Attn: Mr. Mark Morse, Office Manager
4701 Torrey Pines Drive
Las Vegas, NV 89130

Nevada Department of Wildlife
Reno Headquarters
Attn: Mr. Terry Crawfoth, Administrator
1100 Valley Road
Reno, NV 89512

U.S. Fish and Wildlife Service
Nevada Ecological Field Office
Attn: Mr. Robert Williams, State Supervisory
13402 Financial Blvd., Suite 234
Reno, NV 89502

Bureau of Land Management
Attn: Mr. Robert Abbey, State Director
1340 Financial Blvd.
Reno, NV 89502

U.S. Department of the Interior
Office of Environmental Policy and Compliance
Attn: Mr. Willie, Taylor, Director Office of the
Secretary
Washington, DC 20240

Desert National Wildlife Refuge
Complex Office
Attn: Mr. Dick Birger, Project Leader
4701 N. Torrey Pines Drive
Las Vegas, NV 89130

Desert National Wildlife Refuge
Complex Office
Attn: Ms. Amy Sprunger-Allworth
HCR 38, Box 700
Las Vegas, NV 83124

DEPARTMENT OF THE AIR FORCE

DEC

MEMORANDUM FOR Nevada State Clearinghouse Department of Administration
Attn: Mr. Michael Stafford
209 E. Musser St, Room 200
Carson City NV 89701

FROM: HQ ACC/A7ZP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

SUBJECT: Increasing Depleted Uranium Use at the Nevada Test and Training Range

1. The United States Air Force is in the initial stages of preparing an environmental assessment to analyze potential environmental impacts from increasing the annual amount of depleted uranium (DU) rounds fired by A-10 aircraft at Target 63-10 on the Nevada Test and Training Range (NTTR). Under the proposed action, the Air Force will increase the number of DU rounds fired per year from 9,500 to 19,000 DU in order to accommodate annual training requirements and perform testing for tactics development. A map of Target 63-10 is attached.

2. The Environmental Assessment (EA) will comply with the National Environmental Policy Act of 1969, and scoping meetings will occur at the following locations to initiate the process:

Las Vegas, Nevada – 31 January 2006, 6:30-8:30 p.m., Sunrise Library, 5400 Harris Ave.

Indian Springs, Nevada – 1 February 2006, 6:30-8:30 p.m., Indian Springs Community Center, 719 West Gretta Lane

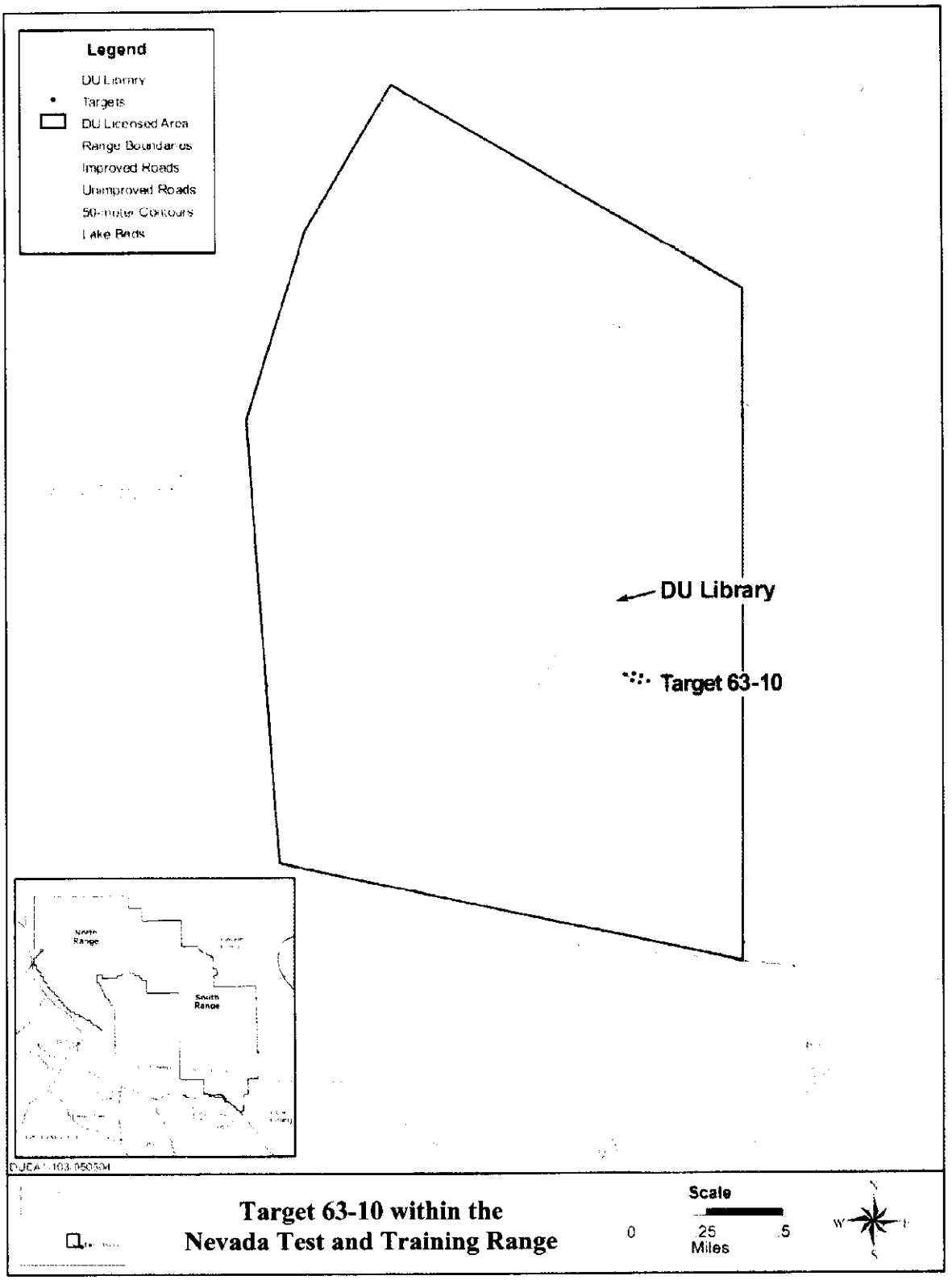
3. These meetings offer the interested public an opportunity to talk one-on-one with Air Force representatives about the proposal, alternatives, and the analysis process, and enable your office to comment on environmental issues and concerns associated with the proposal, or recommend additional alternatives we might consider and analyze in the EA. If our EA process warrants an Environmental Impact Statement (EIS), we will consider comments from the scoping period within it.

4. Please provide us your input regarding general and specific issues or areas of concern for the environmental analysis to address. Also, if your agency is implementing, planning to undertake, or recently completed any new activities appropriate for our cumulative impact analysis, please identify the activity and provide a point of contact. Though we will consider comments received at any time during the environmental process to the extent possible, we'd appreciate comments by 15 February 2006.

5. Our HQ ACC point of contact for the EA is Mr. Donald Calder, (757) 764-9334, or the Nellis AFB Environmental Office at 99 CES/CEV, 4349 Duffer Drive, Ste 1601, Nellis AFB, NV 89191.

LARRY H. DRYDEN, P.E.
Chief, Planning Branch (A7ZP)

Attachment:
Map of NTTR Target 63-10



Target 63-10 within the Nevada Test and Training Range

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

MEMORANDUM FOR Historic Preservation Office
Attn: Mr. Ronald James
100 Stewart Street Capitol Complex
Carson City NV 89701-4285

FROM: HQ ACC/A7ZP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

SUBJECT: Increasing Depleted Uranium Use at the Nevada Test and Training Range

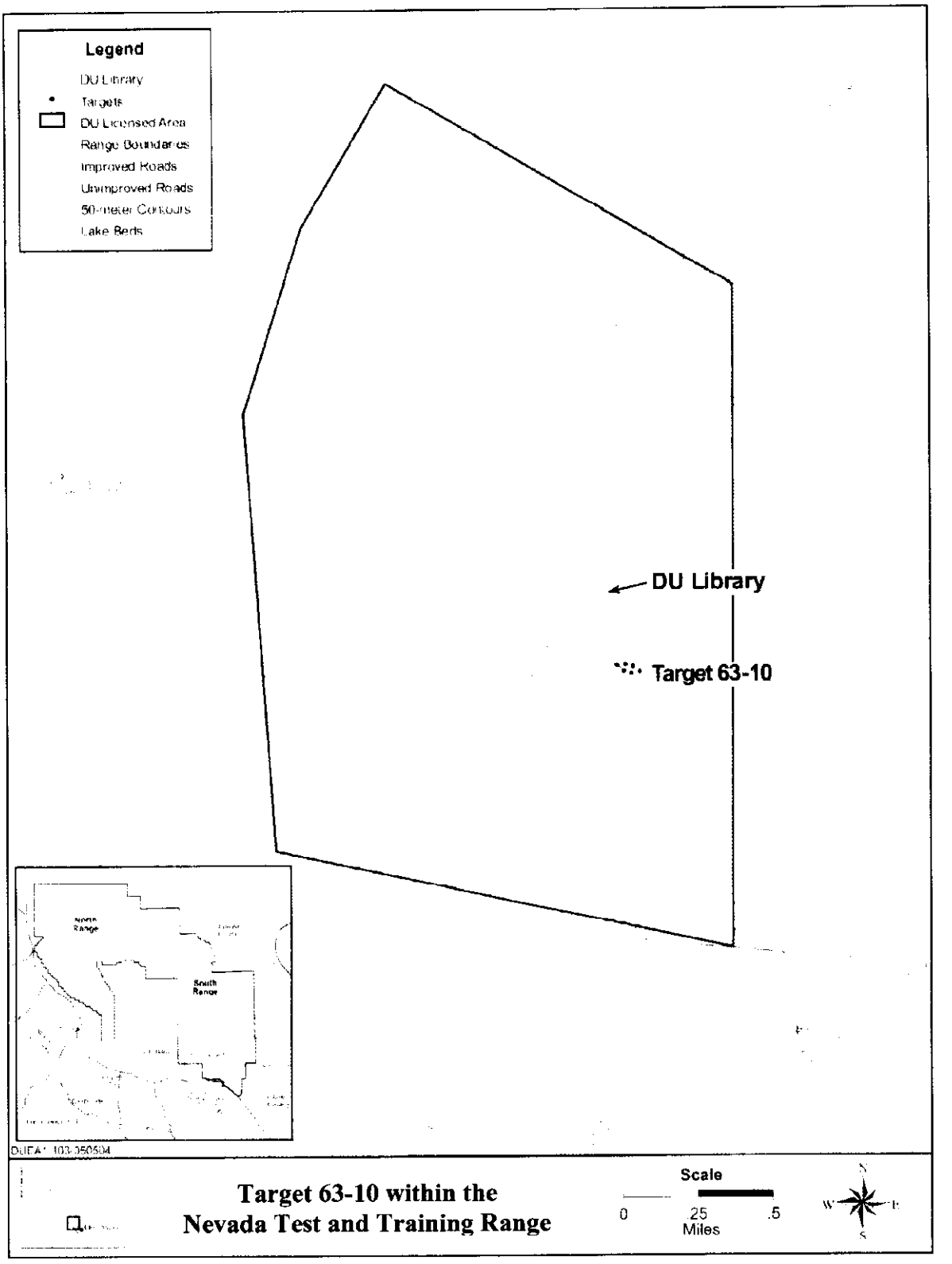
The United States Air Force is in the initial stages of preparing an environmental assessment (EA) to analyze potential environmental impacts from increasing the annual amount of depleted uranium (DU) rounds fired by A-10 aircraft at Target 63-10 on the Nevada Test and Training Range (NTTR). Under the proposed action, the Air Force will increase the number of DU rounds fired per year from 9,500 to 19,000 in order to accommodate annual training requirements and perform testing for tactics development.

Please help us initiate the Section 106 process of the National Historic Preservation Act of 1966 preservation act in the potentially affected area on the NTTR (see enclosed map of Target 63-10). Our EA will consider the proposal's potential impacts on historic or culturally significant properties, and we will coordinate related information with your office according to the steps outlined in 36 CFR 800.3 through 36 CFR 800.7. In order to help expedite your review, please refer to the previous EA covering the target library at range 63-10: (Nevada Test and Training Range Depleted Uranium Target Disposal EA, March 2005). This document covers the same location as our current project.

Please forward any issues or concerns to our ACC project manager, Donald Calder, by 15 February 2006. Mr. Calder can be reached at the above address or telephoned at (757)764-6156.

LARRY H. DRYDEN, P.E.
Chief, Planning Branch (A7ZP)

Attachment:
Map of Affected Area on NTTR



Target 63-10 within the Nevada Test and Training Range

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Nevada Fish and Wildlife Office
1340 Financial Blvd., Suite 234
Reno, Nevada 89502
Ph: (775) 861-6300 ~ Fax: (775) 861-6301

February 3, 2006
File No. AF 9-1

Mr. Larry H. Dryden, P.E.
Chief, Planning Branch
Department of the Air Force
HQ ACC/A7ZP
129 Andrews Street, Suite 102
Langley AFB, Virginia 23665-2769

Dear Mr. Dryden:

Subject: Comments on the Proposed Environmental Assessment for Increasing Depleted Uranium Use at the Nevada Test and Training Range, Clark County, Nevada

This responds to your letter received on January 3, 2006, requesting information for the environmental assessment regarding areas of concern associated with increasing depleted uranium (DU) use at the Nevada Test and Training Range, Clark County, Nevada. Under the proposed action, the Air Force will increase the number of DU rounds fired per year from 9,500 to 19,000 at Target 63-10 in order to accommodate annual training requirements and perform testing for tactics development. These comments represent a coordinated response from the Fish and Wildlife Service's Southern Nevada Field Office and the Desert National Wildlife Refuge Complex Office.

The proposed action is within the range of the threatened desert tortoise (*Gopherus agassizii*) (Mojave population). The environmental assessment should include an analysis of impacts to this species. To the best of our knowledge, no other listed, proposed, or candidate species occur in the action area. The environmental assessment should also provide details regarding ecological receptors for DU, the fate and transport of DU rounds, and a complete description of any plans for DU recovery.

Based on the Fish and Wildlife Service's conservation responsibilities and management authority for migratory birds under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703 et. seq.), any potential direct, indirect, or cumulative impacts from the proposed project may have on migratory birds should be analyzed. We recommend you consider migratory birds during the planning process.

TAKE PRIDE IN AMERICA

Thank you for the opportunity to provide comments. If you have any questions regarding this correspondence, please contact Heather Adams in the Southern Nevada Field Office at (702) 515-5230.

Sincerely,

Cynthia T. Martinez

for Robert D. Williams
Field Supervisor

cc:
Environmental Manager, 99ABW/EM, Nellis Air Force Base, Nevada (Attn: Donald Calder)
Supervisory Biologist - Habitat, Nevada Department of Wildlife, Las Vegas, Nevada
Acting Project Leader, Desert National Wildlife Refuge Complex, Las Vegas, Nevada

KENNY C. GUINN
Governor

JOHN P. COMEAUX
Director

STATE OF NEVADA

DEPARTMENT OF ADMINISTRATION
209 E. Musser Street, Room 200
Carson City, Nevada 89701-4298
Fax (775) 684-0260
(775) 684-0213

February 13, 2006

Donald Calder
Air Combat Command
HQ ACC/A7ZP
129 Andrews Street
Suite 102
Langley AFB, VA 23665-2769

Re: SAI NV # **E2006-244** Reference:

Project: **Scoping for increasing depleted Uranium use at the Nevada Test and Training Range.**

Dear Donald Calder:

Enclosed are comments from the agencies listed below regarding the above referenced document. Please address these comments or concerns in your final decision.

State Historic Preservation Office

This constitutes the State Clearinghouse review of this proposal as per Executive Order 12372. If you have questions, please contact me at (775) 684-0209.

Sincerely,

Zosia Targosz
Nevada State Clearinghouse Coordinator/SPOC

Enclosure

2/1

Rebecca Palmer

From: Zosia Targosz [zosia@budget.state.nv.us]
Sent: Wednesday, December 28, 2005 11:15 AM
To: Rebecca Palmer
Subject: E2006-244 Scoping for increasing depleted Uranium use at the Nevada Test and Training Range. - HQ ACC/A7ZP

RECEIVED
FEB 10 2006
DEPARTMENT OF ADMINISTRATION
OFFICE OF THE DIRECTOR
BUDGET AND PLANNING DIVISION

NEVADA STATE CLEARINGHOUSE
Department of Administration, Budget and Planning Division
209 East Musser Street, Room 200, Carson City, Nevada 89701-4298
(775) 684-0209 Fax (775) 684-0260
DATE: December 28, 2005

State Historic Preservation Office

Nevada SAI # E2006-244
Project: Scoping for increasing depleted Uranium use at the Nevada Test and Training Range.

Follow the link below to download an Adobe PDF document concerning the above-mentioned project for your review and comment.

http://budget.state.nv.us/clearinghouse/Notice/2006/E2006-244.pdf

Please evaluate it with respect to its effect on your plans and programs; the importance of its contribution to state and/or local areawide goals and objectives; and its accord with any applicable laws, orders or regulations with which you are familiar.

Please submit your comments no later than Monday, February 13, 2006.

Use the space below for short comments. If significant comments are provided, please use agency letterhead and include the Nevada SAI number and comment due date for our reference. Questions? Zosia Targosz, Clearinghouse Coordinator, (775) 684-0209 or zosia@budget.state.nv.us.

____No comment on this project ____Proposal supported as written

AGENCY COMMENTS:

Signature: Rebecca L Palmer Date: 1/26/06

The SHPO reviewed the subject document. The SHPO notes that this office previously commented on a similar project in the Three Lakes Valley area. Unfortunately, none of the maps included in the submission of 2005 or in the scoping document are similar in scale or map base. In order for this office to determine if we have previously reviewed the effect of the undertaking on cultural resources, the SHPO requests maps of a similar nature to the 2005 submission be sent to our office at your earliest convenience. If you have any questions concerning this correspondence, please contact me by phone at (775) 684-3443 or by E-mail at rlpalmer@clan.lib.nv.us.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

JUN 2 1 2006

MEMORANDUM FOR ALL INTERESTED GOVERNMENT AGENCIES, INDIVIDUALS, ORGANIZATIONS, AND PUBLIC AND ACADEMIC REFERENCE LIBRARIES

FROM: HQ ACC/A7ZP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

SUBJECT: Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range Draft Environmental Assessment

1. We are pleased to provide the Draft Environmental Assessment (EA) for the proposed increase in the use of Depleted Uranium (DU) at target 63-10 on the Nevada Test and Training Range (NTTR). This document is provided in accordance with the National Environmental Policy Act of 1969 (Public Law 91-190, 42 United States Code Sections 4321-4347), and its implementing regulations (40 CFR Parts 1500-1508). Libraries should file this document for public access and reference. The document is also available on the following web sites:

http://www.a7zpintegratedplanning.org
http://www.nellis.af.mil/pa.htm

2. We request submittal of your written comments on or before 24 July 2006; please address them to:

99 ABW/PA (Attn: Mike Estrada)
4430 Grissom Avenue, Ste 107
Nellis AFB NV 89191

SHERYL K. PARKER
Acting Chief, Planning Branch (A7ZP)

2 Attachments:
1. Distribution List
2. Draft EA

Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range
Draft Environmental Assessment
Distribution List

U.S. Army-Dugway Proving Ground
Dugway, UT 84022
Attn: Jerry Mason

National Nuclear Security Administration
Nevada Site Office
232 Energy Way
North Las Vegas, NV 89030
Attn: Michael Skougard

Planning, Environmental, Regulatory Division
CESWF-PER-EE
819 Taylor Street, Room 3A14
Fort Worth, TX 76102
Attn: Joe Paxton

AFIOH/SDRE
2350 Gillingham Dr.
Brooks City Base, TX 78235
Attn: Brian Renaghan

AFMSA/SGPR
110 Luke Avenue, Room 405
Bolling AFB, DC 20032

U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011
Attn: Rachel Browder

Nevada State Clearinghouse Department of Administration
209 E. Musser St., Room 200
Carson City, NV 89701
Attn: Zosia Targosz

Nevada Division of Environmental Protection
State of Nevada
Capitol Complex
333 W. Nye Lane, Room 138
Carson City, NV 89706
Attn: Allen Biaggi

Nevada Division of Emergency Management
2525 S. Carson Street
Carson City, NV 89711

Bureau of Land Management
Las Vegas Field Office
4701 Torrey Pines Drive
Las Vegas, NV 89130
Attn: Juan Palma

U.S. Fish and Wildlife Service
Nevada Ecological Field Office
1340 Financial Blvd., Suite 234
Reno, NV 89502
Attn: Robert Williams

Bureau of Land Management State Office
1340 Financial Blvd.
Reno, NV 89502

Office of Environmental Policy and Compliance
U.S. Department of the Interior
Office of the Secretary
Washington, DC 20240
Attn: Willie R. Taylor

Desert National Wildlife Refuge Complex Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
Attn: Linda Miller

Desert National Wildlife Refuge Complex Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
Attn: Amy Sprunger-Allworth

Clark County Clearinghouse
240 Water Street Mail Stop 115
Henderson, NV 89009
Attn: Jennifer Olsen

Southern Desert Correctional Center
P.O. Box 208
Indian Springs, NV 89070

High Desert State Prison
P.O. Box 650
Indian Springs, NV 89018

Clark County Comprehensive Planning
500 S. Grand Central Pkwy, Suite 3012
Las Vegas, NV 89155

Indian Springs Library
715 W. Gretta Lane
Indian Springs, NV 89018

North Las Vegas Library District Main Branch
2300 Civic Center Drive
North Las Vegas, NV 89030

Clark County Library
1401 E. Flamingo Road
Las Vegas, NV 89119

Sunrise Library
5400 Harris Avenue
Las Vegas, NV 89110

Received in PA
26 July 06
Estrada

KENNY C. GUINN
Governor

STATE OF NEVADA

ANDREW K. CLINGER
Director

DEPARTMENT OF ADMINISTRATION
209 E. Musser Street, Room 200
Carson City, Nevada 89701-4298
(775) 684-0222
Fax (775) 684-0260
http://www.budget.state.nv.us/

July 19, 2006

Mike Estrada
US Air Force
99 ABW/PA
4430 Grissom Avenue, Ste 107
Nellis AFB, NV 89191

Re: SAI NV # **E2006-470** Reference:

Project: **DEA for increased DU use at Nevada Test Range**

Dear Mike Estrada:

Enclosed are comments from the agencies listed below regarding the above referenced document. Please address these comments or concerns in your final decision.

State Historic Preservation Office

This constitutes the State Clearinghouse review of this proposal as per Executive Order 12372. If you have questions, please contact me at (775) 684-0209.

Sincerely,

Maud Naroll

Maud Naroll
Nevada State Clearinghouse

Enclosure

Rebecca Palmer

From: Clearinghouse [clearinghouse@budget.state.nv.us]
Sent: Wednesday, June 28, 2006 3:57 PM
To: Rebecca Palmer
Subject: E2006-470 DEA for increased DU use at Nevada Test Range - 99 ABW/PA

NEVADA STATE CLEARINGHOUSE
Department of Administration, Budget and Planning Division
209 East Musser Street, Room 200, Carson City, Nevada 89701-4298
(775) 684-0209 Fax (775) 684-0260
DATE: June 28, 2006

RECEIVED
JUL 17 2006
DEPARTMENT OF ADMINISTRATION
OFFICE OF THE DIRECTOR
BUDGET AND PLANNING DIVISION

State Historic Preservation Office

Nevada SAI # E2006-470
Project: DEA for increased DU use at Nevada Test Range

Follow the link below to download an Adobe PDF document concerning the above-mentioned project for your review and comment.

http://budget.state.nv.us/clearinghouse/Notice/2006/E2006-470.pdf

Please evaluate it with respect to its effect on your plans and programs; the importance of its contribution to state and/or local areawide goals and objectives; and its accord with any applicable laws, orders or regulations with which you are familiar.

Please submit your comments no later than Monday, July 17, 2006.

Use the space below for short comments. If significant comments are provided, please use agency letterhead and include the Nevada SAI number and comment due date for our reference. Questions? Zosia Targosz, Clearinghouse Coordinator, (775) 684-0209 or mailto:clearinghouse@budget.state.nv.us.

____No comment on this project ____Proposal supported as written

AGENCY COMMENTS:

Signature: Rebecca A Palmer Date: 7/14/06

See Previous Comments (1/26/06)

Distribution:
Sandy Quilici, Department of Conservation & Natural Resources Stephanie Martensen, Division of Emergency Management Alan Di Stefano, Economic Development Kathy Dow, Economic Development Chad Hastings, Fire Marshal Steve Robinson, Governor's Office Stan Marshall, State Health Division Skip Canfield, AICP, Division of State Lands Michael J. Stewart, Legislative Counsel Bureau John Walker, Division of Environmental Protection David Pulliman, Department of Wildlife, Director's Office D. Bradford Hardenbrook, Department of Wildlife, Las Vegas Robert Martinez, Division of Water Resources James D. Morefield, Natural Heritage Program Joseph C. Strolin, Agency for Nuclear Projects Steve Weaver, Division of State Parks Mark Harris, PE, Public Utilities Commission Pete Konesky, State Energy Office Rebecca Palmer, State Historic Preservation Office Alisa Huckle, UNR Library Zosia Targosz, zzClearinghouse Reese Tietje, zzClearinghouse -Reese Maud Naroll, zzClearinghouse-Maud

Campe, James P.

From: Campe, James P.
Sent: Friday, August 04, 2006 11:57 AM
To: 'rlpalmer@clan.lib.nv.us'
Cc: 'keith.myhrer@nellis.af.mil'
Subject: RE: DU
Attachments: DU Increase Maps.pdf

Dear Rebecca,

As we discussed on our phone call today, I am providing you with the map used in the 2004 consultation for the DU target Disposal proposal with Target 63-10 of the current proposal shown. The 2004 consultation letter refers to "...approximately 70 percent of the area has been impacted by mission-related activities. They include grading, target construction, and vehicle traffic initiated in the 1970's.".

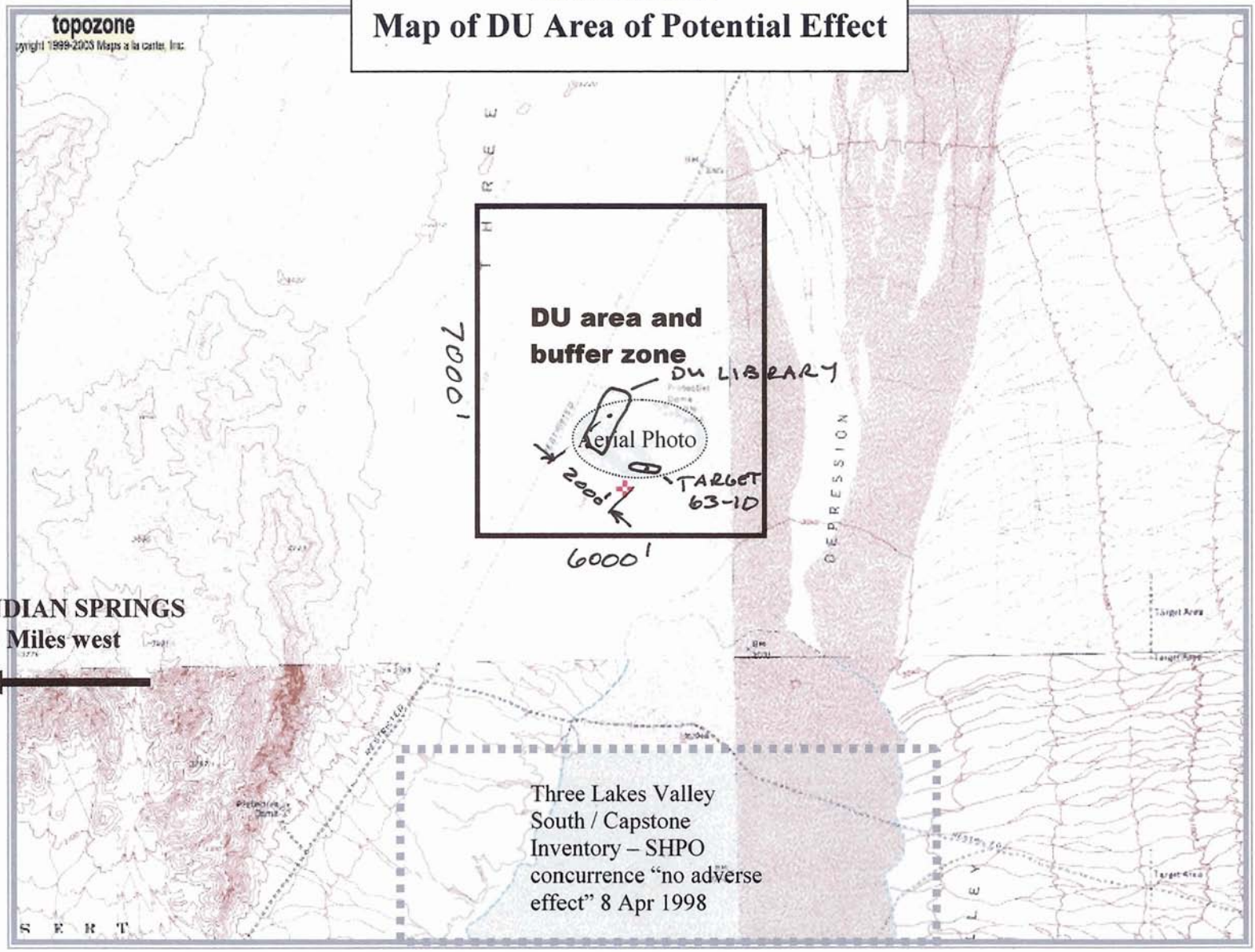
Target 63-10 described in the current DU Increase EA is part of the 70 percent and, in fact, is the target referred to in the above statement.

Please call or email me if you need anything else. My phone number is 530 888-7183.

Sincerely,

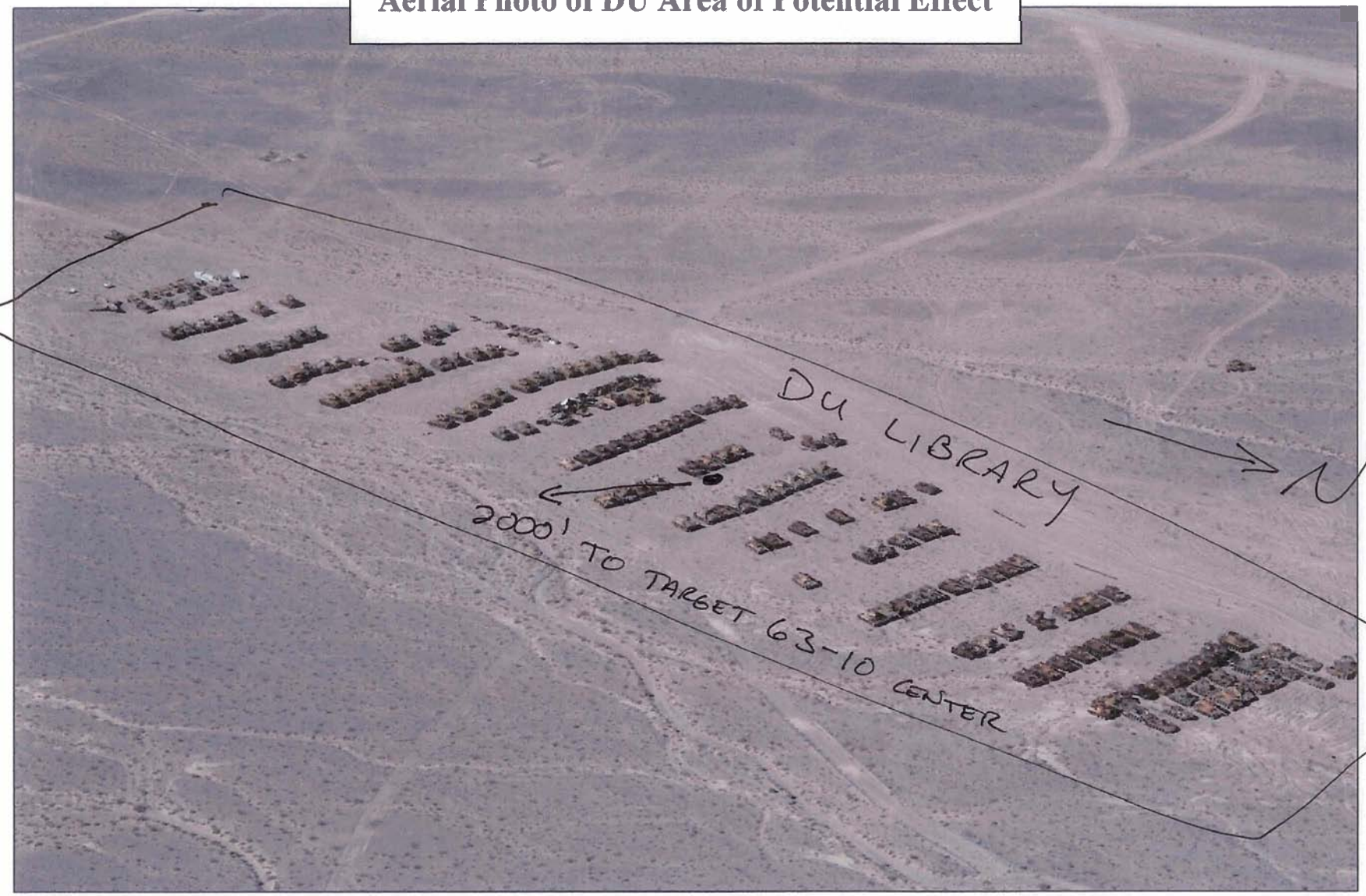
Jim Campe
TEC, Inc.
5361 Quail Hollow Ct
Pilot Hill CA 95664
530 888-7183 Office
530 919-3640 Cell

Attachment 1
Map of DU Area of Potential Effect



Map of DU buffer zone and the north portion of the Three Lakes Valley South/Capstone Inventory *clearance* zone.

Attachment 2
Aerial Photo of DU Area of Potential Effect



Department of Air Quality & Environmental Management

500 S Grand Central Pky 1st Fl • PO Box 555210 • Las Vegas NV 89155-5210
(702) 455-5942 • Fax (702) 383-9994

Christine L. Robinson, Director • Alan Pinkerton, Deputy Director • Lewis Wallenmeyer, Assistant Director

Mr. Mike Estrada
99 ABW/PA
4430 Grissom Ave., Ste 107
Nellis AFB, NV 89191

Re: Environmental Assessment (EA) for Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range

The Department of Air Quality and Environmental Management (DAQEM) reviewed the above document for any impacts to air quality. The project is proposed by the United States Air Force. The project continues and increases the use of depleted uranium (DU) ammunition at the Nevada Test and Training Range by the A-10 aircraft. The project site is located in an attainment area for the criteria pollutants. The following comments are provided for the above project:

Page 1-8, annual clean-up. The clean-up activities description appears not to meet the definition of construction activities to require a dust control permit, as stated in Section 94 of the Air Quality Regulations.

Pg. 6 and 3-10, affects of wind during firing operations. During firing impacts, the EA should consider the prevailing winds of the target area. Consider avoiding high wind days when conducting training activities to minimize fugitive dust from firings, aerosolized DU and possibly for pilot safety (i.e. wind shear etc.).

The above comments are provided for consideration. DAQEM doesn't object to the proposed alternative (Alternative A). Clark County Air Quality Regulations and forms are located on link http://www.accessclarkcounty.com/air_quality/index.htm . For more information please dial (702) 455-0287.

Sincerely,

John Mendoza, S. Planner
500 S. Grand Central Pky
PO Box 555210
Las Vegas, NV. 89155

BOARD OF COUNTY COMMISSIONERS
RORY REID, Chairman • MYRNA WILLIAMS, Vice Chair
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THOM REILLY, County Manager

APPENDIX B

AIR DISPERSION MODELING

APPENDIX B
AIR DISPERSION MODELING

OVERVIEW ON THE ATMOSPHERE

In a region close to the surface of the earth exists a boundary layer where large-scale flows in the atmosphere are transferred to a zero value at the surface of the earth. Within this region are pronounced vertical variations in the velocity as the horizontal velocity changes from strong flows to zero value. This turbulent region where changes in the velocity are concentrated is known as the planetary boundary layer (PBL). The PBL thickness is quite variable; on a clear day when it is thickest, the boundary layer ranges between 1 and 2 km, whereas on a clear night when it is thinnest, the PBL is less than 200 to 300 meters.

The upper limit of the PBL is denoted as h, and represents the thickness of the turbulent region adjacent to the ground. During the daytime when convective turbulence dominates, the thickness of the PBL is generally the height of the inversion layer. The top of the PBL can often be clearly seen by pilots as the upper region where reduced visibility caused be the mixing of smoke, dust, and other forms of small particulate.

Over flat regions, for example the DU licensed area, where the terrain is flat and homogenous, the PBL can be divided into three distinct layers.

1.) Surface Layer – The lowest part of the PBL is called the surface layer. The thickness of the surface layer is roughly 10 percent of the PBL. This is where the vertical distribution of the velocity and the characteristics of the turbulence are relatively simple and by the way the best understood. Logarithmic wind and temperature profiles are frequently used to model the surface layer conditions.

    In the lowest portion of the surface layer is found the viscous layer sublayer. This is the region where viscous forces dominate, eddy stress is nearly absent, and the mean wind speed has a large positive shear.

2.) Mixed Layer – Sometimes called the Ekman Layer of convective boundary layer. Here the mean gradients are usually smallest; in other words, the mean temperature and velocity profiles are essentially constant with height. The upper limit of the mixed layer generally extends to the inversion layer (z_i).

3.) Inversion Layer – This region extends between 0.8 z_i to 1.2 z_i. This region denotes the upper limit of the PBL. The conditions in this region approach those of the free atmosphere. Inside the

inversion layer turbulence structure is dominated by entrainment effects, the characteristics of the inversion, and the instability of the free atmosphere aloft.

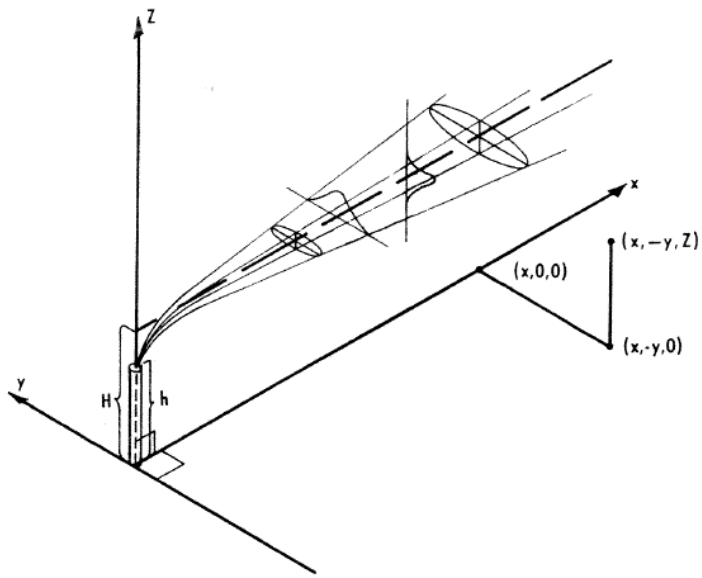
Above the PBL the motion of the air flow is quite different. The flow is much less turbulent and a major portion of the flow is viewed as laminar. Where there is turbulence above the PBL it is due to synoptic systems. These systems are related to atmospheric flow systems that can be resolved on weather maps that have eddies with horizontal scales on the order of 1,000 km. The amount of turbulent energy due to the synoptic system will increase in height up to the tropopause which is at an altitude of about 11 km about the earth surface. Two mechanisms responsible for turbulence above the PBL are: regions where air masses moving above one another produce localized shear layers and convective clouds.

OVERVIEW OF AIR DISPERSION MODELING

For air pollution release at the DU we are mainly concerned with the lowest layer of the PBL, namely the surface layer. One of the many concerns with air flowing in the surface layer is the surface roughness. Surface roughness causes turbulence that enables mixing of the pollutants with the atmosphere. In the DU the terrain is desert that is flat with low lying desert flora. The surface roughness contributes very little to the frictional effects of the wind, so that the wind variation near the ground will increase rapidly with elevation.

The pollution we are concerned with is from explosions that are released over shortened period of time. The pollution is not a continuous release that would result from a smoke stack, but rather a puff that occurs from an explosion. It is very difficult to accurately determine the concentration of the pollutant downstream of the puff, especially over an integrated period of time. The concentration at any downstream position is dependent on the wind direction, wind speed, the travel time, the turbulent level of the wind, height of release, and the total mass of the release.

There are different theories that have been applied to atmospheric dispersion modeling, but the most widely accepted technique is the Gaussian distribution. This distribution in its most general form assumes that the pollutants emitted by a point source are of a Gaussian distribution in the vertical and horizontal directions. In the figure below is a schematic illustrating the basic system of coordinates used in a Gaussian model.



The primary variables to a Gaussian model are:

	Concentration at receiver position, grams/m^3
Q	Pollutant emission rate, grams/sec
U	Wind speed, meters/sec
$_y$	Guassian Distribution standard deviation in the cross-wind direction, meters
$_z$	Guassian Distribution standard deviation in the vertical direction, meters
H	Effective height above ground level of pollutant release, meters

The equations that follow this theory determine the concentration at the ground along the wind direction denoted as x in the diagram. The maximum value is reached at the center of the plume at some effective height H above the ground level, which is the same as the height of the pollutant release.

The rate that the pollutant is dispersed into the atmosphere, as the plume move in the x direction is determined by the standard deviation. The values chosen for the standard deviation determine the concentration of the pollutant in the downwind direction from the point of release. There are many different techniques for estimating the values for the standard deviation, but the most widely accepted method was introduced by Pasquill (1961). Applications of the Pasquill methodology assume smooth terrain low surface roughness, which is a close approximation to the DU training area.

Pasquill divided the atmosphere into stability classes from which the standard deviations in the y and z direction are determined. The mechanical turbulence of the atmosphere is factored into the stability classes. The generation of positive buoyant turbulence is considered through the insolation of the incoming solar radiation. The negative generation of buoyant turbulence is considered through the

nighttime cover. High wind speeds on an overcast day will produce neutral conditions (stability class D), while low wind speeds with high levels of the earth surface heating will produce strongly unstable conditions (Stability class A). In this analysis it was assumed that the conditions modeled were for stability class B, which are the condition for a moderately unstable atmosphere. After selecting the stability class, a set of equations are then used to model the standard deviation in the y and z direction, from which the concentration is immediately determined.

The accuracy of the magnitude of the concentration at some point downwind from the point of release is considered a "best estimate." The error in the emission rate, the wind speed, and the atmospheric stability are included in the calculation. The error in the wind speed at the point of release is on the order of 10 to 50 percent. The error in the Pasquill dispersion parameters are compartmentalized into six classes, while in reality the atmosphere behaves as a continuum of these classes. These errors, though they may at first appear to be gross estimates, give an accurate indication of the concentration order of magnitude. The actual concentration will depend on many factors, but the order of magnitude of the concentration can be accurately estimated using the Gaussian dispersion model with the Pasquill stability classes.

REFERENCES

Turner, D. Bruce. 1994. Workbook of Atmospheric Dispersion Estimates. 2nd Edition.

Panofsky, Hans A. and John A. Dutton. 1984. Atmospheric Turbulence.

APPENDIX C

ENDANGERED, THREATENED, PROPOSED, AND CANDIDATE SPECIES OF NEVADA

ENCLOSURE

U. S. FISH AND WILDLIFE SERVICE
NEVADA FISH AND WILDLIFE OFFICE

ENDANGERED, THREATENED, PROPOSED AND CANDIDATE SPECIES OF NEVADA
(Updated October 30, 2003)

Species	Federal Status	Critical Habitat in NV	Recovery Plan
Birds			
Western yellow-billed cuckoo, *Coccyzus americanus occidentalis*	C	N/A	N/A
Southwestern willow flycatcher, *Empidonax traillii extimus*	E	N	N
Bald eagle, *Haliaeetus leucocephalus* ★	T	N	Y
Yuma clapper rail, *Rallus longirostris yumanensis*	E	N	Y
Reptile			
Desert tortoise, *Gopherus agassizii* (Mojave population)	T	Y	Y
Amphibians			
Columbia spotted frog, *Rana luteiventris* (Great Basin population)	C	N/A	N/A
Mountain yellow-legged frog, *Rana muscosa* (Sierra Nevada Distinct Population Segment)	C	N/A	N/A
Relict leopard frog, *Rana onca*	C	N/A	N/A
Fishes			
Warner sucker, *Catostomus warnerensis*	T	N	Y
Cui-ui, *Chasmistes cujus*	E	N	Y
White River springfish, *Crenichthys baileyi baileyi*	E	Y	Y
Hiko White River springfish, *Crenichthys baileyi grandis*	E	Y	Y
Railroad Valley springfish, *Crenichthys nevadae*	T	Y	Y
Devils Hole pupfish, *Cyprinodon diabolis*	E	N	Y
Ash Meadows Amargosa pupfish, *C. nevadensis mionectes*	E	Y	Y
Warm Springs pupfish, *Cyprinodon nevadensis pectoralis*	E	N	Y
Pahrump poolfish, *Empetrichthys latos*	E	N	Y
Desert dace, *Eremichthys acros*	T	Y	Y
Humpback chub, *Gila cypha* *	E	N	Y
Bonytail chub, *Gila elegans*	E	Y	Y
Pahranagat roundtail chub, *Gila robusta jordani*	E	N	Y
Virgin River chub, *Gila seminuda* [a]	E	Y	Y
White River spinedace, *Lepidomeda albivallis*	E	Y	Y
Big Spring spinedace, *Lepidomeda mollispinis pratensis*	T	Y	Y
Moapa dace, *Moapa coriacea*	E	N	Y
Lahontan cutthroat trout, *Oncorhynchus clarki henshawi*	T	N	Y
Woundfin, *Plagopterus argentissimus*	E	Y	Y
Colorado pikeminnow, *Ptychocheilus lucius* *	E	N	Y
Independence Valley speckled dace, *Rhinichthys osculus lethoporus*	E	N	Y
Ash Meadows speckled dace, *R. osculus nevadensis*	E	Y	Y
Clover Valley speckled dace, *R. osculus oligoporus*	E	N	Y
Bull trout, *Salvelinus confluentus* (Jarbidge River Distinct Population Segment)	T	N	N
Razorback sucker, *Xyrauchen texanus*	E	Y	Y

U. S. FISH AND WILDLIFE SERVICE
NEVADA FISH AND WILDLIFE OFFICE

ENDANGERED, THREATENED, PROPOSED AND CANDIDATE SPECIES OF NEVADA
(Updated October 30, 2003)

Species	Federal Status	Critical Habitat in NV	Recovery Plan
Invertebrates			
Ash Meadows naucorid, *Ambrysus amargosus*	T	Y	Y
Elongate mud meadows Pyrg, *Pyrgulopsis notidicola*	C	N/A	N/A
Carson wandering skipper, *Pseudocopaeodes eunus obscurus*	E	N	N
Plants			
Ash Meadows milkvetch, *Astragalus phoenix*	T	Y	Y
Spring-loving centaury, *Centaurium namophilum*	T	Y	Y
Ash Meadows sunray, *Enceliopsis nudicaulis* var. *corrugata*	T	Y	Y
Steamboat buckwheat, *Eriogonum ovalifolium* var. *williamsiae*	E	N	Y
Ash Meadows gumplant, *Grindelia fraxinopratensis*	T	Y	Y
Ash Meadows ivesia (mousetail), *Ivesia eremica* (= *I. kingii* var. *eremica*)	T	Y	Y
Webber ivesia, *Ivesia webberi*	C	N/A	N/A
Ash Meadows blazing star, *Mentzelia leucophylla*	T	Y	Y
Amargosa niterwort, *Nitrophila mohavensis*	E	N	Y
Soldier Meadows cinquefoil, *Potentilla basaltica*	C	N/A	N/A
Tahoe yellowcress, *Rorippa subumbellata*	C	N/A	N/A
Ute lady's tresses, *Spiranthes diluvialis*	T	N	D

E = Endangered; T = Threatened; C=Candidate; ★ = Proposed for delisting
Y = Yes; N = No; D = Draft; N/A = Not Applicable
* = Believed extirpated from Nevada;
[a] Endangered only in the Virgin River; population in Muddy River is species of concern.

APPENDIX D

DRAFT ENVIRONMENTAL ASSESSMENT DISTRIBUTION LIST

Increased Depleted Uranium Use on Target 63-10, Nevada Test and Training Range
Draft Environmental Assessment
Distribution List

U.S. Army-Dugway Proving Ground
Dugway, UT 84022
Attn: Jerry Mason

National Nuclear Security Administration
Nevada Site Office
232 Energy Way
North Las Vegas, NV 89030
Attn: Michael Skougard

Planning, Environmental, Regulatory Division
CESWF-PER-EE
819 Taylor Street, Room 3A14
Fort Worth, TX 76102
Attn: Joe Paxton

AFIOH/SDRE
2350 Gillingham Dr.
Brooks City Base, TX 78235
Attn: Brian Renaghan

AFMSA/SGPR
110 Luke Avenue, Room 405
Bolling AFB, DC 20032

U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011
Attn: Rachel Browder

Nevada State Clearinghouse Department of Administration
209 E. Musser St., Room 200
Carson City, NV 89701
Attn: Zosia Targosz

Nevada Division of Environmental Protection
State of Nevada
Capitol Complex
333 W. Nye Lane, Room 138
Carson City, NV 89706
Attn: Allen Biaggi

Nevada Division of Emergency Management
2525 S. Carson Street
Carson City, NV 89711

Bureau of Land Management
Las Vegas Field Office
4701 Torrey Pines Drive
Las Vegas, NV 89130
Attn: Juan Palma

U.S. Fish and Wildlife Service
Nevada Ecological Field Office
1340 Financial Blvd., Suite 234
Reno, NV 89502
Attn: Robert Williams

Bureau of Land Management State Office
1340 Financial Blvd.
Reno, NV 89502

Office of Environmental Policy and Compliance
U.S. Department of the Interior
Office of the Secretary
Washington, DC 20240
Attn: Willie R. Taylor

Desert National Wildlife Refuge Complex Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
Attn: Linda Miller

Desert National Wildlife Refuge Complex Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
Attn: Amy Sprunger-Allworth

Clark County Clearinghouse
240 Water Street Mail Stop 115
Henderson, NV 89009
Attn: Jennifer Olsen

Southern Desert Correctional Center
P.O. Box 208
Indian Springs, NV 89070

High Desert State Prison
P.O. Box 650
Indian Springs, NV 89018

Clark County Comprehensive Planning
500 S. Grand Central Pkwy, Suite 3012
Las Vegas, NV 89155

Indian Springs Library
715 W. Gretta Lane
Indian Springs, NV 89018

North Las Vegas Library District Main Branch
2300 Civic Center Drive
North Las Vegas, NV 89030

Clark County Library
1401 E. Flamingo Road
Las Vegas, NV 89119

Sunrise Library
5400 Harris Avenue
Las Vegas, NV 89110

Scoping Attendees:

James Pigg
E. Tiesenhavsen
Daniel Kezar
Christine Brehm
Ann Brauer
Jim Brauer