
RECORD OF DECISION

FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT FOR DEFENSE THREAT REDUCTION AGENCY (DTRA) ACTIVITIES ON WHITE SANDS MISSILE RANGE, NEW MEXICO

FINAL



Prepared by:

**Defense Threat Reduction Agency
8725 John J. Kingman Road
MSC 6201
Fort Belvoir, VA 22060-6201**

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

May 2007



DEFENSE THREAT REDUCTION AGENCY
1680 TEXAS STREET SE
KIRTLAND AFB, NM 87117-5669

23 May 2007

Defense Technical Information Center (DTIC)
DTIC Southern Regional Office at Albuquerque
ATTN: DTIC-BPA
Building 419
3550 Aberdeen Avenue, S.E.
Kirtland AFB, New Mexico 87117-5776

Dear sir or madam:

Please find enclosed the Record of Decision (ROD) for the *Final Programmatic Environmental Impact Statement (PEIS) for DTRA Activities on White Sands Missile Range, New Mexico*. The Final PEIS and ROD are also available for viewing on the DTRA website, www.dtra.mil.

This ROD documents the Agency's final decision based on analysis contained in the Final PEIS with regard to its intended future activities at WSMR. The preferred alternative was chosen because it was best suited to support DTRA's mission and is expected to have fewer environmental consequences than alternative two.

This ROD will be distributed to agencies having authority or oversight over aspects of the proposal and cooperating agencies, congressional and state offices and interested persons upon request. A Notice of Availability will be published in the Federal Register On May 25, 2007 announcing the ROD's availability for public viewing.

For more information, contact DTRA Public Affairs, (800) 701-5096 or (703) 767-5870.

Sincerely,

A handwritten signature in cursive script, reading "Joel Brian Wilson", is positioned above the typed name.

Brian Wilson
Site Manager
Zia Engineering and Environmental LLC
Contractor for DTRA

Enclosure

DEPARTMENT OF DEFENSE

Office of the Secretary

Lead Agency: Defense Threat Reduction Agency

Cooperating Agency: U.S. Army, White Sands Missile Range

Title: Record of Decision for DTRA Activities at White Sands
Missile Range, New Mexico

Additional Information: Cheri Abdelnour
Public Affairs Operations
Defense Threat Reduction Agency
(703) 767-5860/5870

Action: Record of Decision

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Section	Title	Page
	Acronyms and Abbreviations	4
I	Introduction	5
II	Background	6
III	Purpose and Need	6
IV	Alternatives Analysis	7
V	Public Involvement	10
VI	Environmental Impacts and Mitigation Measures	11
VII	Decision	23
Table S-1	Summary of Impact Analysis and Proposed Mitigations	24

Acronyms and Abbreviations

Alt. SHIST	Alternate Seismic Hardrock In Situ Test
Bt	<i>Bacillus thuringiensis</i>
CBR	chemical, biological, and radiological (simulants)
CEQ	Council on Environmental Quality
CO	carbon monoxide
dBA	Decibels (adjusted)
DoD	Department of Defense
DSWA	Defense Special Weapons Agency
DTRA	Defense Threat Reduction Agency
EA	Environmental Assessment
EIS	Environmental Impact Statement
HE	high explosive
HEST	high explosive simulations tests
HPS	Hantavirus pulmonary syndrome
HTD	Hard Target Defeat
LB/TS	Large Blast/Thermal Simulator
LCTA	Land Condition Trend Analysis
NEPA	National Environmental Policy Act
NOA	Notice of Availability
NOI	Notice of Intent
PEIS	Programmatic Environmental Impact Statement
PHETS	Permanent High Explosive Test Site
POL	petroleum, oil, and lubricants
PPE	personal protection equipment
ROD	Record of Decision
SAPs	Satellite Accumulation Points
SOPs	Standard Operating Procedures
SHIST	Seismic Hardrock In Situ Test
TWA	time-weighted average
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
WMD	weapons of mass destruction
WSMR	White Sands Missile Range
WS-ES	White Sands Environmental Services Division

I. INTRODUCTION

This Record of Decision (ROD) announces final Agency determinations and approvals prepared by the Defense Threat Reduction Agency (DTRA) in response to a proposal to increase DTRA testing activities at the White Sands Missile Range (WSMR), New Mexico. The proposed action (and preferred alternative) is comprised of nine activity-related categories: 1) collateral effects testing using simulant materials; 2) rock penetration testing; 3) hard target lethality and defeat testing; 4) advanced weapons lethality testing; 5) static high explosive (HE) testing for target lethality; 6) weapons effects testing using the Large Blast/Thermal Simulator (LB/TS); 7) antiterrorism testing; 8) development of weapon effects targets and test beds; and 9) improvements to the Permanent High Explosive Test Site (PHETS) Administrative Park.

Two Environmental Assessments (EA) covering DTRA operations at WSMR were completed in early 2002. At that time, DTRA had no requirements for the use of simulants or taggants south of Mockingbird Gap and the limited number of simulants met the Agency requirements. It was recognized at that time if either situation changed, additional National Environmental Policy Act (NEPA) reviews would be required. In the fall of 2002, requests were made for the use of simulants at Capitol Peak and for the use of new simulants. Based on the number of simulants, the potential impact to the White Sands pupfish population and the overall scope, DTRA in conjunction with WSMR, determined a Programmatic Environmental Impact Statement (PEIS) rather than an EA was necessary to appropriately evaluate the proposed action.

DTRA prepared and issued a PEIS March 15, 2007, to aid in determining the course of action for increased testing activities on WSMR. The range is managed by the U.S. Army, which participated as a cooperating agency in the development of the PEIS.

The PEIS analyzes the environmental consequences of the proposed action and the no action alternative. The timeframe for future actions under this document is approximately 10 years. Analysis in the document emphasizes potential environmental effects on the northern part of WSMR, which is the area most used by DTRA. Environmental subject areas included soils, water, biological resources, cultural resources, airspace, air quality, socioeconomics, and infrastructure.

This ROD was prepared and issued by DTRA to announce and document the proposed Federal actions and Agency decisions in compliance with the NEPA of 1969 and the implementing regulations of the Council on Environmental Quality (CEQ).

II. BACKGROUND

DTRA was established in 1998 to assist in safeguarding the United States and its allies from weapons of mass destruction (WMD). DTRA maintains a number of test beds and target types at WSMR to support the Department of Defense (DoD), Federal agencies, and friendly Nations' programs to counterproliferation of WMD. One of the DTRA legacy Agencies, the Defense Nuclear Agency, which was later known as the Defense Special Weapons Agency (DSWA), has operated and maintained test beds and related infrastructure at WSMR since 1976.

As part of its mission, DTRA evaluates the ability to counter and defeat WMD (chemical, biological, radiological, nuclear, and HEs). The Agency maintains a broad spectrum of target types on its test beds (many of them mock-ups of WMD facilities) and directs the development and implementation of new weapons technologies against these targets.

To evaluate weapon defeat capabilities and further sensor development for WMD agents, simulant test materials are used that have similar characteristics to the weapons materials, but are either non-hazardous or much less hazardous. When a mock WMD facility containing simulants is destroyed in a test on WSMR, the airborne simulant plume is tracked and analyzed to obtain models for the behavior of actual WMD plumes to better plan for a real scenario and helps reduce non-combatant casualties.

DTRA also conducts tests to evaluate warhead penetration through bedrock and deep soil against mock enemy target structures. For example, Hard Target Defeat testing analyzes the means to penetrate and destroy targets buried within rock structures (bunkers). Large- and small-scale HE tests are also conducted on DTRA test beds. At WSMR, DTRA currently operates the Large Blast/Thermal Simulator (LB/TS), PHETS, Seismic Hardrock In Situ Test Site (SHIST), Alternate SHIST Site (Alt. SHIST), and the Capitol Peak Hard Target Defeat (HTD) Test Bed.

III. PURPOSE AND NEED

The purpose of the proposed action is to provide adequate test areas and facilities to evaluate the lethality effectiveness of weapon systems used against simulated enemy ground targets producing, storing or controlling WMD.

There is a need to improve weapon systems designed to defeat enemy military assets including hardened and reinforced structures. These enemy military assets can house WMD and pose a significant threat to international stability and peaceful coexistence among Nations. The military structures and equipment of the

United States and its allies, alternately, must also be refined to better withstand attack by enemy weapon systems to reduce collateral damage.

IV. ALTERNATIVES ANALYSIS

Proposed Action (Alternative One):

The proposed action (alternative one) is the preferred alternative. The proposed action encompasses expanding existing test beds and creating new ones, expanding the range of test types including targets, simulants, delivery systems and explosives, and implementing infrastructure improvements at the PHETS Administrative Park.

The proposed action includes testing of special weapons and delivery systems and the expansion and/or improvement of existing weapon effects test facilities that have been explained in the following nine action categories:

- 1) Collateral effects testing using chemical, biological, and radiological (CBR) simulants;
- 2) Hard rock penetration testing;
- 3) Hard target lethality and defeat testing;
- 4) Advanced weapon lethality testing;
- 5) Static HE testing for target lethality;
- 6) LB/TS weapons effects testing;
- 7) Antiterrorism tests;
- 8) Development of weapon effects targets and test beds; and
- 9) Improvement to the PHETS Administrative Park

In summary, the nine action categories address the following: the use of new and larger amounts of CBR simulants, continued testing of existing concepts at new sites using existing and new weapon designs, location and use of new sites, and improvement to existing test bed infrastructure.

DTRA currently uses extensive areas in the northern part of WSMR where hardened and special WMD targets are built as mock-ups of enemy military structures and various weapons are tested against these targets. Hardened targets are well protected, often deeply buried structures that include reinforced concrete bunkers and tunnels excavated into mountains. Weapons currently tested are mainly air-delivered bombs and missiles in the current U.S. arsenal and developmental weapons. Some future tests would involve the use of CBR simulants. In these tests, the simulants placed inside mock production facilities would be released when the structure is attacked, allowing the dispersal patterns of the airborne simulants to be analyzed to predict the patterns of actual WMD

agents. This experimental data is used to validate predictive codes used to determine and minimize the exposure to non-combatants near a real-world facility following attack. Through the ongoing testing supported by DTRA, weapon systems are continually being developed and improved to defeat hardened targets and reduce the threat of WMD.

Some DTRA test beds would be used for static HE tests (detonating from a fixed position on the test bed). PHETS was created primarily to provide a location for conducting HE tests consisting of igniting above and below ground static charges. Proposed large-scale static HE tests (primarily using many tons of ammonium nitrate-fuel oil) would be designed to evaluate the survivability of military assets against simulated enemy nuclear blasts and to calibrate equipment used to verify compliance with the Threshold Test Ban Treaty of 1974. Proposed small-scale tests would be conducted to obtain the explosive characteristics of various system components and require smaller quantities of explosives.

Advanced weapons testing in the near future would include the possible use of lasers, electromagnetic pulse devices, and unmanned ground or air vehicles. Antiterrorism tests would be conducted using a mock-up government building at PHETS to obtain survivability data after the detonation of simulated terrorist explosive devices or for examining the characteristics of various improvised explosive devices. The proposed action also encompasses expanding test beds and creating new ones, and implementing infrastructure improvements at the PHETS Administrative Park.

The primary DTRA test beds are summarized below:

- LB/TS is an enclosed facility used to evaluate the survivability and vulnerability of full-scale military and other equipment subjected to the air blast and thermal conditions of an enemy's simulated nuclear explosion. The facility can also be used to simulate conventional explosive blast effects against building facades and military equipment.
- PHETS is used for HE events and tests to evaluate the effectiveness of various weapon systems against hardened targets. Collateral effects resulting from the release of chemical and biological agents after target defeat is also evaluated at PHETS using simulants and taggants (materials used to track the path of simulant plumes through the air).
- SHIST and Alt. SHIST sites are used principally for bedrock (e.g., granite, diabase, shale, or limestone) penetration tests using various warhead types. A new limestone test bed would be established at an

Alt. SHIST site. Weapons are typically air-delivered inert and live bombs, and projectiles launched from ground-based vehicles.

- The Capitol Peak HTD Test Bed was established to provide realistic hardened tunnel targets. These underground structures are excavated and recessed in bedrock and designed to simulate tunnels used to protect personnel and assets including nuclear, biological, chemical, and conventional weapons from attack.
- A new test bed for HTD testing is proposed at Mockingbird South.

Alternative one, the preferred alternative, would allow DTRA to expand its activities to better meet its mission of reducing the threat of WMD by utilizing weapons effects testing at WSMR.

Alternative Two

Alternative two contains all actions described in alternative one plus the use of chemical simulants and taggants/tracers that are considered to have higher toxicity levels than those considered under alternative one. Alternative two would provide a broader selection of chemical simulants available for collateral effects testing, providing greater security in reducing the threat of WMD, but would pose a higher risk to human health and the surrounding environment than those under alternative one. The increased hazard of using these chemicals leads to identifying alternative one as the preferred alternative.

No Action Alternative

The no action alternative would effectively cap the level of DTRA activities to the extent that development of threat reduction technologies would be seriously constrained. The no action alternative would limit the activities at present levels until existing environmental documentation expires.

Alternatives Considered, but Not Analyzed

Alternatives considered, but not carried forward for further analysis include: the establishment of alternate testing facilities other than WSMR, the exclusive use of computer modeling and simulations, and elimination of DoD weapons testing focused on reducing the threat of WMD. Test ranges other than WSMR could be used for many of the tests described in the proposed action; however, none of the other test ranges provide the needed space and infrastructure in one place, as WSMR does, to support these programs.

Computer modeling and simulation (especially regarding collateral effects tests) is an important tool for generating weapons effects testing data for control of WMD. However, this approach by itself is insufficient in that it must be validated by field-testing of the models and simulations.

The elimination of DoD development and testing of weapons to reduce the threat of WMD was suggested at a public information meeting regarding the PEIS. This alternative is a national policy issue beyond the scope of the PEIS. Therefore, this alternative was excluded from further consideration.

V. PUBLIC INVOLVEMENT

CEQ regulations implementing NEPA require public participation as part of an open process for determining the scope of issues related to the proposed action and its alternatives. Comments and questions received as a result of the DTRA PEIS process assist the DoD in identifying potential concerns and environmental impacts to the human and natural environment. Comments submitted to DTRA from the public regarding relevant environmental issues were thoughtfully considered for incorporation into the PEIS. All input from the public is part of the administrative record.

Open discussions with the public and concerned agencies about the PEIS scope, proposed action and alternatives to the proposed action, procedural issues, further public involvement, and issues of concern began on *May 19, 2003*, when the Notice of Intent (NOI) to prepare a PEIS was published in the *Federal Register*. The public scoping period ended on *September 15, 2003*.

A Notice of Availability (NOA) for the Draft PEIS was announced in the *Federal Register* *January 28, 2006*. This draft environmental analysis of proposed actions and alternatives was made available for public review to begin the public comment period. The 60-day public comment period, including public hearings, ended on *March 28, 2006*.

A number of methods were used to inform the public about DTRA activities on WSMR and solicit formal public comment including:

- The NOI and NOA announcement in the *Federal Register*
- Direct mailings to politicians, special interest groups, and landowners in the region
- Paid advertisements in local and regional newspapers in Spanish and English
- News releases to local and regional news media

- Information on the DTRA public Web site and a WSMR Web site link to the DTRA Web site
- Public meeting displays where DTRA representatives presented informational material

During the public meetings, attendees were invited to view informational displays, ask questions, and/or make comments to the program representatives regarding the draft PEIS. Regulatory agencies and the general public were given opportunities to offer written comments (e.g. letters and emails) and/or oral comments and questions (during public information meetings) regarding the PEIS for DTRA activities on WSMR. All written comments and oral transcripts of public meetings are located in the Final PEIS.

Comments made during the scoping and public comment periods ranged from strong support of national security goals and DoD activities such as DTRA, to condemnation for promoting violence and war. Many comments were: 1) largely political in nature, 2) general NEPA and environmental impact statement (EIS) process questions, and/or 3) unrelated to the DTRA proposed action and alternatives, considered outside the scope of the PEIS, and were therefore not addressed. Public and regulatory agency comments pertaining to specific resources potentially affected by the proposed action were considered for incorporation into the PEIS.

All comments received from the public, as well as from Federal, state, and local agencies, were carefully considered by DTRA in the preparation of the PEIS. In many cases, additional research was performed, or scientific explanations were expanded in the document to address comments. In some cases, DTRA responded by modifying material in the Draft PEIS that now appears in final form in the Final PEIS. All comments received during the 60-day public comment period were responded to within Section 8 of the Final PEIS.

VI. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impacts to the environment from the proposed action and alternatives were analyzed in the PEIS in the following categories: physical resources (further subdivided into topography, aesthetics and visual resources, climate, geology and soils, seismicity, and water resources); biological resources; cultural resources; land use; airspace; air quality; noise and blast; radiation; hazardous waste; human health and safety; and socioeconomics and infrastructure. The major factors used to evaluate environmental consequences consist of the following: *resource sensitivity* (the probable response of the resource to an action); *resource quality* (the present condition of the resource potentially affected); *resource quantity* (the

amount of the resource potentially affected); and *duration of impact* (the time over which the resource would be affected).

An additional category is *cumulative impacts*, which are incremental impacts of a proposed action when added to the other past, present, and reasonably foreseeable future impacts regardless of the agency or entity undertaking the action.

The following is a summary of the potential environmental impacts and mitigation measures anticipated from the proposed action (alternative one) only, since no additional impacts are anticipated from the no action alternative and alternative two would cause the greatest environmental impact. The impacts and associated mitigation methods of the proposed action and no action alternatives are summarized in detail in Table S-1, "Summary of Impact Analysis and Proposed Mitigations." **No significant impacts are anticipated from the proposed action if the proposed associated mitigation measures are implemented.**

Topography

Some changes to topography, particularly at the Capitol Peak HTD and SHIST test beds, could be significant. Mitigation measures are proposed to minimize the consequences of proposed DTRA activities. These measures include limiting vehicle travel to existing roads and off-road travel wherever possible. Proposed new roads should be evaluated and approved by White Sands Environmental Services Division (WS-ES) prior to construction. Following the end of their usefulness as test beds, all sites should be returned to their approximate original contours to the greatest extent feasible. Impact craters and depressions caused by explosions or recovery activities should be filled and returned to approximate original contours.

Aesthetics and Visual Resources

The proposed activities at various DTRA test beds (except LB/TS) would include explosives testing and construction. These activities would contribute to the already disturbed appearance of the landscape in established test beds and result in visual changes to some previously undisturbed areas. Construction activities would create dust visible to drivers on WSMR roads. Berms, tunnels, nonpermanent structures at PHETS, and other infrastructure constructed under the proposed action would also be visible from some local roads.

Mitigation measures are proposed to lessen the visual impact of DTRA activities under the proposed action. Test support vehicles should use existing roads and keep within test bed boundaries. Off-road travel should be limited to placement of testing infrastructure, plume tracking, and recovery activities using a single path in

and out. Following the end of their usefulness as test beds, these areas should be returned to their approximate original contours to the greatest extent feasible. Impact craters and depressions caused by explosions or recovery activities would normally be filled in and returned to approximate original contours following testing. In cases where recovery activities are prolonged due to extensive data collection efforts, craters and depressions should be filled within two years of testing.

Climate

Several collateral effects test materials (sulfur hexafluoride, carbon tetrafluoride, and bromine trifluoride) have been identified as greenhouse gases that contribute to the problem of global warming. However, only very small amounts of these tracer gases are used in biological simulant tests and their use is restricted. Interferent-type test materials, including burning plastic and tires, would produce relatively small quantities of carbon dioxide, a well-known greenhouse gas, through combustion. Considering the small quantities of greenhouse gases conceivably generated under the proposed action, DTRA activities would not significantly impact the climate on any scale.

Geology and Soils

There are no unique geologic features at any of the DTRA test beds that would be affected by DTRA activities. Concrete, sand, and gravel used for construction would have a small impact on geologic resources such as limestone and sand deposits.

Explosive detonations, hard rock penetration warhead tests, and excavation activities for target construction would have an effect on surface and near-surface soil horizons throughout the DTRA test beds. Soil compaction from construction equipment usage would increase the potential for soil erosion in the affected test beds.

Soils in the northern part of WSMR are subject to wind and water erosion. Wind erosion (and dust generation) would be a hazard to soils throughout DTRA test beds where ground-disturbing activities occur. Water erosion would be a slight to moderate hazard on most of the DTRA test beds, although areas with steeper slopes would have greater potential for sheet and gully erosion. Wildfires started inadvertently through DTRA activities would also potentially lead to accelerated erosion from creation of bare soil areas.

Soil chemical and biological characteristics would not be significantly affected from DTRA activities including the use of CBR simulants for collateral effects

tests. Biological simulants are the same types of bacteria that occur naturally throughout the environment and will not displace the native microbial populations. Other biological simulants would rapidly decompose or are non-infectious. Chemical simulants or test materials have mostly low propensity to adsorb soil and would dissipate readily into the air or degrade rapidly in the soil environment. Radiological simulants are non-radioactive and would not be harmful to existing soil microbes.

Soil erosion and compaction mitigation measures are proposed to address repairing damage to areas used by DTRA. Proposed mitigation measures for addressing soil compaction and erosion include maintaining or restoring vegetative cover, using existing roads only where possible, and creating roads in areas where impacts to vegetation would be minimized. An appropriate level of NEPA review should be conducted for all proposed new roads. Upon test bed closure, road areas should be remediated with the test beds. Additionally, fires should be managed in accordance with the WSMR Fire Management Plan, erosion control measures should be implemented along steep slopes, dust abatement measures should include the use of water spray trucks and application of soil stabilizers, and a comprehensive soil monitoring program should be established.

Seismicity

Geologic faults in the region that include the DTRA test beds have low seismic activity (not prone to generating earthquakes) and would be essentially unaffected by large-scale HE tests. The proposed action would not have an effect on seismicity with regard to generating earthquakes.

Water Resources

Surface water flow may be disrupted locally on test beds after ground disturbance from tunnel target construction, weapon impacts, and warhead recovery. In these instances, surface water runoff from rain events may increase due to an increase in bare ground, but would not cause flooding.

DTRA test beds are at least several kilometers from perennial surface water bodies in Tularosa Basin. Computer models have indicated that collateral effects tests at the Capitol Peak HTD test bed would result in only trace amounts of simulants potentially entering Salt Creek or nearby basin springs.

DTRA activities are not water-intensive and would have little effect on ground water resources in the region. Most of the water needed to support the proposed action would be transported by truck from WSMR supply wells, mainly Stallion Range Center. Explosive testing is not anticipated to affect ground water quality

on the DTRA test beds. PHETS is the main test bed historically for large-scale tests, and analysis of ground water samples has not revealed evidence of test-related contamination from explosive residues or unburned explosives. Well water samples near present collateral effects test beds have detected no simulants. Other DTRA test beds are mostly atop bedrock with thin alluvial cover, and there are likely only small amounts of temporary ground water present (i.e., after a substantial rainfall) at the alluvium-bedrock interface with little potential for contamination.

To mitigate any potential impacts to water resources, the following actions are proposed: groundwater should be analyzed annually for particular simulants tested at PHETS; storm water samples should be taken annually and analyzed for the presence of recently-tested simulants used at the Capitol Peak HTD test bed; ground water should be monitored at test sites frequently utilizing large quantities of perchlorate-based explosives; and, appropriate erosion control measures should be implemented to minimize surface water impacts from proposed test bed expansion and construction activities.

Biological Resources

Collateral effects using simulants may cause plant mortality, impair plant growth, or reduce plant reproductive success in areas close to the dispersion point. Other DTRA testing activities would disturb or destroy plants within the test bed. Tunnel target construction and test bed expansion would also damage or destroy vegetation locally.

The Todsen's pennyroyal (*Hedeoma todsenii*) is the sole Federal endangered plant species known on WSMR. Populations of this species are many kilometers south of the DTRA test beds and would not be affected by DTRA activities.

Most biological simulants do not cause disease and are essentially non-toxic. *Bacillus thuringiensis* (Bt) is a common soil bacteria and is used commercially as an insecticide. Insect mortality from tests using Bt is possible near DTRA test structures. There is evidence in scientific literature of Bt toxicity for certain birds and fish.

Chemical simulants have not been widely tested on wildlife species, but laboratory data indicate that most have high lethal dose/lethal concentration values (relatively large amounts of simulants are needed to cause mortality in sample populations). Some chemical simulants have the potential to bioaccumulate (build up within the tissue of an animal over time). Fish (and other aquatic fauna) are most prone to bioaccumulation, and 10 proposed test materials were identified to have potential for aquatic bioaccumulation.

Earth penetration tests, advanced weapons tests, HTD tests, and explosive tests have the potential to directly injure or kill native fauna from flying debris and blast overpressure. Craters generated from testing and warhead recovery may also pose a trapping hazard to animals. Construction of tunnel targets and test bed expansion through the use of heavy equipment may injure and kill flora and fauna in the areas. Noise from weapon detonations can invoke a startle or panic response in wildlife. Hearing damage to animals is also possible through exposure to large explosions on the DTRA test beds.

There are several faunal species with potential to occur within DTRA test beds in the northern part of WSMR. Mammal species include the desert bighorn sheep (*Ovis canadensis mexicana*, New Mexico endangered); the Oscura Mountains Colorado chipmunk (*Tamias quadrivittatus oscuraensis*, New Mexico threatened); and, the spotted bat (*Euderma maculatum*, New Mexico threatened). The sheep is a species introduced to the San Andres Wildlife Refuge far to the south of the DTRA test beds, and it is unlikely that the sheep would be affected from DTRA activities. The chipmunk occurs at higher elevations in the Oscura Mountains, and testing at SHIST Site would have little effect on these animals. The bat could potentially use the SHIST and Capitol Peak HTD test beds as roosting areas. The use of CBR simulants at these sites has the potential to locally affect insect populations that the bats feed upon.

Bird species that may occur on or near DTRA test beds include the northern aplomado falcon (*Falco femoralis septentrionalis*, Federal and New Mexico endangered); the American peregrine falcon (*Falco peregrinus anatum*, New Mexico threatened); the Baird's sparrow (*Ammodramus bairdii*, New Mexico threatened); and, the piping plover (*Charadrius melodus circumcinctus*, Federal threatened, and New Mexico endangered). The northern aplomado falcon has not been known to nest on WSMR since the early 1990s other than a juvenile observed near Stallion Range Center on August 27, 2005. However, this bird was determined to be a transient, and it is presumed that the range does not currently support a resident population. On July 26, 2006, the U.S. Fish and Wildlife Service (USFWS) down-listed the northern aplomado falcon in New Mexico from Federally Endangered to an Experimental Nonessential Population under section 10j of the Endangered Species Act of 1973 as amended.

The range of the American peregrine falcon lies mainly to the east of WSMR, where the bird is deemed rare. The Baird's sparrow is a rare species on WSMR and is more likely to be sighted during winter months. The piping plover is a rare spring migrant in New Mexico, with only a few sightings reported for the entire state. It is unlikely that DTRA activities would affect these animals.

The only fish species native to WSMR is the White Sands pupfish (*Cyprinodon tularosa*). This small fish is endemic to the Tularosa Basin, occurring in four separate habitats: Salt Creek, Malpais Spring, Mound Spring, and Lost River (Pittenger and Springer, 1999). The White Sands pupfish is listed as a State threatened species and a Federal species of concern. The term “species of concern” refers to a USFWS designation used for planning purposes only and connotes no listing status. Biological simulants released through testing activities may settle in waters home to the pupfish. However, analyses show that the amount of simulants potentially entering these waters would be exceedingly small and incapable of significantly effecting pupfish populations.

To mitigate any potential impacts to biological resources, the following actions are proposed: Data collection plots inside the PHETS boundaries should be sampled annually to assess the impacts of DTRA activities on flora, Land Condition Trend Analysis (LCTA). During static high explosive testing, the fire department would be on call to prevent the spread of wildfires. Best management practices designed to reduce erosion would be implemented. WSMR flora species of interest may be given preferential treatment, which may include avoidance or transplanting prior to construction activities. To avoid interfering with yucca pollination by the yucca moth, tests requiring the use of *Bacillus thuringiensis* (Bt) will not take place during the month of June, the peak flowering time of soap tree yucca. WSMR Environmental Services Division should be provided a list of individual strains and/or sources of all biological simulants for review prior to each test. To protect fauna and habitat, support vehicles should use existing roads whenever possible. Off-road travel will be limited to placement of testing infrastructure, plume tracking, and recovery activities using a single path in and out. If a desert bighorn sheep, northern aplomado falcon or the Baird’s sparrow is seen in proximity to a DTRA test bed, White Sands Environmental Services Division (WS-ES) will be contacted prior to testing. Periodic sampling of the stream waters containing pupfish should occur to ensure testing activities pose little or no impact to aquatic life.

Cultural Resources

The proposed action would not significantly affect archaeological resources, given certain mitigation measures are taken to ensure the least amount of damage to known archaeological sites and historic structures. Proposed mitigation for protection of cultural resources includes avoidance of all known archaeological sites and conducting archaeological surveys to identify cultural resources in previously non-surveyed areas prior to ground disturbing activities. If the planned level or intensity of HE testing should increase, prior consultations will be held with WSMR cultural resource personnel to determine the appropriate level of increased monitoring of the McDonald Ranch House.

Present Land Use

The proposed action is consistent with the mission of WSMR and with ongoing activities currently taking place on DTRA test beds. Military testing would continue as the primary land use for these areas into the foreseeable future. DTRA activities under the proposed action would not significantly affect the use of WSMR for recreation. Public access throughout the installation is limited to certain activities such as hunting, occasional races or bicycle excursion tours, and biannual tours to Trinity National Historic Landmark. These activities are scheduled to ensure that military testing remain the primary mission of WSMR and would not conflict with testing.

Airspace

The proposed action for DTRA activities would keep WSMR airspace use at approximately current levels or increase slightly. There would be an increase in number of sorties for air-to-ground weapons tests against DTRA targets (for example, collateral effects tests, HTD tests, earth penetration tests, and advanced weapon systems tests). The anticipated increased use of airspace is well within the capacity of WSMR, and DTRA activities would not significantly affect this resource.

Air Quality

Collateral effects testing would release CBR simulant plumes into the air above DTRA test beds. Plume concentrations would dissipate rapidly and reach extremely low levels near the northern WSMR boundary. In the case of biological simulants, spore concentrations would be well below levels of agricultural application. Effects to air quality from simulant releases would be transitory, occurring mainly near the point of release for a short time.

Plume tracers and taggants consist of inert gases and rare earth oxides. These materials, like the simulants, dissipate rapidly upon release, and concentrations would decrease to very low levels as the plume approached the WSMR boundary.

Airborne dust and combustion products (primarily water, nitrogen, and carbon dioxide) would be generated from detonations and impacts related to earth penetration tests, HTD tests, advanced weapon system tests, static explosive tests, and anti-terrorism tests. Construction of tunnel targets at Capitol Peak HTD test bed and the proposed Mockingbird South test bed would generate airborne dust from the use of heavy equipment. The testing use of LB/TS requires the release of nitrogen gas (essentially inert and the largest component of air).

DTRA activities will meet all applicable state and federal air quality regulations, and emissions will be maintained within permissible limits. Proposed mitigation to ensure hazardous quantities of test materials do not exit the range include developing prediction models before collateral effects tests and monitoring wind speed and direction. With this information a “no go” criteria will be developed for each test. To minimize dust generated from construction activities, a dust suppressant should be used when practical to minimize excessive vehicle-generated dust levels, and vegetation cover would be retained on sites wherever possible.

Noise

Static near-surface high explosive and air-delivered bomb detonations from DTRA activities would generate high levels of impulse noise on the test beds. The effects of noise and blast vary with size of the explosive charge. Many of these detonations would exceed the safe limit for human exposure, requiring the use of hearing protection equipment for non-evacuated personnel in the test area. Fauna in the vicinity of an explosive detonation will likely have a startle or panic reaction and leave the area or, if sufficiently close, be killed by the blast.

Aircraft used in DTRA activities will generate noise depending upon aircraft type, speed, altitude, and atmospheric conditions. Background traffic noise along roads servicing DTRA test beds typically generates similar short-duration noise.

Construction noise would be generated from building additional tunnel targets at Capitol Peak HTD test bed and a new test bed at Mockingbird South. Heavy equipment creates sufficient noise to require operators to don hearing protection equipment. Tunnel target construction may require detonation of explosives during excavation, creating impulse noise.

Hearing protection will be provided to any exposed personnel within 9.2 km (5.7 mi) of an event 1 KT or larger. If an employee's noise exposure is expected to exceed 85 decibels (dBA) expressed as an 8-hour time-weighted average (TWA), the employee would be required to enroll in a hearing conservation program. Weather and overcast conditions should be monitored, and blast predictions will be verified with distant off-range measurements when conducting HE tests over 20,000 lbs to minimize air blasts.

Radiation

Activities under the proposed action would not result in any significant impacts from ionizing check sources, lasers, or non-ionizing radiation as emissions. Sources of non-ionizing radiation in program activities include instrumentation

fielded for large-scale explosive testing, x-rays from high voltage radar equipment, and the testing of chemical agent detectors. These survey instruments use low-level alpha-radiation that poses little health hazard. Radiological simulant tests would not involve the use or production of ionizing radiation. Sources of non-ionizing radiation anticipated for DTRA activities include laser guidance and tracking systems, radar guidance and tracking systems, site illumination, communication, and electro-optical countermeasures.

Personnel will comply with all safety procedures when utilizing non-ionizing sources of radiation. For safety reasons, lasers are set at maximum permissible exposure levels, which are well below hazardous exposure levels. Each test planning process includes the creation of a test safety plan. When lasers are included as a part of the test, appropriate personal protective equipment (PPE)/eye protection is described and required. Personnel would comply with safety procedures involving support equipment. Safety zones would be established and clearly delineated to exclude entry into areas of hazardous radiation.

Hazardous Materials and Hazardous Waste

Petroleum, oils, and lubricants (POL) are the most common wastes likely to be encountered by personnel during project activities. CBR simulants and other test materials would be used in the smallest amounts practicable so as to reduce the accumulation of hazardous wastes. Any explosives needed for construction would be stored on-site in a temporary container designed for such use.

WSMR has the capability to manage the types and amounts of hazardous wastes generated by DTRA activities. Regulated materials are stored in areas that are far removed from the public. Waste having potentially hazardous or toxic substances would be segregated and stored in approved containers for eventual disposal in a designated area. This function is facilitated through a system of closely monitored Satellite Accumulation Points (SAPs) that are distributed throughout WSMR. SAPs are located at LB/TS, PHETS, and the Capitol Peak HTD test bed.

DTRA will follow appropriate standard operating procedures to prevent, control and cleanup any spills and releases that might occur as a result of testing operations. The collection, accumulation, and packaging of hazardous wastes will be performed in accordance with WSMR Regulation 200-1 *Environmental Hazardous Waste Management* during testing and construction activities. Vehicles, construction equipment, generators, and fuel storage units would employ a spill containment system (e.g., drip pans) in accordance with the WSMR Spill Prevention Plan and other regulations.

Human Health and Safety

DTRA activities pose little hazard to humans living in areas adjacent to WSMR. For collateral effects tests, personnel would handle and have contact with CBR simulants and other test materials during test preparations, post-test evaluations, and site clean up. PPE will be used in these situations in accordance with safety regulations. CBR simulant plumes having dispersed over long distances would pose little hazard to people living in areas outside of WSMR boundaries.

DTRA personnel are often required to travel substantial distances to work on DTRA test beds and are thus subject to risks that include vehicle accidents. In addition, workers are potentially exposed to on-site, work-related risks from the use of heavy equipment and machinery. Personnel involved in field work in support of DTRA activities would also potentially be exposed to the hantavirus while working in enclosed structures. Exposure to venomous animals and spiny plants while working at the DTRA test beds is also possible.

Emissions from heavy equipment could also create hazardous conditions, especially during the construction or reconstruction of tunnel targets. Diesel exhaust emissions from heavy equipment contain carcinogens that could cause carbon monoxide (CO) poisoning in confined spaces.

Visitors to the range for the bi-annual Trinity Site trips, races, hunting, field trips, or other public events are escorted by WSMR personnel or given specific instructions regarding approved routes and areas designated for the given activity. Participants in most of these activities are required to undergo an unexploded ordnance (UXO) briefing and follow specific rules while on WSMR to help ensure their safety and welfare.

Proposed methods for protecting human health and safety include the following: personnel should remain in close contact with the PHETS Administrative Park or other coordination center through radios or cellular telephones in the event of a safety issue or the need for evacuation; radios shall not be used in vicinity of blasting operations or explosive storage locations. WSMR policy requires that personnel receive UXO training and that personnel handling munitions for DTRA activities receive explosive/ammunition training. Training on safe operation of heavy equipment, motor vehicles, hazardous materials and waste use, the use of appropriate PPE, desert survival including animal avoidance, and first aid should also be provided to personnel when relevant. CO emissions should be monitored and work areas properly ventilated to prevent CO buildup in confined areas. To prevent Hantavirus pulmonary syndrome (HPS), exposure to rodents and rodent feces and urine should be avoided.

Socioeconomics and Infrastructure

The overall impact of the proposed action to socioeconomics and infrastructure to WSMR and the region as a whole would be small. The proposed increase in the scope of DTRA activities in the northern part of WSMR would be a small, added socioeconomic stimulus. There would likely be a small benefit to businesses and employment levels in nearby communities (for example, Socorro, NM).

The infrastructure of WSMR would remain essentially the same under the proposed action. Anticipated demands on utility items such as electricity, communications, and natural gas are well within the foreseeable capacity. The PHETS Administrative Park septic system would have capacity expanded by approximately 50 percent. Water requirements at the Park would also likely increase slightly. The road network that services the DTRA test beds has the capacity for any foreseeable increase in traffic volume under the proposed action. An increase in DTRA testing activities may require more frequent roadblocks of internal WSMR roads and of U.S. Highway 380, but this will only be an occasional and temporary disruption of normal traffic flow.

Environmental Justice

Persons who reside in and around WSMR, including minority and/or low-income persons, would not be adversely affected by the proposed action. No environmental or health impacts from the proposed action would be localized or placed primarily on the identified minority and/or low-income population components. The identified minority and/or low-income populations would not be disproportionately affected compared to the general population under the proposed action.

Cumulative Impacts

Cumulative environmental impacts from the proposed actions are anticipated but would not be significant. Cumulative impacts from DTRA tests and construction activities would primarily affect natural resources such as soils, vegetation, and cultural resources. The planned expansion of test beds and construction of a new test bed (Mockingbird South) would add to the overall amount of disturbance to various natural resources.

VII. DECISION

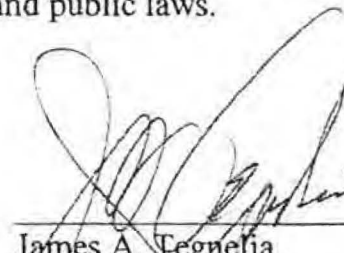
I have considered the potential environmental impacts of the proposed action as defined in the WSMR PEIS as well as the implied costs, technical requirements, applicable regulatory requirements, DTRA's mandate and mission, and public comments. In light of these factors and information, I have decided to implement the proposed action (alternative one) along with its proposed mitigation measures.

Although the no action alternative is the environmentally preferred method, by implementing the proposed mitigation measures, the environmental impacts of the proposed action will be minimized. Moreover, the proposed action is superior in its support of DTRA's mission to eliminate the threat of WMD. Since the proposed action will result in fewer environmental consequences than alternative two without sacrifice to DTRA's mission, it is preferred over alternative two as well.

DTRA will continue to work with the U.S. Army through their offices at WSMR when planning new tests and other activities on WSMR. This interaction will aid in reducing adverse environmental impacts at WSMR and uphold DTRA's commitment to preserving and protecting the environment, the health of DTRA personnel and the welfare of the surrounding communities.

I believe that this decision best meets the purpose and needs of DTRA and is consistent with all regulatory requirements and public laws.

Date: 15 May 07



James A. Tegnelia
Director
Defense Threat Reduction Agency

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Physical Resources, Section 4.1	• Minor disturbance to topography and visual aesthetics at the test beds. • Increased erosion, soil compaction, and surface water runoff. • Disturbance of bedrock at the test beds.	• The same impact on topography, aesthetics, geology, soils, and water resources as the proposed action.	• Less impact to topography, aesthetics, geology, soils, and water resources.	• Proposed mitigation to minimize impacts to topography, geology, soils, and visual resources should limit support vehicles to existing roads and test bed boundaries. Off-road travel should be limited to placement of testing infrastructure, plume tracking and recovery activities using a single path in and out. • Following the end of their usefulness as test beds, all sites (craters and depressions) should be returned to their approximate original contours. • Appropriate surface water and erosion control measures should be implemented at proposed test bed expansion areas. • Dust abatement measures could include the use of water spray trucks and application of soil stabilizers. The WS-ES land manager may also direct additional measures for dust abatement. • To address degradation of soil chemical quality, an appropriate soil monitoring program should be implemented. • Ground water should be analyzed annually for particular simulants tested at PHETS. • Storm water samples should be collected annually and analyzed for the presence of recently-tested simulants used at the Capitol Peak HTD test bed. • Ground water should be monitored at test sites frequently utilizing large quantities of perchlorate based explosives.

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Physical Resources, Section 4.1	- Minor disturbance to topography and visual aesthetics at the test beds. - Increased erosion, soil compaction, and surface water runoff. - Disturbance of bedrock at the test beds.	The same impact on topography, aesthetics, geology, soils, and water resources as the proposed action.	Less impact to topography, aesthetics, geology, soils, and water resources.	- Proposed mitigation to minimize impacts to topography, geology, soils, and visual resources should limit support vehicles to existing roads and test bed boundaries. Off-road travel should be limited to placement of testing infrastructure, plume tracking and recovery activities using a single path in and out. - Following the end of their usefulness as test beds, all sites (craters and depressions) should be returned to their approximate original contours. - Appropriate surface water and erosion control measures should be implemented at proposed test bed expansion areas. - Dust abatement measures could include the use of water spray trucks and application of soil stabilizers. The WS-ES land manager may also direct additional measures for dust abatement. - To address degradation of soil chemical quality, an appropriate soil monitoring program should be implemented. - Ground water should be analyzed annually for particular simulants tested at PHETS. - Storm water samples should be collected annually and analyzed for the presence of recently-tested simulants used at the Capitol Peak HTD test bed. - Ground water should be monitored at test sites frequently utilizing large quantities of perchlorate based explosives.

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Biological Resources, Section 4.2	• A small amount of vegetation would be disturbed or destroyed. • Impairment of plant growth and reproductive success • Increased water and wind erosion. • Simulants could affect insect pollinators causing indirect impacts to insectivores and insect pollinated plants. • Fauna located near test beds could be exposed to simulant materials. • Craters from weapons testing could create a trap hazard for fauna. • Fauna could be injured during test and construction activities. • Noise from construction and test activities would temporarily disturb fauna.	• The effect on floral and faunal species would be slightly higher than the proposed action because of increases in simulant toxicity	• Less impact to biological resources	• To assess the impacts of DTRA activities on flora, Land Condition Trend Analysis (LCTA), data collection plots inside the PHETS boundaries should be sampled annually. • During static high explosive testing, the fire department would be on call to prevent the spread of wildfires. • Best management practices designed to reduce erosion would be implemented. Examples may include mulching, chemical stabilization, silt fences, reseeding, and diversion berms. • WSMR floral species of interest may be given preferential treatment as determined by WS-ES, which may include avoidance or transplanting prior to construction activities. • To limit potential impacts, WS-ES should be provided a list of individual strains and/or sources of all biological simulants for review prior to each test. • To avoid interfering with yucca pollination by the yucca moth, tests using <i>Bacillus thuringiensis</i> (Bt) will not take place during the month of June, the peak flowering time of soap tree yucca. • To protect fauna and habitat, support vehicles should use existing roads whenever possible. Off-road travel will be limited to placement of testing infrastructure and recovery activities using a single path in and out. • Desert bighorn sheep were introduced to an area 41 miles south of WSMR and are unlikely to wander onto the test range. If a desert bighorn sheep (<i>Ovis canadensis mexicana</i>) is seen in proximity to a DTRA test bed, WS-ES will be contacted prior to testing. • Proposed mitigations for tests that could impact White Sands pupfish (<i>Cyprinodon tularosa</i>) habitat would include periodic sampling of the stream waters containing pupfish to assure little or no impact to aquatic life. • If a northern aplomado falcon (<i>Falco femoralis septentrionalis</i>) is sighted, or if DTRA plans to conduct activities in areas classified as suitable aplomado habitat, they will contact WSMR's Environmental Stewardship Division to ensure compliance with the Endangered Species Act.

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Biological Resources, Section 4.2	• A small amount of vegetation would be disturbed or destroyed. • Impairment of plant growth and reproductive success. • Increased water and wind erosion. • Simulants could affect insect pollinators causing indirect impacts to insectivores and insect pollinated plants. • Fauna located near test beds could be exposed to simulant materials. • Craters from weapons testing could create a trap hazard for fauna. • Fauna could be injured during test and construction activities. • Noise from construction and test activities would temporarily disturb fauna.	• The effect on floral and faunal species would be slightly higher than the proposed action because of increases in simulant toxicity.	• Less impact to biological resources.	• To assess the impacts of DTRA activities on flora, Land Condition Trend Analysis (LCTA), data collection plots inside the PHETS boundaries should be sampled annually. • During static high explosive testing, the fire department would be on call to prevent the spread of wildfires. • Best management practices designed to reduce erosion would be implemented. Examples may include mulching, chemical stabilization, silt fences, reseeding, and diversion berms. • WSMR floral species of interest may be given preferential treatment as determined by WS-ES, which may include avoidance or transplanting prior to construction activities. • To limit potential impacts, WS-ES should be provided a list of individual strains and/or sources of all biological simulants for review prior to each test. • To avoid interfering with yucca pollination by the yucca moth, tests using <i>Bacillus thuringiensis</i> (Bt) will not take place during the month of June, the peak flowering time of soap tree yucca. • To protect fauna and habitat, support vehicles should use existing roads whenever possible. Off-road travel will be limited to placement of testing infrastructure and recovery activities using a single path in and out. • Desert bighorn sheep were introduced to an area approximately 41 miles south of WSMR and are unlikely to wander onto the test range. If a desert bighorn sheep (<i>Ovis canadensis mexicana</i>) is seen in proximity to a DTRA test bed, WS-ES will be contacted prior to testing. • Proposed mitigations for tests that could impact White Sands pupfish (<i>Cyprinodon tularosa</i>) habitat would include periodic sampling of the stream waters containing pupfish to assure little or no impact to aquatic life. • If a northern aplomado falcon (<i>Falco femoralis septentrionalis</i>) is sighted, or if DTRA plans to conduct activities in areas classified as suitable aplomado habitat, they will contact WSMR's Environmental Stewardship Division to ensure compliance with the Endangered Species Act.

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Cultural Resources, Section 4.3	• The proposed action would not significantly affect archaeological resources, if certain mitigation measures are taken. • Radiocarbon dating could be affected by chemical and biological simulants.	• The effect on cultural resources from additional simulants would be similar to the proposed action.	• Less impact to cultural resources.	• Proposed mitigation for protection of cultural resources includes avoidance of all known archaeological sites and conducting archaeological surveys to identify cultural resources in previously non-surveyed areas prior to ground disturbing activities. • If the planned level or intensity of HE testing should increase, prior consultations will be held with WSMR cultural resource personnel to determine the appropriate level of increased monitoring of the McDonald Ranch house. • Proper sample preparation will greatly reduce the chance of simulant contamination of datable material.
Present Land Use, Section 4.4	• The proposed action would not significantly affect present land use.	• Same affect as the proposed action.	• Same affect as the proposed action.	• In the event that testing activities must be conducted during non-duty hours, range scheduling and WS-ES will be notified in advance to ensure that no conflicts occur.
Airspace, Section 4.5	• Air.space activities would increase slightly over present levels.	• Same affect as the proposed action.	• Less impact to airspace.	• None
Air Quality, Section 4.6	• Release of simulant plumes, explosive by-products, and dust from test activities. • Construction and testing activities would generate dust and vehicular emissions.	• Additional simulants would result in the release of test materials with higher toxicity levels than the proposed action.	• Less impact to air quality.	• Proposed mitigation to ensure hazardous quantities of test materials do not exit the range include developing prediction models before collateral effects tests and monitoring wind speed and direction. With this information a "no go" criteria will be developed for each test. • A proposed mitigation to minimize dust generated from construction activities would be to apply a dust suppressant when practical to minimize excessive vehicle-generated dust levels, and vegetation cover would be retained on sites wherever possible.
Noise and Blast, Section 4.7	• Personnel and fauna would be exposed to noise from test and construction activities.	• Same as the proposed action.	• Less impact from noise and blast.	• Employees would be enrolled in a hearing conservation program if noise exceeds 85 dBA expressed as an 8-hour TWA and would be required to wear hearing protection. • Personnel would be evacuated to a safe distance prior to explosive tests. • To minimize blast pressure effects resulting from high-explosive tests over 20,000 lbs, weather, and overcast conditions should be monitored and blast predictions be verified with distant off-range measurements.

Table S-1. Summary of Impact Analysis and Proposed Mitigations				
Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Cultural Resources, Section 4.3	- The proposed action would not significantly affect archaeological resources, if certain mitigation measures are taken. - Radiocarbon dating could be affected by chemical and biological simulants.	The effect on cultural resources from additional simulants would be similar to the proposed action.	Less impact to cultural resources.	- Proposed mitigation for protection of cultural resources includes avoidance of all known archaeological sites and conducting archaeological surveys to identify cultural resources in previously non-surveyed areas prior to ground disturbing activities. - If the planned level or intensity of HE testing should increase, prior consultations will be held with WSMR cultural resource personnel to determine the appropriate level of increased monitoring of the McDonald Ranch house. - Proper sample preparation will greatly reduce the chance of simulant contamination of datable material.
Present Land Use, Section 4.4	The proposed action would not significantly affect present land use.	Same effect as the proposed action.	Same effect as the proposed action.	In the event that testing activities must be conducted during non-duty hours, range scheduling and WS-ES will be notified in advance to ensure that no conflicts occur.
Airspace, Section 4.5	Airspace activities would increase slightly over present levels.	Same effect as the proposed action.	Less impact to airspace.	None.
Air Quality, Section 4.6	- Release of simulant plumes, explosive by-products, and dust from test activities. - Construction and testing activities would generate dust and vehicular emissions.	Additional simulants would result in the release of test materials with higher toxicity levels than the proposed action.	Less impact to air quality.	- Proposed mitigation to ensure hazardous quantities of test materials do not exit the range include developing prediction models before collateral effects tests and monitoring wind speed and direction. With this information a "no go" criteria will be developed for each test. - A proposed mitigation to minimize dust generated from construction activities would be to apply a dust suppressant when practical to minimize excessive vehicle-generated dust levels, and vegetation cover would be retained on sites wherever possible.
Noise and Blast, Section 4.7	Personnel and fauna would be exposed to noise from test and construction activities.	Same as the proposed action.	Less impact from noise and blast.	- Employees would be enrolled in a hearing conservation program if noise exceeds 85 dBA expressed as an 8-hour TWA and would be required to wear hearing protection. - Personnel would be evacuated to a safe distance prior to explosive tests. - To minimize blast pressure effects resulting from high-explosive tests over 20,000 lbs, weather, and overcast conditions should be monitored and blast predictions be verified with distant off-range measurements.

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Radiation, Section 4.8	• Testing and support equipment would emit low-levels of ionizing or non-ionizing radiation. • Exposure could possibly result in damage to eyes, skin and organ tissue.	• Same as the proposed action.	• Same as the proposed action.	• Personnel should comply with safety procedures involving radars and other support equipment that emits non-ionizing and ionizing radiation. Safety zones should be established and clearly delineated, to exclude entry into areas of hazardous radiation.
Hazardous Materials and Waste, Section 4.9	• POL waste would be generated from test and construction activities.	• Following regulations, SOPs and guidelines, the impact of alternative two would be the same as the proposed action.	• Less impact from hazardous materials and waste.	• Vehicles, construction equipment, generators, and fuel storage units would employ a spill containment system (e.g., drip pans) in accordance with the WSMR Spill Prevention Plan. • CBR simulants and other test materials would be used in the smallest amounts practicable so as to reduce the accumulation of hazardous wastes.
Human Health and Safety, Section 4.10	• Personnel could be exposed to CBR test materials during test preparations, post-test evaluation, and site cleanup. • Nitrogen gas could displace oxygen, producing a hazardous working environment. • Personnel would be exposed to hazards from the use of explosives, heavy equipment operation, and post-test evaluations of tunnel targets such as falling rock, cave-ins and dust inhalation.	• Same as the preferred alternative plus exposure to test materials that are more toxic.	• Less impact to human health and safety.	• Personnel will use PPE in accordance with MSDS recommendation for all CBR test materials. • To avoid hazardous working environments at LB/TS in which nitrogen could displace oxygen, all SOPs and safety precautions will be followed to ensure the safety of test personnel. • Personnel would be trained on safe operation of heavy equipment and wear hardhats and other appropriate PPE. • Measures to reduce hazards concerning engine exhaust emissions include monitoring for CO, proper ventilation of work areas, and the use of proper PPE.

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Radiation, Section 4.8	• Testing and support equipment would emit low-levels of ionizing or non-ionizing radiation. • Exposure could possibly result in damage to eyes, skin and organ tissue.	• Same as the proposed action.	• Same as the proposed action.	• Personnel should comply with safety procedures involving radars and other support equipment that emits non-ionizing and ionizing radiation. Safety zones should be established and clearly delineated, to exclude entry into areas of hazardous radiation.
Hazardous Materials and Waste, Section 4.9	• POL waste would be generated from test and construction activities.	• Following regulations, SOPs and guidelines, the impact of alternative two would be the same as the proposed action.	• Less impact from hazardous materials and waste.	• Vehicles, construction equipment, generators, and fuel storage units would employ a spill containment system (e.g., drip pans) in accordance with the WSMR Spill Prevention Plan. • CBR simulants and other test materials would be used in the smallest amounts practicable so as to reduce the accumulation of hazardous wastes.
Human Health and Safety, Section 4.10	• Personnel could be exposed to CBR test materials during test preparations, post-test evaluation, and site cleanup. • Nitrogen gas could displace oxygen, producing a hazardous working environment. • Personnel would be exposed to hazards from the use of explosives, heavy equipment operation, and post-test evaluations of tunnel targets such as falling rock, cave-ins and dust inhalation.	• Same as the preferred alternative plus exposure to test materials that are more toxic.	• Less impact to human health and safety.	• Personnel will use PPE in accordance with MSDS recommendation for all CBR test materials. • To avoid hazardous working environments at LB/TS in which nitrogen could displace oxygen, all SOPs and safety precautions will be followed to ensure the safety of test personnel. • Personnel would be trained on safe operation of heavy equipment and wear hardhats and other appropriate PPE. • Measures to reduce hazards concerning engine exhaust emissions include monitoring for CO, proper ventilation of work areas, and the use of proper PPE.

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Human Health and Safety, Section 4.10 (Continued)	• Engine exhaust could cause CO poisoning in confined spaces. • Personnel would be exposed to the risk of vehicle collisions with oryx. • Personnel could be exposed to the risk of hantavirus and West Nile virus. • Outdoor working conditions could result in heat-related illness. • Personnel could be exposed to venomous snakes, insects and spiders.			• DTRA personnel should be briefed on the potential for oryx/vehicle collisions and precautions to be taken. • To prevent hantavirus pulmonary syndrome (HPS), exposure to rodents and rodent feces and urine should be avoided. Personnel should avoid areas that have potential hantavirus risk until that risk has been evaluated and abated, if necessary. • Precautions should be taken to minimize the risk of contracting West Nile virus, to include avoiding areas with a high concentration of mosquitoes, wearing insect repellent, and draining standing water. • Personnel should be briefed on desert survival and the signs of heat stroke and heat exhaustion. Personnel should be provided with adequate water and have proper training in first aid for heat related illness. • Personnel should avoid contact with venomous snakes, spiders, scorpions, and spiny plants.
Socioeconomics and Infrastructure, Section 4.11	• Would provide an added, but relatively small, stimulus to the local and regional economies.	• Same as the proposed action.	• No change.	• None
Environmental Justice, Section 4.12	• No adverse impacts to minority populations located in the region of influence. • Would not disproportionately affect minority and low-income populations compared to the general population.	• Same as the proposed action.	• Same as the proposed action.	• None

Table S-1. Summary of Impact Analysis and Proposed Mitigations

Environmental Resources	Impacts of the Proposed Action (Preferred Alternative)	Impacts of Alternative Two	Impacts of the No Action Alternative	Proposed Mitigation
Human Health and Safety, Section 4.10 (Continued)	- Engine exhaust could cause CO poisoning in confined spaces. - Personnel would be exposed to the risk of vehicle collisions with oryx. - Personnel could be exposed to the risk of hantavirus and West Nile virus. - Outdoor working conditions could result in heat-related illness. - Personnel could be exposed to venomous snakes, insects and spiders.	<i>No additional content shown in source table (continuation row).</i>	<i>No additional content shown in source table (continuation row).</i>	- DTRA personnel should be briefed on the potential for oryx/vehicle collisions and precautions to be taken. - To prevent hantavirus pulmonary syndrome (HPS), exposure to rodents and rodent feces and urine should be avoided. Personnel should avoid areas that have potential hantavirus risk until that risk has been evaluated and abated, if necessary. - Precautions should be taken to minimize the risk of contracting West Nile virus, to include avoiding areas with a high concentration of mosquitoes, wearing insect repellent, and draining standing water. - Personnel should be briefed on desert survival and the signs of heat stroke and heat exhaustion. Personnel should be provided with adequate water and have proper training in first aid for heat related illness. - Personnel should avoid contact with venomous snakes, spiders, scorpions, and spiny plants.
Socioeconomics and Infrastructure, Section 4.11	Would provide an added, but relatively small, stimulus to the local and regional economies.	Same as the proposed action.	No change.	None.
Environmental Justice, Section 4.12	- No adverse impacts to minority populations located in the region of influence. - Would not disproportionately affect minority and low-income populations compared to the general population.	Same as the proposed action.	Same as the proposed action.	None.