

**DRAFT**

**ENVIRONMENTAL ASSESSMENT  
THERMAL TEST FACILITY**

**SOLDIER SYSTEMS CENTER  
NATICK, MASSACHUSETTS**

BPA MASTER NUMBER  
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*Prepared for:*

Soldier Systems Center  
Natick, Massachusetts

*Prepared by:*

MACTEC Engineering and Consulting, Inc.  
Portland, Maine  
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This report presents a summary of information known to MACTEC concerning the project site which MACTEC considered pertinent to the scope of work and stated project objective. MACTEC performed this environmental assessment with the care and skill ordinarily used by members of the profession practicing under similar conditions. The conclusions presented herein are those that are deemed pertinent by MACTEC based upon the assumed accuracy of the available information. No other warranty, expressed or implied, is made as to the professional advice included in this report. The information present in this report is not intended for any use other than the stated objectives of the project and is intended for the sole use of the U.S. Army, the only intended beneficiary(ies) of our work. MACTEC's professional opinions contained in this report are subject to modification if additional information is obtained, through further investigation, observations, or verification testing and analysis.



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## 1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

This Environmental Assessment (EA) has been prepared for the proposed construction and operation of the Thermal Test Facility at the U.S. Army Soldier Systems Center (SSC Natick) in Natick, Massachusetts. The project is required to provide a fully instrumented, environmentally acceptable, and safe facility for the full-scale testing under controlled conditions of soldier uniforms and various support equipment. Testing at the proposed facility will determine the adequacy of protection provided to the soldier against battlefield thermal effects from flame/incendiary weapons, laser, and other thermal sources.

The overall mission of the SSC Natick is to accomplish research and development in physical and biological sciences and engineering effort for equipment and material to improve the effectiveness, survival, sustenance, and support of the individual soldier on the integrated battlefield of the future. SSC Natick also has the Navy Clothing Textile Research Facility as a tenant activity. This activity develops clothing and protection equipment for the Navy as well as the Coast Guard. SSC Natick is also tasked by the Air Force and Marines to provide technical assistance in developing their protective ensembles. All these factors make SSC Natick the Center of Excellence for clothing and protective equipment for all of the U.S. Department of Defense (DOD). Some of the clothing and equipment being developed are laser ballistic eye protection, light weight helmet, intermediate cold-wet glove, enhanced desert and hot weather battle dress uniforms, enhanced cold weather clothing systems, communication and aural protection systems, and five-soldier tents.

The proposed Thermal Test Facility is required by SSC Natick to provide soldiers of the future with state of the art uniforms with flame and thermal protective capabilities. SSC Natick is also planning to establish the National Protection Center for developing protective clothing and equipment. SSC Natick is tasked to improve the effectiveness of the individual combat soldier through the evaluation and development of weapons and personal equipment worn or carried by the soldier. One part of SSC Natick's task is to develop clothing that is hardened to nuclear thermal effects. This testing was historically done using flash lamps available through a private contractor in Virginia. This arrangement is considered inadequate because it resulted in delays in reservation time and because testing could be done only on postage-sized textiles and not full ensembles. Because of these inadequacies and questions regarding relocation of the facility, SSC Natick has not performed this type of testing since 1985.

SSC Natick must also test for thermal resistance of clothing. Some testing has been done in the past at an outdoor facility at Kirtland Air Force Base in New Mexico. The Kirtland facility was designed and developed to test thermal effects on large equipment. Due to the large-scale size of the Kirtland facility, it is very expensive and not cost-efficient for SSC Natick to operate the entire facility to test a small mannequin ensemble.

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At the Kirtland facility, SSC Natick is also subject to weather delays and lack of last-minute flexibility in conducting tests. Schedule delays potentially set back the development of clothing research by as much as two years. Laser testing is conducted at SSC Natick, however, insufficient space causes many problems.

SSC Natick and other DOD researchers such as the Air Force Materials Lab, the Navy Textile Facility, and Federal and State agencies would greatly benefit from a thermal test facility located at SSC Natick. There is no other known total thermal testing facility for ensembles within the Department of the Army or within the DOD.

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Public comments for this draft EA must be received within 30-days of publication of the legal notice. A September 20, 2004 deadline has been set for public comments.

This document complies with the policies and procedures outlined in Department of the Army Regulation 32 CFR Part 651 "Environmental Analysis of Army Actions; Final Rule, Federal Register: March 29, 2002".



## 2.0 SITE DESCRIPTION AND PROPOSED ACTION

**Site Description.** SSC Natick is located approximately 17 miles west-southwest of Boston in the town of Natick, Massachusetts. The research facility, which occupies a small peninsula extending from the eastern shoreline of Lake Cochituate, encompasses approximately 74 acres. The land use surrounding SSC Natick along the eastern banks of Lake Cochituate includes residential, commercial/retail, and light industrial.

The location of the proposed 11,000 square foot Thermal Test Facility is between Buildings Number 20 and Number 77 in the rectangular-shaped North Campus, located at SSC Natick's northernmost end adjacent to the South Pond of Lake Cochituate (Figure 1); the North Campus is approximately 11 acres in size. The campus consists of several warehouse and material storage buildings, a laboratory, communications building, recreational fields, and non-commissioned officers' mess hall. Much of the area between the buildings is paved. The paved area serves as a parking lot, and also functions as a traveled way for motorists. The proposed Thermal Test Facility footprint area, is currently unoccupied by permanent structures; and is used by SSC Natick for intermittent, temporary storage of materials. An elevation view of the proposed facility is shown in Figure 2. There will be no net increase in impervious surfaces as a result of this project.



### 3.0 ALTERNATIVES CONSIDERED

The proposed action and subject of this EA is the proposed construction and operation of the Thermal Test Facility at SSC Natick (Alternative 1). Two additional options have been identified; these alternatives are: Alternative 2 Continue Existing Testing Program – testing at offsite facilities, with limited laser testing done at SSC Natick, and Alternative 3 No Action - cease testing of soldier clothing and equipment.

#### 3.1 ALTERNATIVE 1 - NEW THERMAL TEST FACILITY

Alternative 1 is the proposed construction and operation of the Thermal Test Facility. This alternative is the preferred alternative because:

- Alternative 1 will place a modern testing facility offering all types of thermal testing at SSC Natick, the Army's Center of Excellence for development of clothing and protective equipment for the individual soldier. SSC Natick is responsible for development of the Armored Crew Gear, Helicopter Uniform, Air Crew Uniform, Combat Vehicle Crewman Uniform, and the Battle Dress Uniform. SSC Natick is also responsible for the Chemical Protective Suits and the Laser Protection Goggles used in Operations Enduring Freedom and Iraqi Freedom. The addition of a new thermal test facility at SSC Natick will ensure the safety of the individual soldier on the integrated battlefields of the future.
- There is no federal government agency that does flame, laser, and nuclear threat testing all in one facility.
- All other DOD agencies would benefit from the research developments created at the new thermal test facility at SSC Natick.
- Construction and operation of the new thermal test facility is the lowest cost alternative of the two active alternatives (Alternatives 1 and 2). The net present value is higher while the equivalent uniform annual cost is lower for Alternative 1 when compared to Alternative 2.
- Operation of the new facility will prevent a two-year lag time (discussed in the following Alternative 2 text) between research and development efforts and clothing development testing.

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### **3.2 ALTERNATIVE 2 – CONTINUE EXISTING TESTING PROGRAM**

Alternative 2 is the continuation of the existing testing program, which takes place at outdoor facilities at Kirtland AFB, with limited laser testing completed at SSC Natick. This alternative is considered to be unacceptable because:

- The high cost of doing external testing has prevented SSC Natick’s researchers from completing all desired testing for certain uniforms and protective ensembles for the troops. This presents two problems: (1) the potential is created for unacceptable quality or latent defects in the finished products at the production end of the development effort, and (2) due to the lag time between clothing research efforts and development (see next item below), a uniform could potentially become obsolete in one year because of possible improvements discovered by further testing. The financial implications of repeated mass uniform production as a result of this shortcoming are significant.
- Researchers have determined that the time needed to find required testing facilities and delays due to weather and scheduling difficulties causes clothing development and production to lag up to two years behind research efforts.
- Natick SSC is currently using Kirtland AFB for thermal radiation source testing. This outdoor facility is designed for large equipment and is not an optimal venue for testing clothing and small equipment. As a result, radiation source testing results are not as accurate as would be expected from a smaller indoor facility. When testing is required, researchers must pack up their equipment and travel over two thousand miles to perform testing; scheduling of research efforts at the offsite facility also must take into account facility availability.

### **3.3 ALTERNATIVE 3 – CEASE TESTING PROGRAM (NO ACTION ALTERNATIVE)**

Alternative 3 is the cessation of soldier clothing and equipment testing. This alternative is considered to be unacceptable because:

- Cessation of soldier clothing and equipment testing would discontinue a significant component of the mission of SSC Natick by seriously impairing its ability to make available the most protective uniform ensemble and support equipment possible. In addition, SSC Natick’s plans to establish the state of the art National Protection Center for developing protective clothing and equipment would be jeopardized.
- Alternative 3 would impair the national defense posture by reducing the protection provided to U.S. military personnel on the battlefield.

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#### 4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section discusses the existing environment in the vicinity of the Thermal Test Facility, where potential environmental effects may be experienced during facility operation. Existing conditions for each resource category are provided as a baseline for evaluating potential impacts resulting from the proposed construction. Resources evaluated include land use, infrastructure (traffic and utilities), socioeconomics, public services, noise, air quality and climate, geology and soils, water resources, biological resources, and cultural resources. For the Continue Existing Testing Program alternative and the No Action alternative (Alternatives 2 and 3, respectively), existing conditions for all resource categories would remain essentially unchanged. Note that all necessary permits, registrations and regulatory approvals for equipment to be used at this facility will be obtained prior to operating this facility.

**Land use.** The North Campus consists of several warehouse and material storage buildings, a laboratory, communications building, and recreational fields. Much of the area between the buildings is paved. The paved area serves as a parking lot, and also functions as a traveled way for motorists. An area of private residences abuts the North Campus; the closest residence to the proposed facility is approximately 300 feet west of the proposed Thermal Test Facility.

It is anticipated that the day-to-day business conducted at the campus will continue into the foreseeable future. Additionally, there are no current plans to change land use in the nearby residential area. Therefore, no change in land use is expected from as a result of the presence of the Thermal Test Facility.

**Infrastructure.** During construction of the Thermal Test Facility, equipment and materials will be transported to the campus on local roads. The temporary increase in the volume of traffic will not overtax the capacity of existing roads. The new facility will not generate new, additional traffic outside of SSC Natick premises. The researchers that will be using the facility already work at Natick SSC. Normal occupancy of the facility has been designed to be 15 individuals.

Operation of the Thermal Test Facility will not adversely affect electric, water, sewer, telephone, or natural gas service in the area. Existing utility infrastructure at SSC Natick has sufficient capacity to service the new facility. There will be no adverse affect on public utility service outside of the SSC Natick.

**Socioeconomics.** The proposed activities include construction and operation of the 11,000 square-foot building housing the Thermal Treatment Facility. The testing cells and laboratories within the facility will be used by 12 SSC Natick employees who are currently working in positions already assigned to the Soldier Systems Center, and between five and ten outside users such as other DOD agencies or civilian contractors. The North Campus will continue to be the site of current day-to-day activities following completion of the proposed construction. Therefore, the proposed facility construction and operation would not result in measurable changes to the local population, number of available jobs or unemployment rate, income generation, or local housing market.

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**Public services.** With the exception of transportation of construction equipment and materials from off-site, operations related to the Thermal Test Facility will be conducted entirely on the SSC Natick property. Additionally, the campus will continue to be the site of current day-to-day SSC Natick activities during the testing facility's operation. Therefore, proposed operation of the Thermal Test Facility will not result in the need for, or elimination of, public services such as fire protection, law enforcement, medical services, or schools.

**Noise.** Construction and operation activities associated with the Thermal Test Facility will be restricted to normal business hours during weekdays. Construction activities will be between 7:00 AM and 5:00 PM, Monday through Friday. No weekend construction activities are planned. Because the proposed building does not have a basement (the proposed building is a slab on grade) there are no piles to be driven for foundations. There will be a minimal amount of sheet piling driven to provide slope support in the area where the building extends into the embankment on the south side. Proposed construction activities will require the use of standard construction equipment (e.g., trucks, excavators, dozers, and graders). With the exception of truck traffic for transportation of construction materials and equipment, proposed construction activities will be conducted on-site.

The Thermal Test Facility will operate between 6:30 AM and 5:30 PM, Monday through Friday. No weekend operation activities are planned. Sound from the operation of heating, ventilating, and air conditioning exhaust units and other rooftop mounted equipment will be indiscernible from ambient noise levels at SSC Natick. A screen wall at the perimeter of the rooftop will mitigate noise associated with Thermal Test Facility operations, maintenance equipment and the rooftop pollution control device.

**Air Quality:** The Thermal Test Facility is not expected to result in significant emissions and expected to operate well within the federally enforceable Restricted Emissions Status (RES) Approval granted by Massachusetts Department of Environmental Protection (Mass DEP), MBR-94-RES-072. The Thermal Test Facility will be added to the list of equipment already subject to the RES. Scientists and test operators will maintain records to demonstrate that emissions have not exceeded what is allowed by the RES approval, nor any other 310 CMR 7.00 restrictions/reporting and permit requirements. Such records will include daily research test quantities, types of materials tested, fuel purchase records, emission test results, monitoring equipment data and reports. Researchers will keep records of routine maintenance activities and malfunctions on emission control and monitoring equipment. RES records will be kept on site for at minimum a three-year period. Thermal Test Facility emissions will be included in the annual RES Compliance Report and the annual Stationary Source Emission Inventory Statement (SSEIS) submitted to Mass DEP.

Actual emissions from the Thermal Test Facility are expected to be relatively low due to low quantities of materials being tested. Only approximately 624 pounds of material will be tested annually, with less than 1% of the tested material being plastic components, plastic coating or plastic finishes. A roof-mounted pollution control device will be installed to handle these very

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low emissions expected. The proposed natural gas or propane firing unit is expected to have a maximum firing rate of 6 MMBTU/hr. Worst-case scenario material test projections would be six pounds per trial, 14 trials per week or 4,368 pounds per year. Worst case particulate material emissions (PM) would be approximately 990 pounds without emission control technologies and with a 99% roof-top particulate removal technology at a ten(10) micron-size, worst case PM emissions are expected to be less than ten (10) pounds annually.

Expected project emissions are based upon 6 pounds of material tested per trial and only two trials per week, or 624 pounds per year, would result in an actual (anticipated) annual emissions of just 141 pounds PM and with 99% roof-top PM capture capabilities at ten (10) micron-size, less than about 1.4 pounds PM emission expected annually from this facility or less than approximately 0.02 pounds per day based upon 2 test per week average.

Roof-top pollution control technology will have the capability to remove 90-98% of the following emissions: SO<sub>2</sub>, HCL, SiF<sub>4</sub>, Ammonia, HF, HNO<sub>3</sub> vapors. Use of control technology is expected to reduce worst-case HCL emissions to about 52 pounds per year. Actual average HCL emissions based upon the 6 pounds per test, less than 1% plastic materials, 624 pounds per year, would result in about less than a pound of HCL emissions per year.

Confirmation testing will be done prior to start-up to prove that emissions are within RES/310 CMR 7.00 limits.

**Geology and soils.** Construction of the Thermal Test Facility involves regrading of existing surface soil to allow placement of the slab on grade building. In addition, utility trenches for local connections will be excavated up to a depth of seven feet below the site's existing paved surface. Erosion control measures to prevent runoff of disturbed soil during construction will be incorporated into the design documents and implemented at the site.

Areas disturbed during facility construction will be restored by placing topsoil, seed, and mulch, and by pavement replacement. Since there will be no net increase in impervious area it is not anticipated that the proposed construction activities associated with the Thermal Test Facility will cause flooding or erosion, expose people to geologic hazards, cause slope or foundation instability, or cause a loss of mineral resources.

**Water resources.** The U.S. Army is responsible for the preparation of plans and procedures for conducting the Thermal Testing Facility construction activities (e.g., excavation, grading, and erosion control measures). Sediment runoff from the construction area will be controlled through the use of standard erosion control measures such as hay bales and siltation fences

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placed in appropriate locations. Silt Sack<sup>®</sup>'s shall be placed within the catch basins. The proposed construction activities are not anticipated to adversely affect water resources. The activities will not degrade water quality, degrade or deplete groundwater supply, cause flooding, or change surface water runoff characteristics. Fuel and laboratory chemicals will be stored in locations having secondary containment so that should accidental release occur, it would be contained. Also, flooring materials shall be finished with fuel resistant or chemical resistant epoxy to prevent chemical releases.

**Biological resources.** Construction of the Thermal Test Facility includes removal of existing pavement, regrading of underlying surface soil, and assembly of the building materials. In addition, site utilities will be installed in trenches to depths of up to seven feet below the existing site surface. Utility trenches will be backfilled with native soils and with engineered soil materials from off-site. Disturbed areas will be restored by placing topsoil, seed, and mulch, and by pavement replacement.

Any adverse effects to ecological receptors are expected to be minimal and short-term. Additionally, there are no known rare or endangered species present in the vicinity of the North Campus. Therefore, it is anticipated that the proposed construction activities will not cause: (1) adverse effects to wetlands, rare or endangered species or habitat, or movement of resident or migratory fish or wildlife species; or (2) reduction or removal of a significant portion of a biological resource. The proposed activity is not within 100 feet of any wetland resource protected under 310 CMR 10.

**Cultural resources.** An Archeological Overview and Management Plan was conducted for the U.S. Army Natick RD&E Center in 1984. This survey was performed by Envirosphere Company. The study revealed that prior to 1952 a gravel pit existed on the proposed site of the Thermal Test Facility. A thorough investigation of informational sources showed that no documented archeological, historical, or architectural sites or cultural resources exist on SSC Natick property (U.S. Army, 2003). Construction and operation of the proposed facility is not expected to adversely affect cultural resources. [SSC prepared a Cultural Resource Management Plan (CRMP) that was submitted by the Army Corps of Engineers (ACOE) of New England in 1997 to the Massachusetts State Historical Preservation Office (SHPO). Based upon the CRMP and comments from the Massachusetts SHPO, projects such as the Thermal Test Facility that take place on areas of the facility that have already been disturbed can proceed. The proposed construction is not expected to impact any "Cold War" significant locations].

## 5.0 CONCLUSIONS

The SSC Natick is tasked to improve the effectiveness of the individual combat soldier through the evaluation and development of weapons and personal equipment worn or carried by the soldier. Research to be conducted at the proposed Thermal Test Facility (Alternative 1) will provide soldiers of the future with state of the art uniforms with flame and thermal protective capabilities. The Thermal Test Facility will greatly enhance SSC Natick's plans to establish the National Protection Center for developing protective clothing and equipment.

Alternative 2, the continuation of the existing testing program which takes place at offsite facilities outside of SSC Natick with limited laser testing done at the SSC Natick considered unacceptable because: (1) the high cost of doing external testing has prevented SSC Natick's researchers from completing all desired testing for certain uniforms and protective systems for the troops, (2) the time needed to find required testing facilities and delays due to weather and scheduling difficulties causes clothing development and production to lag up to two years behind research efforts, and (3) current offsite thermal radiation source testing is not an optimal venue for testing clothing and small equipment with respect to test accuracy, cost, and scheduling.

Alternative 3, cessation of soldier clothing and equipment testing, is considered unacceptable because it would result in discontinuance of a significant component of the mission of SSC Natick by seriously impairing its ability to make available the most protective uniform ensemble and support equipment possible; as a result, the national defense posture is impaired due to the reduction of protection provided to U.S. military personnel on the battlefield.

No significant environmental impacts are expected due the Thermal Test Facility construction and operation, a Finding of No Significant Impact will be published.

**LIST OF ACRONYMS**

CMR	Commonwealth of Massachusetts Regulation
DEP	Department of Environmental Protection
DOD	U.S. Department of Defense
EA	Environmental Assessment
HCL	Hydrochloric Acid
HF	Hydrofluoric Acid
HNO <sub>3</sub>	Nitrates
PM	Particulate Matter
RES	Restricted Emission Status
SiF <sub>4</sub>	Silicon Fluoride
SO <sub>2</sub>	Sulfur Dioxide
SSC Natick	U.S. Army Soldier Systems Center

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**REFERENCES**

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U.S. Army, 2003. Fiscal Year 2005 Military Construction Project Data, Thermal Test Facility, U.S. Army Soldier Systems Center, Natick, Massachusetts. Project Number 24487. April 10, 2003.

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