

ENVIRONMENTAL ASSESSMENT

**LOW COST BOOST TECHNOLOGIES PROGRAM
JOHN C. STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI**

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ABSTRACT

NASA is planning to initiate testing for the Low Cost Boost Technologies Program at the B-2 Test Position at the Stennis Space Center as part of the Advanced Space Transportation Technology Program. The test articles considered in this environmental assessment are a vertical 60,000 lbf thrust engine and a horizontal 64,000 lbf thrust engine using liquid oxygen/rocket propellant fuel. The proposed project will not result in significant impact on the quality of the human environment.

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1.0 Introduction

1.1 Description and Purpose of the Proposed Action

NASA is planning to initiate testing for the Low Cost Boost Technologies Program at the B-2 Test Position at the Stennis Space Center (SSC) as part of the Advanced Space Transportation Technology Program. The test articles are a vertical 60,000 lbf thrust engine and a horizontal 64,000 lbf thrust engine using liquid oxygen/rocket propellant fuel and thrust vector control.

An environmental assessment of the proposed project has been conducted to comply with the requirement of the National Environmental Policy Act (NEPA). The proposed action involves restoration and modernization of the structural, mechanical, and electrical components of the B-2 Test Position and tests of the Low Cost Boost Propulsion Test Articles (PTAs).

1.2 Alternative Actions

Two possible alternatives to the Low Cost Boost PTA tests at SSC are considered: Modernization and restoration of the existing facility and testing to be conducted at Marshall Space Flight Center (MSFC), or the "No Action Alternative".

1.3 No Action Alternative

Inclusion of the "No Action Alternative" is prescribed by the Council on Environmental Quality guidelines implementing the National Environmental Policy Act (NEPA). The "No Action Alternative" provides the benchmark against which the proposed actions are evaluated. This alternative would not meet NASA's objective to reduce costs of small Earth-to-Orbit transportation systems.

1.4 Environmental Considerations

Based on the proposed design and testing requirements for the Low Cost Boost PTA, the environmental impacts identified in this assessment are minor. The result of this action will not alter the environment presently existing and as defined in the SSC Environmental Resource Document.

1.5 Conclusions and Recommendations

Restoration of the SSC B-2 Test Position and the Low Cost Boost PTA testing will cause minor physical, noise, air and water environmental impact. A finding of no significant impact is recommended. The proposed restoration and testing at SSC is the most desirable based on environmental impacts, cost, and expediency.

2.0 Facilities Description and Purpose

2.1 Stennis Space Center

Stennis Space Center is situated near Bay St. Louis, Mississippi. The Center occupies 13,800 acres (5,585 hectares) in western Hancock County known as the government-owned fee area. Currently, SSC is the site for development and testing of the Space Shuttle Main Engines (SSMEs) and other rocket

propulsion system testing. The Stennis Space Center has been designated by NASA as the Center for Excellence for Large Propulsion Systems Testing. SSC is host to other federal, state, and related organizations including the U.S. Department of Commerce, the U.S. National Oceanic and Atmospheric Administration, the U.S. Environmental Protection Agency-Toxic Analysis Center, the U.S. Department of Defense, the U.S. Geological Survey; and Mississippi and Louisiana State Agencies.

Surrounding the fee area, the government has acquired a perpetual restrictive easement which prohibits the maintenance or construction of dwellings and other buildings suitable for human habitation or occupancy. This region is known as the buffer zone and covers 125,071 acres (50,616 hectares). The facility is situated between the towns of Picayune to the north and Bay St. Louis to the south. The majority of SSC is located in Hancock County, Mississippi, although portions of the Buffer Zone extend into St. Tammany Parish, Louisiana and into Pearl River County, Mississippi.

2.2 Marshall Space Flight Center

MSFC is located on approximately 1,841 acres (745 hectares) within the grounds of the Department of the Army's Redstone Arsenal, southwest of the city of Huntsville, Alabama. Wheeler National Wildlife Refuge overlaps part of MSFC's western and southern boundary.

MSFC has a fully-developed infrastructure, including road access and all utilities to support over 7,000 federal employees and contractor personnel. Existing land use for MSFC consists of: administration and management; offices and laboratories; services and support facilities; industrial/manufacturing and test areas (which are the predominant land use of the MSFC); recreation areas; open areas; and circulation and parking areas.

3.0 Description of the Proposed Action and Alternative Actions

3.1 Proposed Action

3.1.1 Test Positions

The B-2 Test Position at SSC is the proposed testing location for the development, acceptance testing, and certification of NASA's Low Cost Boost Technologies Program PTAs (Figure 1). The B-2 Test Position was designed and constructed in 1965 to support the Apollo program and has been inactive since the early 1980s. This test position is being reactivated to support PTA engine tests. Modifications to this facility may include addition of ancillary support systems, functional and structural interfaces, and an engine mounting adapter. A detention pond presently exists to receive runoff of cooling water from the engine testing. The discharge will be regulated through a National Pollution Discharge Elimination System (NPDES) permit established by the Mississippi Department of Environmental Quality.

3.1.2 Low Cost Boost Propulsion Test Article

The newly designed Propulsion Test Articles are approximately 13 feet by 13 feet at the base and 50 feet in length (Figure 3). They will consist of propellant tanks, pressurization system components, propellant delivery systems, intertanks, a thrust structure, forward and aft skirts, fairings, avionics, batteries and power distribution systems. The propellant will consist of liquid oxygen (LOX) as the oxidizer and rocket propellant (RP-1) as the fuel. RP-1 is a highly refined kerosene fuel with a low sulfur content. Test

duration will be approximately 150 seconds or less per test with about 75 tests in the 1997-99 time frame. The test articles will be developed at MSFC. Processes for assembly have been previously evaluated by personnel at MSFC and found to have no significant impact on the environment. The assembly processes therefore are not included in this environmental assessment. The test articles will be assembled and tested at SSC.

All parameters for the two engine configurations are the same except for the engine expansion ratio for the exit nozzle. The expansion ratio for the 60,000 lbf vertical engine is 15:1, while the ratio for the 64,000 lbf horizontal engine is 30:1. The horizontal engine will also use a steam ejector to simulate low atmospheric pressure of 30,000 to 40,000 feet.

3.2 Alternative Actions

Alternatives to the Low Cost Boost Technologies Program are considered: the modification of facilities and testing activities to occur at Marshall Space Flight Center or the "No Action Alternative".

3.2.1 The MSFC Alternative

The proposed location for testing at MSFC is Test Facility 116 (TF 116) in the East Test Area (Figure 2). Test Facility 116 has a 3,000 gallon RP-1 run tank. Cooling water will be discharged into a two acre (0.8 hectare) detention pond. Water from the detention pond flows into Huntsville Spring Branch through an unnamed tributary. The discharge is regulated by a State of Alabama NPDES permit. Testing of the PTA's would be the same as proposed for SSC.

3.2.2 The No Action Alternative

The mission at SSC as the Center of Excellence for Propulsion Testing cannot be fulfilled without the support of the B-2 Test Position and the ability to test small Earth-to-Orbit transportation systems. The test position must contain state of the art equipment that is modern, efficient, and reliable.

3.3 Comparison of Alternatives

Both locations can fulfill the program obligations without major modifications or potential environmental harm. SSC is the preferred location for testing because it has been designated by NASA as the lead center for propulsion testing.

4.0 Potential Environmental Impacts

4.1 Oil Products and Hazardous Substances and Wastes

Refurbishment of the test stands and ancillary facilities for this program may involve use of toxic and hazardous materials such as paints and adhesives, which would be used and disposed of according to the manufacturers' recommendations and standard NASA/SSC or NASA/MSFC procedures. The use of solvents for parts cleaning will be conducted under SSC standard 7900.1 which is the governing standard for guidelines on cleanliness requirements for space hardware. The RP-1 fuel will be provided by tanker truck and will be stored in an above ground storage tank of not more than 15,000 gallons capacity. Any above ground storage tanks used for this purpose will conform to secondary containment requirements of

40 CFR 112 and overfill protection will be installed. Hypergol canisters containing TEA/TEB (triethylaluminum and triethylboron) weighing 2.5 lb (1.134 kg) each are planned to be used for rocket ignition. The hypergol system planned for use in this program ignites spontaneously on contact with the oxygen.

The SSC Spill Prevention Control and Countermeasure Plan and Contingency Plan will be revised to include handling of RP-1 fuel. MSFC also maintains a Spill Prevention Control and Countermeasure/RCRA Contingency Plan to handle oil and hazardous material emergencies. MSFC's plan would be updated to include the requirements of this program. Potential impacts from spills or leaks of RP-1 would be mitigated by the spill plan and secondary containment.

Overall impact for oil products is expected to be minor. Only small amounts of other hazardous materials would be used. Therefore, impacts of hazardous substances and waste are expected to be insignificant.

4.2 Air Quality

Short term fugitive air emissions may result from the construction activities during the restoration efforts. Additional fugitive air emissions may result from the abrasive blasting and re-coating of the structural components of the SSC B-2 Test Position or the MSFC TF 116 Test Stand. Fugitive air emissions resulting from this process may be contained by curtains or other enclosures to prevent deterioration of environmental quality during the restoration.

The Mississippi Department of Environmental Quality has agreed that the SSC capability to test engine systems using RP-1 and liquid oxygen as conducted in the early 1960s is permitted under the existing facility permit. Air emissions from the Low Cost Boost Technology Program will be much less than the maximum annual release of carbon monoxide (CO) during the Apollo era testing which was approximately 1,250 tons. Estimated annual releases from the proposed program based on 38 tests per year at 150 seconds per test are shown in Table 1.

Currently MSFC is required to maintain an air emissions permit by the Alabama Department of Environmental Management. Emissions for the proposed testing program will be evaluated to determine if additional permits are necessary. During Apollo era testing an average of 2,500 tons per year of carbon monoxide was released as a result of engine development.

Table 1
Maximum Annual Air Emissions

Pollutant	Emission (tons/year)
Carbon Monoxide	64.7
Particulate (10 μ)	0.2
Nitrogen Oxides	0.2
Sulfur Dioxide	0.1

Exposure levels from individual tests were determined using the Rocket Effluent Exhaust Diffusion Model (REEDMV7), a NASA developed model which provides projections on initial cloud size and stabilization height, and the Integrated Puff Model (INPUFF), an EPA approved model for projecting cloud dispersion and exposure levels. The maximum projected ambient air emission exposure levels of carbon monoxide, using site specific meteorological conditions from SSC and MSFC for both vertical and horizontal engine configurations, are shown in Table 2 and compared to applicable National Ambient Air Quality Standards (NAAQS). Atmospheric conditions which represent inversions are not included, but would cause emissions to increase by about 20%.

Table 2

Maximum Projected Ambient Air Emission Exposure Levels of CO for Worst Case Meteorological Conditions for Both Engine Configurations

	SSC		MSFC	
	1 HR	8HR	1HR	8HR
Propulsion Test Article ($\mu\text{g}/\text{m}^3$)	480	60	608	76
Background ($\mu\text{g}/\text{m}^3$)	9,300	7,190	9,300	5,900
Total ($\mu\text{g}/\text{m}^3$)	9,780	7,250	9,908	5,976
NAAQS ($\mu\text{g}/\text{m}^3$)	40,000	10,000	40,000	10,000
Distance from test Area (km)	0.4	0.4	0.4	0.4

Air emission impacts due to construction and engine testing at SSC and MSFC are insignificant.

4.3 Noise

SSC is surrounded by a large uninhabited buffer zone consisting of mostly forests and pasture lands. The B-2 Test Stand is located near the center of SSC and is oriented to the north northeast in a manner that directs sound to the north and east. Predictions of off site noise levels that would be produced by small engines are estimated to be a maximum of 60 decibels. This level is similar to the noise created by normal street traffic and will last only a couple of minutes.

MSFC is surrounded by a large federally owned area consisting of the Department of the Army's Redstone Arsenal (RSA) and the Wheeler National Wildlife Refuge. This area is an effective physical barrier between MSFC engine testing and the general public. TF 116 is located in the southeast portion of MSFC and oriented to the south-southeast in a manner that directs sound to the south and east.

Noise from construction activities needed to facilitate engine testing will have no impact. There will be insignificant noise impact due to construction and operation activities.

4.4 Water Quality

SSC is permitted by the State of Mississippi to divert or withdraw water for beneficial use from the Access Canal (Permit No. MS-SW-0232). The canal will be the primary source of water for the 66 Mgal industrial water reservoir which is used to provide deluge fire water protection and deflector cooling water for the test stand. After use, the cooling water will be discharged into the SSC canal system. Water from the canal is directed to the East Pearl River through a lock system. A spillway and overflow of the canal drains into Devil's Swamp, which discharges into Bayou LaCroix and the Bay of St. Louis to the Mississippi Sound.

Industrial water for MSFC, supplied by RSA, is stored in large tanks to provide for cooling water and fire protection of the test stands and flame deflector during testing. After use, the cooling water is discharged into a two acre (0.8 hectare) detention pond. Water from the detention pond flows into Huntsville Spring Branch through an unnamed tributary. The discharge is intermittent and regulated by a state of Alabama NPDES permit, discharge serial number (DSN) 012.

Small quantities of waste solvents, oils, and lubricants, as well as dust particles from the test stand, may be washed into the cooling water discharge. Based on prior knowledge of RP-1 engine testing, a potential exists for the introduction of unburned fuel into the cooling water discharge. A National Pollutant Discharge Elimination System (NPDES) permit application addendum has been submitted to the Mississippi Department of Environmental Quality to modify SSC's NPDES Permit No. MS0021610 for wastewater sources that will be associated with deluge or cooling water releases. The MSFC NPDES (DSN) 012 permit allows only testing of liquid oxygen, liquid hydrogen, and RP-1 fueled rocket engines.

There should not be any impact on water quality during the restoration of the B-2 Test Position or the TF 116. Construction wastewater discharges will consist of sanitary wastewater and storm water runoff from the area. Sanitary wastewater will be conveyed to the sanitary wastewater treatment systems as is currently being accomplished. An NPDES permit for storm water will not be required as there will be no land disturbance during test stand modifications. No change in present operating conditions is anticipated.

4.5 Groundwater Resources

Water for potable and industrial use at SSC is supplied through six large capacity wells on site. No additional groundwater wells or deep subsurface disturbance is planned for this project. No impact to groundwater resources is expected.

MSFC does not utilize on site wells, and no groundwater wells or deep subsurface disturbance is planned for this project. Therefore, no impact to the environment is anticipated.

4.6 Wetlands and Flood Plains

The SSC facility straddles the watersheds of two rivers: the East Pearl River on the western Fee Area boundary and the Jourdan River on the Eastern Fee Area boundary. Some tributaries at the facility flow west to Harper Bayou and eventually drain into the East Pearl River. Other tributaries flow east into Catahoula Creek, with some intermittent streams flowing south into Devil's Swamp. Catahoula Creek and Devil's Swamp both eventually drain into the Jourdan River. The Pearl River empties into Lake

Borgne, while the Jourdan River drains into the Bay of St. Louis. Both Lake Borgne and the Bay of St. Louis discharge into the Mississippi Sound.

As a result of the wetlands hydrology found at and around SSC and the presence of hydric soils and hydrophytic vegetation, a large portion of both the Fee Area and Buffer Zone are considered jurisdictional wetlands by the U.S. Army Corps of Engineers. The proposed restoration of the B-2 Test Position and PTA testing are not in a functional wetlands area and will not encroach on jurisdictional wetlands. The test position is located on previously developed land.

The documented floodplain at SSC includes a 100-year floodplain along the East Pearl River at the western edge of the Fee Area, and a 100-year floodplain along the Wolf Branch and along the Lion Branch of Catahoula Creek in the northeast portion of the Fee Area. The majority of SSC is in an area of minimal flooding. The B-2 Test Position is not located in the 100 year floodplain and is considered Zone "C" per the Flood Insurance Rate Map of Hancock County, Mississippi, Panel 125 of 195, revised 18 September 1987, Federal Emergency Management Agency. Zone "C" is defined as areas of minimal flooding.

TF 116 is located in the East Test Area and approximately 400ft (122 m) north and northwest of the Wheeler National Wildlife Refuge. TF 116 has a drainage ditch and detention pond that are classified PFO (Palustrine Forested) and PUB (Palustrine Unconsolidated Bottom) wetlands, respectively. The drainage ditch consists of approximately one acre (0.4 hectares) of PFO wetlands. The hydrology of this wetland system is controlled by storm water and process water from the test facility. The detention pond is approximately two acres (0.8 hectares) and receives NPDES permitted process water from the East Test Area.

Modifications to existing facilities and testing operations will not have an impact on wetlands or flood plains for SSC or MSFC.

4.7 Biotic Resources

Pine forest communities account for the majority of the vegetation in the uncleared portions of SSC and the surrounding buffer zone. Bottomland hardwood communities occur in low, poorly drained soils, which may have standing water. Vegetation and wildlife species that occur at SSC are identified in the SSC Environmental Resources Document (NASA/SSC, 1992).

The proposed test area is located in an area of developed land covered by pavement or mowed grass. The site is surrounded by canals and wetlands. The area may be suitable for foraging species of wildlife, however it does not serve as a nesting or roosting habitat. Noise from testing would likely startle wildlife and possibly drive them from the area temporarily. Animals in the vicinity of the test stands do not appear to be unduly disturbed by testing activities. No significant or permanent impacts to the fauna and flora have been recorded in the past, or are expected to be observed during future testing activities.

Physiographically, MSFC is located in the Tennessee Valley district on the Highland Rim section of the Interior Low Plateaus. Ecologically, this position has resulted in the presence of rich biological diversity associated with an abundance of animal and plant communities. The most sensitive natural habitats at MSFC are those adjacent to the test areas in the Wheeler National Wildlife Refuge. The refuge is a major

waterfowl wintering area and year round habitat for many species. Vegetation and wildlife species are identified in the MSFC Environmental Resources Document (NASA/MSFC, 1991a).

The proposed test area at MSFC is located within an area of developed land covered by pavements or mowed grass. The site is surrounded by mixed pine and hardwood forest. Wildlife habitat in the immediate area of the test stand is considered marginal because of the present use of this facility. This area may be a suitable foraging area for various species. However, activity associated with current engine tests and operations limits its suitability as nesting or roosting habitats. As at SSC, noise may temporarily drive wildlife from the area, but observations indicate that the wildlife is not significantly disturbed.

Overall construction and operational impacts to SSC or MSFC are projected to be insignificant.

4.8 Threatened and Endangered Species

There are a significant number of threatened, endangered, and ranked species with ranges overlapping the SSC fee area and buffer zone. Listed and State-ranked species that potentially occur in the project area are identified in the SSC Environmental Resources Document (NASA/SSC, 1992). Proposed construction and testing activities should not affect any threatened and endangered species or critical habitat that may exist in the SSC fee area. If a listed or ranked species is identified, the appropriate agency will be consulted. Management procedures will be in place to protect any species located during testing activities.

MSFC has been provided a list of federally listed endangered and threatened species and candidates for listing which may be in the project area by the United States Fish and Wildlife Service (USFWS), Daphne Field Office. Additional listed and state ranked species with potential habitats in the project area are identified in the Field Manual of Threatened and Endangered Species Potentially Occurring at the Marshall Space Flight Center (NASA, 1994). MSFC will follow consultation procedures with the USFWS as described in the Endangered Species Act if required.

4.9 Archeological Resources

Historically, the land at SSC has been severely disturbed by timber harvesting and the associated naval stores industry during the late nineteenth and early twentieth centuries. More recently, the land was disturbed by the construction of the SSC facility during the 1960's, making it unlikely that undisturbed archaeological sites would be found. In the Fee Area, only the townsite of Gainesville may require future archaeological considerations if land disturbing activities are proposed for the Fee Area. This project is not located near the Gainesville townsite and is on previously disturbed land. There should be no archaeological impact resulting from this project.

Two archeological sites at MSFC have been identified within a mile of the TF 116, however the closest site is 0.2 miles away. Soil disturbance in the East Test Area during construction will be minor, therefore, no impact to archaeological sites is expected. If any previously undiscovered archeological site is uncovered during construction, construction will stop until the State Historical Preservation Office and the NASA Federal Preservation Officer have been notified and the requirements of the Advisory Council on Historic Preservation (36 CFR 800) have been satisfied.

4.10 Cultural and Historical Resources

Three test stands at SSC have been designated as National Historic Landmarks and appear on the National Register of Historic Places. These test stands and associated control centers have been so designated because of their importance in the testing of Saturn rockets, and the importance of the Saturn rocket in landing men on the moon. This project involves the restoration of the B-2 Test Position, but will not alter the primary function, architecture, or structure of the test position. The project will preserve the character and physical attributes of the facility and will not affect the property from a cultural resource standpoint. This project will not alter the historical attributes of the B-2 Test Position.

The testing of advanced engine systems with RP-1 engines could enhance the historical significance of the test stand. The test stand will be exposed to hot gaseous emissions from the propulsion article tests. Maintenance and cleanup of the structure will be conducted as part of the proposed test operations to prevent any deterioration of the test stand. There are no other historically significant structures at SSC that could be affected by these test activities. Insignificant impact is expected.

Four facilities on MSFC have been listed as National Historic Landmarks. Such a listing automatically places these facilities on the National Register of Historic Places. None of these landmarks will be impacted by the modifications or testing for this project.

4.11 Transportation

Interstates 10 and 59 (I-10 and I-59), U.S. Highway 90, and Mississippi 607 serve the SSC area. Direct access to and through SSC from I-10 and I-59 is provided by Mississippi Highway 607. Highway 607 also connects with U.S. Highway 90 approximately 9 miles (14.5 km) southeast of SSC. Approximately 8.5 miles (13.7 km) of canals inside the fee area are available to transport material within SSC. The SSC canal system links to the East Pearl River through a lock system. The East Pearl River links SSC to the national waterway transportation system. It is 21 miles (33.8 km) from the main canal entrance to the Gulf Intracoastal Waterway. Major engine component hardware will be transported by road or barge without impact to the existing infrastructure of roads and bridges. Propellant transport will be by truck. No known transportation accidents have occurred in the past, therefore, no impact is expected.

MSFC and Huntsville are served directly by U.S. Highways 72, 72A, 231, and 431, all of which are four lane roads. Access to Interstate Highway 65, approximately 16 miles west of MSFC is by way of U.S. 72, U.S. 72A, and Interstate Highway 565. MSFC has direct access to low cost, deep water transportation via the Tennessee-Tombigbee Waterway and the Tennessee/Ohio/Mississippi River system including barge loading docks on the adjacent RSA and the supporting road system to handle very large cargo. Trucking of rocket propellants via public access ways is the most common method of transportation. There have been no known accidents on public property to date and the same safe handling, transfer and storage procedures will be used with this program. No impacts are expected from transportation activities and practices.

4.12 Waste Generation and Treatment

The solid waste generated at SSC is recycled or placed in the on site Class A landfill. Unacceptable wastes, such as hazardous waste, paint products, and fuels are excluded from disposal in the landfill.

Some construction waste, rubble, and vegetation will be disposed in of in the SSC Class II rubbish landfill. Hazardous or other unacceptable wastes are shipped off-site for treatment or disposal.

The solids resulting from the abrasive blasting of the B-2 Test Stand will contain lead from the original paint primers. Emissions resulting from this process will be captured to eliminate any environmental impact during the restoration. The waste solids containing lead will transported off-site to a permitted hazardous waste disposal facility. Contractors will be required to have proper certification for the handling of the hazardous waste they generate and provide the appropriate methods for disposal off-site in accordance with Federal and State regulations.

Other solid waste produced will be construction debris from the demolition of parts of the old system. The scrap material should not be considered hazardous. Where material recovered from demolition or replacement has a scrap value, it will be salvaged and sold. Solid waste generation will not significantly increase the volume of waste generated by SSC. Solid waste impacts will be insignificant.

Most of the waste generated at MSFC is burned at the City of Huntsville Refuse-to Steam Plant which opened in 1990. Unacceptable wastes, such as hazardous waste, paint products, fuels, and construction debris are excluded from disposal at the plant. Construction waste, rubble, vegetation, and asbestos are disposed of in the RSA inert landfill. To the maximum extent possible, wastes are turned over to the MSFC Property Management Division for reuse, recycling or appropriate disposal. Hazardous waste is packaged and transported to qualified hazardous waste disposal facilities. Construction and operation impacts will be insignificant.

4.13 Socioeconomics

This project may require the employment of a few high-tech personnel and contractors at SSC or MSFC. This will not significantly change the number of personnel presently involved in the operations of the test stands, therefore, there will be no significant impact.

4.14 Public and Employee Health and Safety

The SSC and MSFC test areas are designed with consideration of the hazardous nature of the operations and provisions for the protection of employees. The hazardous operations take place in areas safely isolated from the general public. SSC and MSFC were located and designed to minimize risk to public health and safety. Proposed construction involves modification and enhancements to existing facilities. Only small quantities of hazardous substances will be required for use or storage during construction. Insignificant impacts are expected.

SSC and MSFC operations are regulated by stringent federal and state laws governing the conduct of all operations with respect to environmental, worker, and public protection. Environmental permits issued to SSC and MSFC and new ones that will be required for the conduct of the proposed activities ensure that discharges and emissions to the surface water, groundwater, and air are within acceptable limits and protect the public health and safety. SSC and MSFC adhere to Occupational, Health, and Safety Administration (OSHA) standards for protection of employees on site. Procedures are in place to monitor and protect employees as necessary.

The SSC Contingency Plan (SHB 4130.3) and the MSFC Emergency Plan (MM 1040.3E) detail specific emergency procedures to respond to natural and man-made emergencies. There are ongoing training programs to ensure emergency preparedness. The Local Emergency Planning Committees will be notified when large quantities of propellants are ordered for transport on local highways, and the SSC Contingency Plan or the MSFC Emergency Plan will be modified as appropriate. Transportation of propellants onto the facility will meet all Department of Transportation regulations as has been routine at both sites for over 30 years. On site, strict security is maintained in the test areas.

Due to the physical and operational considerations of public and employee health and safety, no impact to the public and employee health and safety is expected.

4.15 Pollution Prevention and Environmental Justice

In accordance with Executive Order (EO) 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements," and NASA's implementation of this EO (NASA, 1995b), SSC (NASA/SSC, 1995) and MSFC (NASA/MSFC, 1996) have written pollution prevention strategies into their Pollution Prevention Plans. These plans encourage elimination or reduction of the use and purchase of toxic chemicals, energy efficiency, solid waste reduction and recycling, water conservation, and hazardous waste and oil spill prevention. In order to meet the goals of the Pollution Prevention Plans, SSC and MSFC have initiated projects affecting both the physical infrastructure and the program/project operations. Many elements of the Low Cost Boost Technologies Program will benefit from incorporation of newer, more environmentally friendly processes.

In accordance with EO 12898, SSC's Environmental Justice Implementation Plan reflects agency policy established in "Environmental Justice Strategy", March 1995. Any adverse effects of programs at SSC on low income or minority populations will be identified and, if necessary, remedies will be provided through implementation of these plans. The SSC buffer zone surrounding the fee area makes any environmental justice concerns for this project insignificant. MSFC environmental justice concerns are also insignificant.

5.0 References

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Figure 1 - Location of the SSC B-2 Test Position restoration and PTA Testing

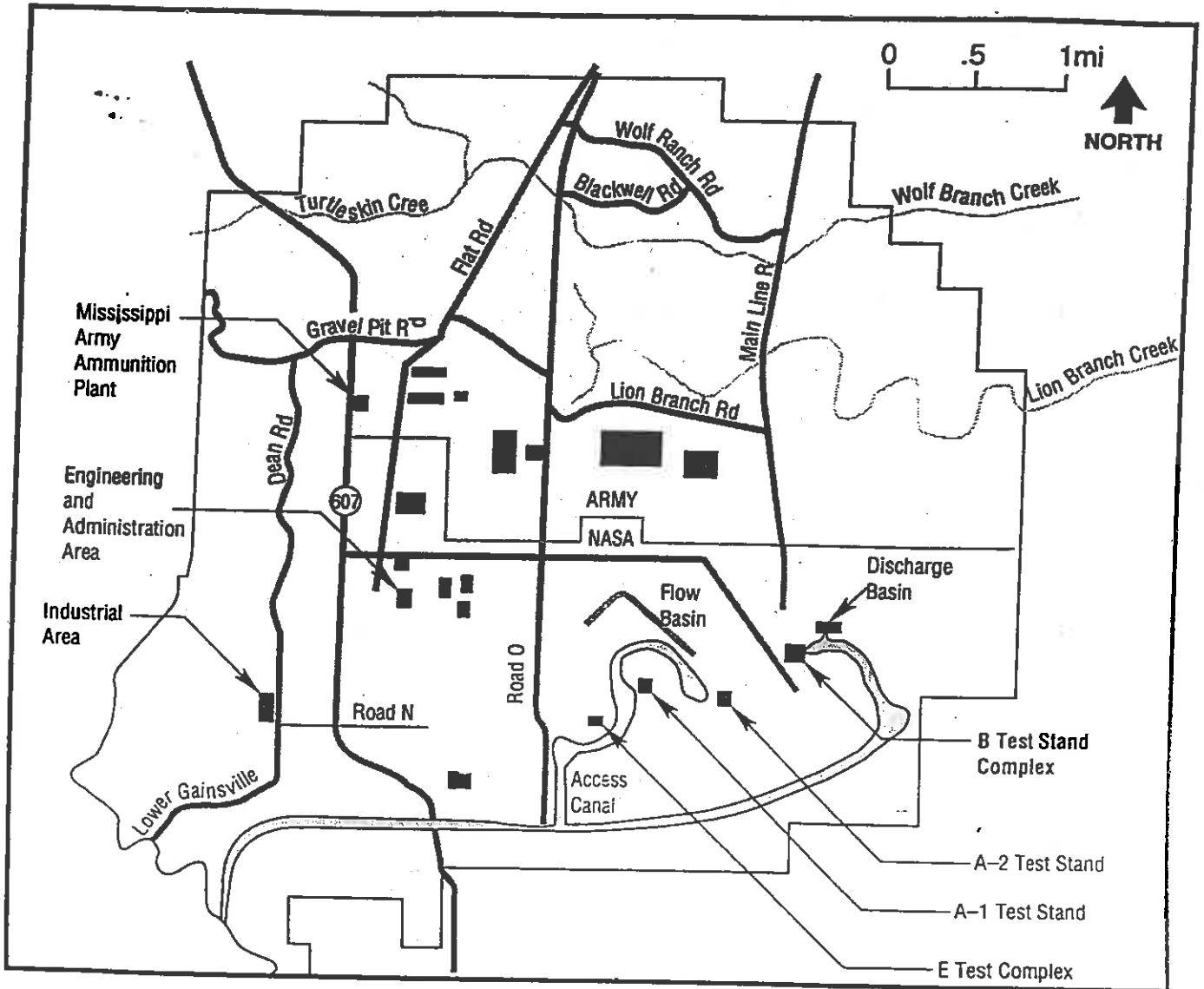


Figure 2 - Location of the MSFC TF 116 restoration and PTA Testing

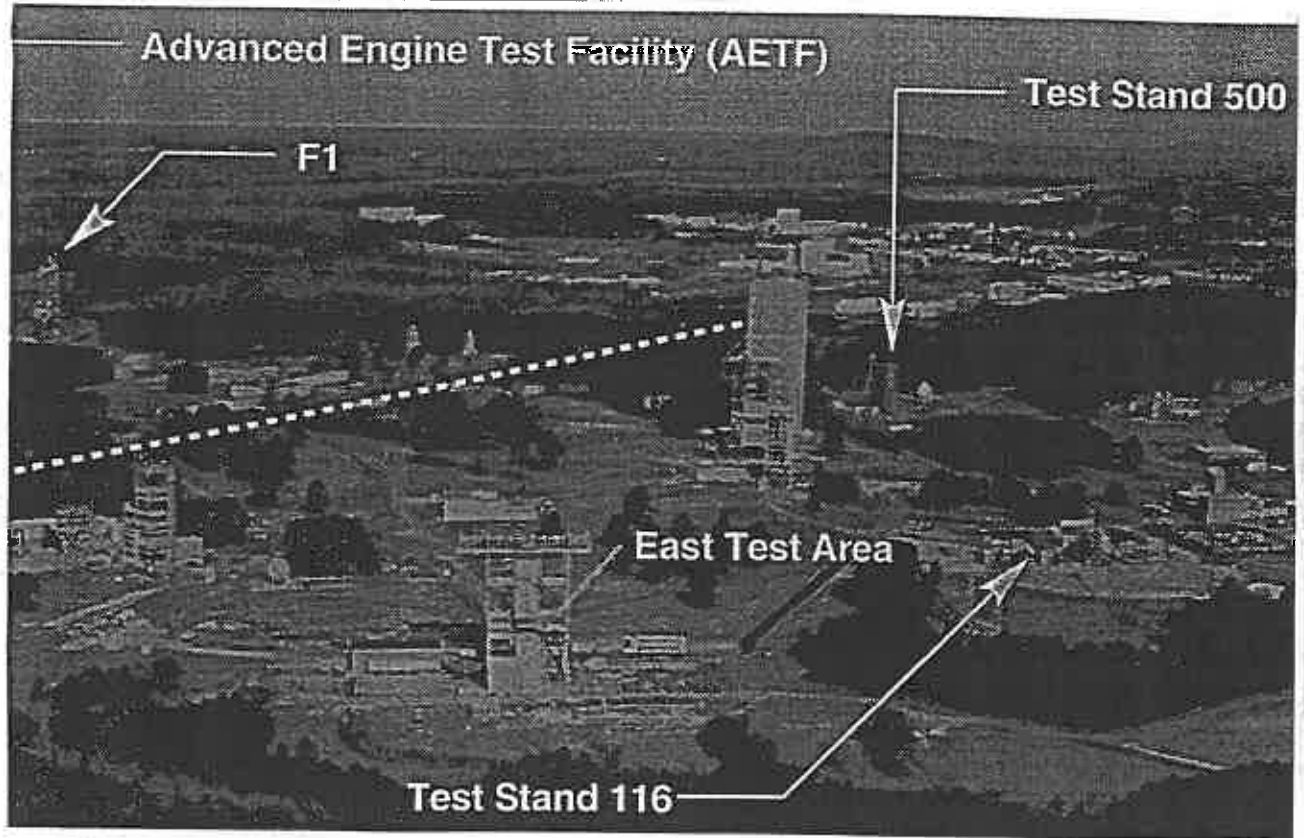


Figure 3 - Propulsion Test Article Design

