

ENVIRONMENTAL ASSESSMENT

**RESTORATION OF THE GASEOUS NITROGEN SYSTEM
JOHN C. STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI**

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May 25, 1994

ABSTRACT

NASA is planning to restore the existing nitrogen system in the high pressure gas facility at the Stennis Space Center. The nitrogen system will continue to be used in the static test firing of the space shuttle main engines. The proposed restoration will not result in significant impacts on the environment.

RESTORATION OF THE NITROGEN SYSTEM HPGF
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1.0 Introduction

1.1 Description and Purpose of the proposed action:

The National Aeronautics and Space Administration (NASA) is planning to restore the existing nitrogen system in the High Pressure Gas Facility at the John C. Stennis Space Center (SSC). The present nitrogen system has been in operation since the early 1960's. The system is beyond its expected operational lifetime and requires restoration to continue operation.

This environmental assessment of the proposed project has been prepared to comply with the requirement of the National Environmental Policy Act (NEPA).

1.2 Alternative Actions:

Three possible alternatives to the restoration of the nitrogen system are considered: restoration of the existing facility, the construction of a new facility, or the no action alternative. The proposed restoration of the system is the most desirable based on environmental impacts, cost, and expediency.

1.3 No Action Alternative:

The major mission of the Stennis Space Center is the static test firing of the Space Shuttle Main Engine (SSME). A no action alternative would result in continued high level maintenance on the existing nitrogen system with the possibility of unplanned periodic failures or permanent failure that would result in a loss of the center's ability to perform its mission.

1.4 Environmental Considerations:

Based on the preliminary design requirements, the environmental impacts identified in this assessment are sufficiently minor that they would not require an environmental impact statement. The removal of the gas-fired vaporizers will have a beneficial impact by removing two air emission points. The result of this action will not alter the environment presently existing and as described in the SSC Environmental Resource Document.

1.5 Conclusions and Recommendations:

Restoration of the nitrogen system will cause very minor physical environmental impact and a positive impact on air emissions while not altering the current operations. A finding of no significant impact is recommended.

2.0 Facility Description and Purpose

2.1 SSC Location and Function:

Stennis Space Center is located along the southern edge of the Gulf Coastal Plain near the Gulf of Mexico. The Center is located approximately 88.5 kilometers (55 miles) northeast of New Orleans, Louisiana and 58 kilometers (36 miles) west of Gulfport/Biloxi, Mississippi. 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.

SSC was built between 1963 and 1966. The facility was originally established to perform developmental and acceptance tests of large liquid-propellant rocket systems for the United States Space Program. Currently, SSC is the site for development and testing of the Space Shuttle Main Engines. SSC is host to other Federal, State, and related organizations located at SSC 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.

SSC consists of both a fee area and buffer zone. The fee area is comprised of approximately 5439 hectares (13,440 acres) of government-owned land. Within the fee area, NASA and the other resident government agencies have constructed the test facilities, laboratories, office and support buildings necessary to conduct their operations.

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 approximately 50,505 hectares (124,800 acres).

2.2 The Gaseous Nitrogen System (GN₂):

The high pressure gas facility (HPGF), B - 3305 at SSC provides pressurized gas to various facilities that is essential for the development, acceptance testing, and certification of NASA's rocket propulsion systems and subsystems. The high pressure nitrogen gas system provides facility wide distribution of missile quality nitrogen gas. The nitrogen gas is used primarily to maintain inert atmospheres and to purge vehicle and oxidizer systems. Other uses include vehicle tank leak detection, instrument check out and operation of pneumatic instruments, pressurization of on-board propellants, valve actuation, and purging of emptied propellant supply and storage systems during maintenance.

The GN₂ system that is in operation at the HPGF was designed and constructed in 1965 to support the Apollo program. Since then, SSC and the mission of SSC have gone through several changes. With the program and propulsion system changes, the GN₂ usage and demand have substantially changed. The HPGF is required to produce a sufficient volume of GN₂ to support SSME testing as well as the SSME support activities. The mission of the HPGF is to maintain an adequate supply of GN₂ to support users at SSC.

3.0 Description of the Proposed Action and Alternative Actions

Two alternatives to the restoration of the nitrogen system are considered: the construction of a new facility or the no action alternative.

3.1 The Proposed Action:

The proposed action is to replace six liquid nitrogen pumps that presently feed the natural gas fired vaporizers, the demolition and replacement of the gas-fired vaporizers with atmospheric vaporizers, and the replacement of deteriorated piping.

The replacement pumps will be mounted on the pump foundations under the existing canopy at Building 3305. The new atmospheric vaporizers will be installed on a new foundation in the area of the existing gas-fired vaporizers that will be removed. The existing piping and associated asbestos insulation will be replaced by new piping and non-asbestos insulation.

The removal of the gas-fired vaporizers and asbestos insulation will provide the additional benefit of mitigating an asbestos hazard and the elimination of two air emission points. The current air emission points are identified in the SSC Air Pollution Control Permit 1000-0005.

The net effect of this action will be a beneficial environmental impact.

3.2 The New Facility Alternative:

The construction of a new facility would cause greater adverse environmental impact. The siting of a new facility, its associated environmental considerations, and the time required to construct the new facility make this alternative less desirable than the restoration of the existing facility.

3.3 The No Action Alternative:

The mission at SSC as a propulsion system testing center cannot be fulfilled without the support of the GN₂ System. The system must be efficient and reliable. The present GN₂ system at the HPGF is approximately twenty-five years old and is approaching the design

life of this system. This aging system is requiring ever increasing maintenance and expenses to remain operational. Periodic or possibly permanent outages for maintenance would prevent SSC from fulfilling its mission.

4.0 Environmental Impacts

4.1 Air Quality Impacts:

Short term fugitive air emissions may result from the minor excavation and construction of the pads for the storage vessel and the atmospheric vaporizers. If fugitive air emissions occur, they will be during the short term construction period. There will be reduction in air emissions during normal operation of the system with the removal of the gas-fired vaporizers.

4.2 Water Quality Impacts:

Short term minor impacts on water quality may be caused by storm water erosion during the excavation and construction of the atmospheric vaporizer foundations. Appropriate sedimentation control measures will be implemented. Operational waste water discharges will consist of sanitary waste water and storm water runoff from the area. Sanitary waste water will be conveyed to the sanitary waste water treatment system as is currently being achieved. No change in the present operating conditions is anticipated. Current discharges are fully permitted under NPDES Permit Number MS0021610 issued by the Mississippi Department of Environmental Quality.

4.3 Solid and Hazardous Waste Impacts:

There will be no hazardous waste generated as a result of this project. The solid waste produced will be construction debris from the demolition of parts of the old system. None of the scrap material should be considered hazardous. There will be asbestos wastes generated during the construction. Asbestos wastes are considered special wastes and will be disposed in the SSC landfill as approved by the Mississippi Department of Environmental Quality.

4.4 Toxic Substances:

There will be no toxic substances produced as result of this project.

4.5 Radioactive Materials and Ionizing Radiation:

No radioactive materials or the generation of ionizing or non-ionizing radiation will occur during this project nor during normal operations as a result of this project.

4.6 Wetlands:

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 o 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 Corps of Engineers. The proposed restoration of the GN₂ system is not in a functional wetlands area and will not encroach on jurisdictional wetlands.

4.7 Threatened and Endangered Species:

A survey for threatened and endangered species in the vicinity of the High Pressure Gas Facility have been reported by Drs. Edmund Keiser and Paul Lago. There have not been any documented sightings of threatened or endangered species in the area of the High Pressure Gas Facility. A 1992 fall survey of flora at the landfill site did not uncover any threatened or endangered botanical species. Proposed restoration of the nitrogen system should not affect any threatened and endangered species or critical habitat possibly known to exist in the SSC fee area.

4.8 Noise:

Noise impacts from construction will be short term. There are no long term adverse noise impacts anticipated as a result of this project.

5.0 Land and Natural Resource Impacts

5.1 Geology, Topography, and Soils:

SSC lies in the Lower Coastal Plain Physiographic Province of Mississippi, with the Buffer Zone surrounding the fee area extending into the Pine Hills Province. The site is underlain by a thick sequence of sedimentary deposits dipping to the south and west. Recent age alluvium, quaternary coastal deposits, and the citronelle formation of the Pliocene Age occur at the surface. Strata ranges from unconsolidated alluvium and coastal deposits, sands, gravel, and clays to sediments varying from clays to gravel. Bedrock is thought to be as much as 3,000 to 3,700 meters (10,000 to 12,000 feet) below the surface. The Lower Coastal Plain is a low flat area; elevations increase gradually

from sea level to slightly higher elevations in the northern highlands of the Province. Southern areas of the Province are primarily marshlands. North to south elevated ridges are the topographic features. Land surface elevation ranges from 2 to 27 meters (10 to 90 feet) above sea level, and local relief is negligible. Fee Area elevations range from approximately 1.5 to 9.1 meters (5 to 30 feet) above mean sea level. The topography of the Pine Hills Province is generally a level or rolling hills. Heavy forestation of pine occur in parts of the Province.

The Hancock County, Mississippi Soil Survey indicates the soils in the Fee Area are dominated by Atmore silt loam (At), the Smithton association (Su), and Escambia loam (EsA). These soils are generally composed of poorly to somewhat poorly drained silty and loamy soils. They are generally acidic with other significant characteristics of wetness, high organic matter, and weathered clay mineralogy.

5.2 Land Use:

The Fee Area and Buffer Zone at SSC occupy approximately 36% of the Hancock County land base. Land uses outside the Buffer Zone vary. Urban areas interspersed with open spaces, such as coastal wetlands, are scattered along the coast. The northern half of the county is primarily commercial forestry and cropland. Recreational areas are scattered along open bodies of water. Institutional and industrial land uses occupy areas of the Buffer Zone perimeter.

The majority of the land within the Buffer Zone is used for commercial pine forests. The remaining land uses include wildlife management areas, cattle grazing, limited cropland, and small mineral mining operations.

5.3 Floodplain:

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. This project is not in the 100-year floodplain.

5.4 Energy Impacts:

Restoring the facility with modern, energy-efficient motors and replacing the gas-fired vaporizers with non-fired, atmospheric vaporizers will reduce the energy demands and consumption of the GN₂ system.

6.0 Archaeological, Historic and Cultural Aspects

6.1 Archaeological:

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 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 on previously disturbed land and should have no archaeological impact.

6.2 Historical:

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 designated because of their importance in the testing of Saturn rockets, and the importance of the Saturn rocket in landing men on the moon. The nitrogen system restoration project does not involve the three test stands.

6.3 Socioeconomic:

This project will not change the number of personnel presently involved in the operations of the nitrogen system. There will be an increase in the number of transient short term construction and installation personnel. The nitrogen system restoration project does not have a socioeconomic impact.

7.0 Contacts

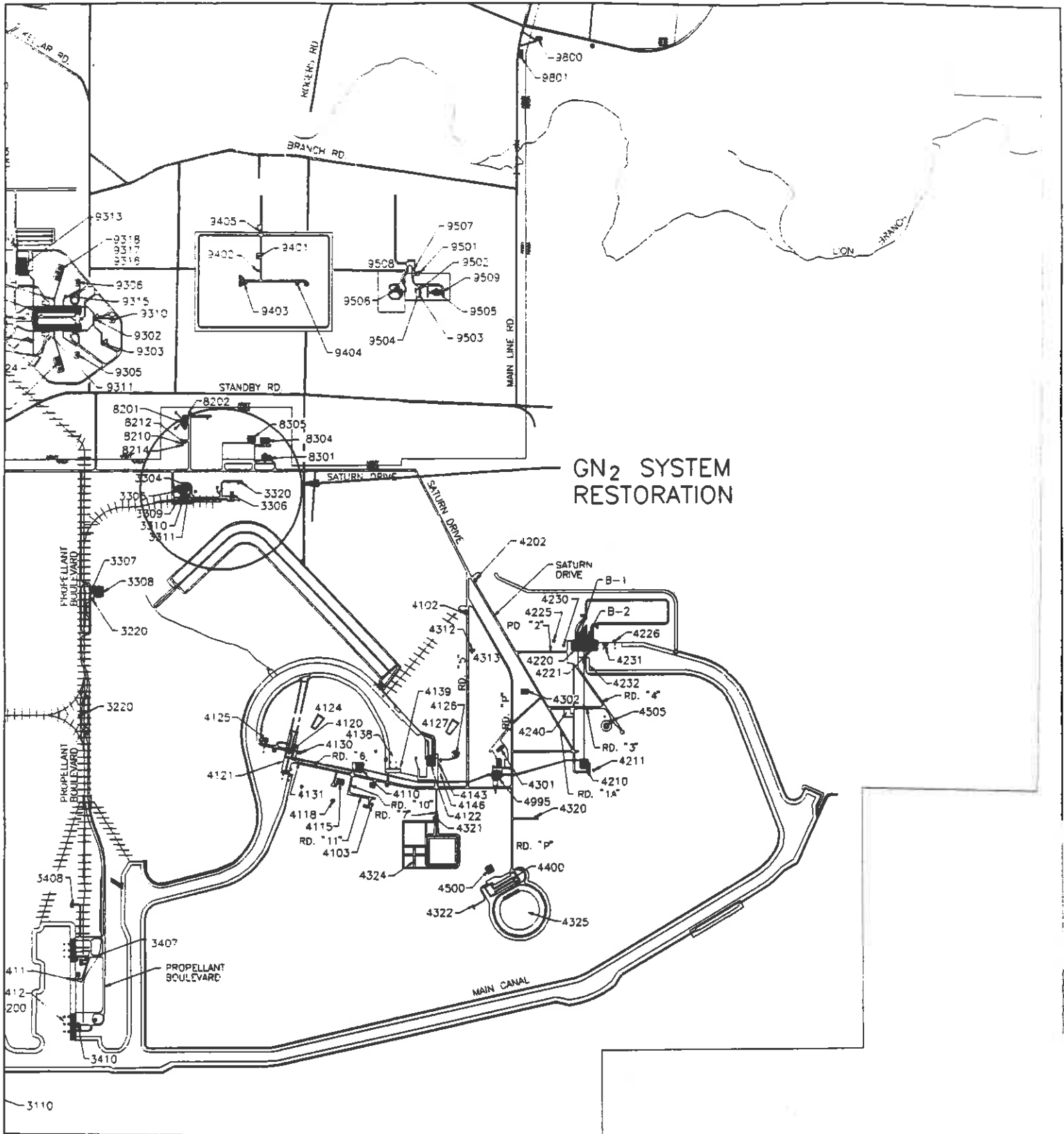
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Figures

Figure 1 - Proposed Location of the Nitrogen System restoration



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