13.0 Economic, Population, Transportation and Employment Factors

The economic study area addressed in this ERD is the one-hour commuting radius (80 kilometer or 50 mile) from SSC. The area includes Hancock, Harrison, and Pearl River Counties in Mississippi and St. Tammany and Washington Parishes in Louisiana. Of the five county areas, Hancock, Harrison, Pearl River, and St. Tammany provide most of the work force to SSC.

Mississippi cities within the area are Picayune, Poplarville, Long Beach, Waveland, Pass Christian, Bay St. Louis, Gulfport, and Biloxi. Louisiana cities include Covington, Slidell, Mandeville, and Bogalusa. The areas vary from rural in Washington Parish to urban along the Gulf Coast.

13.1 Economic Impact

According to a conservative estimate by Dr. Charles A. Campbell, Associate Professor of Economics, Mississippi State University, the reduction of employment for the local area if Stennis Space Center had not been in operation in 2000 would be 24,121 jobs. A similar conservative estimate indicates that personnel income would have been reduced by more than $807 million, and $323 million would have reduced retail sales. It is also assessed that Stennis Space Center has a tax revenue impact on local government revenues of $87 million.

13.2 Population

Population along the central Gulf coast is concentrated in the New Orleans, Louisiana and Mobile, Alabama metropolitan areas. The SSC area is located between these cities. Total population in the four county/parish areas grew by only 7.85 percent during the 1994 through 1998 period, employment increased by 13.73 percent during the same timeframe, thus representing an economically healthy and growing area. Distribution of SSC employees within these counties is provided in Table 3-1. All five of the counties/parishes experienced growth over the 8-year period from 1990 to 1998. Census data for Hancock County, MS, Harrison County, MS, Pearl River County, MS, St. Tammany Parish, LA, and Washington Parish, LA is provided in Table 13-2. Some of the increased growth shown in Table 13-2 is most probably due to the introduction of the casino gambling industry on the Mississippi Gulf Coast.

Table 13-1
SSC Distribution of Personnel

County/Parish	Percentage
Hancock	21%
Harrison	20%
Pearl River	28%
Other, MS	4%
St. Tammany	21%
Other, LA	5%
Other	1%

Source: NASA, 2000, SSC Community Impact.

Table 13-2
Population

County/Parish	1990	1999	Average Annual Percent Change
Hancock	31,760	41,518	+30.7
Harrison	165,365	178,567	+8.0
Pearl River	38,714	47,969	+23.9
St. Tammany	144,500	192,945	+33.5
Washington	43,185	43,162	-0.1
Total	423,524	504,161	+19.2

Sources: Population Estimates Program, Population Division, U.S. Bureau of the Census, Washington, DC 20233 (http://www.census.gov/populations/estimates/county/ets/co-99-2).

13.3 Employment

SSC has employed as many as 6,000 people during the 1960s; however, there are 4,558 employees as of April 2000 this number includes NASA, NASA contractors, and all resident agencies and organizations. SSC is currently home to a number of governmental, military, and industrial agencies and contractors. These include operations of the Department of Defense, Department of Commerce, Department of Interior, EPA, General Services Administration (GSA), State of Mississippi, State of Louisiana, Institute for Technology Development, and seven major industrial contractors. Table 13-3 shows a breakdown of SSC manpower as of September 2000.

Employees at SSC are mainly scientists, engineers, and technicians. Scientific and engineering employees make up 37 percent of the workforce at SSC, with business and professional people at 18 percent, technicians, crafts, and production employees at 29 percent, clerical at 10 percent, and other at 6 percent. Most employees have earned advanced educational degrees: 6% Doctorates, 18% Master's, 34% Bachelor's, and 9% Associate's degrees.

13.4 Income

The 2000 per capita personal income in the five-county/parish area around SSC was below the national average income of $24,436. Table 13-4 shows the per capita income and the percent of the national average for each county/parish around SSC. In Hancock County, MS, the industries producing the greatest amount of total county earnings in 1994 were: services, 40.1%; federal, civilian government, 20.3%; and durable goods manufacturing, 9.7%. In Harrison County, MS, these industries were: services, 31.5%; military, 12.6%; and federal, civilian government, 10%. In Pearl River County, MS, these industries were: services, 24.7%; retail trade, 19.8%; and state and local government, 19.7%. In St. Tammany Parish, LA, these industries were: services, 30.4%; state and local government, 19.6%; and retail trade, 14.6%. In Washington Parish, LA, these industries were: state and local government, 21.5%; services, 21.1%; and non-durable goods manufacturing, 18.8%.

Table 13-3
SSC Manpower

Employers	Numbers of Employees
NASA/NASA Contractors	1,829
Department of Defense	
Department of Navy	1,806
Department of Army and Contractors	77
Department of Commerce and Contractors	109
Department of Interior	41
Other Resident Federal Agencies	696
Total	4558

Source: NASA, 2000, SSC Community Impact.

Table 13-4
Per Capita Income
(1996)

Location	Per Capita Income ($)	Percent of National Average
Hancock County	16,038	65.6%
Harrison County	19,644	80.4%
Pearl River County	14,207	58.1%
St. Tammany Parish	23,006	94.1%
Washington Parish	16,250	66.5%

Source: U.S. Bureau of Economic Analysis 1999 (http://govinfo.kerr.orst.edu).

13.5 Housing

The number of dwellings, including mobile homes, in the study area was 102,943 in 1970. In 1980 there were 141,295 private housing units in the five-county/parish study area, of which 122,548 were occupied, resulting in a 13 percent vacancy rate. Between 1980 and 1986 an additional 25,970 units were authorized by building permits, resulting in a total of 167,265 units in 1986. According to the 1990 Census, the total number of housing units was 175,777.

13.6 Law Enforcement

Each county/parish and all major cities in the area are currently serviced by law enforcement agencies. Sheriff departments and the urban areas service rural areas by city police departments. A list of law enforcement agencies is provided in Table 13-6.

13.7 Fire Protection

Fire protection at SSC is provided on a 24 hour per day, year round basis. The Fee Area and Buffer Zone are approximately 561 square kilometers (138,690 acres) of wooded and grassed areas. Fire protection covers all areas and activities in the Fee Area. Other services provided are fire prevention inspections, stand-by duty for liquid oxygen (LOX) and liquid hydrogen (LH_2) transfers, explosive tests and jet engine tests, basic and refresher fire-fighting training programs for full-time firemen and officers, and assistance to the contractor in establishing fire-fighting training programs to qualify their personnel in the use of fire-fighting equipment.

In addition, mutual aid responsibilities have been established with landowner corporations in the Buffer Zone and several nearby municipalities, which include the following:

- Diamondhead, Mississippi
- St. Tammany Parish, Louisiana
- Bay St. Louis, Mississippi
- Gulfport, Mississippi
- Pass Christian, Mississippi
- Picayune, Mississippi
- Waveland, Mississippi and
- International Paper

Table 13-5
Distribution of Law Enforcement Personnel

Location	Law Enforcement Personnel	
	Full-Time	Part-Time
Hancock County (Rural)	53	10
Bay St. Louis	24	22
Waveland	14	09
Harrison County (Rural)	181	100
Gulfport	62	39
Long Beach	28	15
Pass Christian	12	15
Biloxi	64	50
Pearl River (Rural)	16	01
Picayune	21	20
Poplarville	6	02
St. Tammany Parish (Rural)	321	07
Covington	29	0
Slidell	85	02
Mandeville	30	0
Washington Parish (Rural)	79	30
Bogalusa	38	23

Source: Economic Development Department, Cajun Electric Power Cooperative, Inc., 1994, St.Tammany Parish Profile.

Washington Industrial Development Foundation, Inc., 1995, Washington Parish, LA

Mississippi State University College of Business and Industry, 1994, Mississippi Statistical Abstract.

The mutual aid agreements provide terms under which the various fire-fighting organizations agree to lend equipment and personnel to the facility and municipality in need of assistance.

13.8 Schools

Table 13-6 shows the number of public schools and school enrollment for each of the five-county/parish areas. The latest student/teacher numbers are for the 2000 school year. The numbers are averaged from the number of districts in the county/parish and based on the average daily attendance.

13.9 Health Services

A medical clinic is located at SSC, which provides industrial medical services to all government and contractor personnel at SSC. The clinic provides an Occupational Medicine Program to promote and maintain an optimum state of health in the work environment for all employees. The following services are provided for personnel assigned to SSC:

- Medical care of occupational injury and illness, consisting of emergency, diagnostic, and rehabilitative medical care of employees who are injured or become ill in the course of their employment.

- Preventive medicine oriented toward minimizing the loss of human resources due to injury or illness.

- Industrial hygiene to evaluate the work environment for conditions that are harmful for personnel and to develop methods and procedures for identifying and correcting potential hazards.

- Physical examinations for employees as required by the agency, department, or company in accord with applicable policies and established occupational medicine standards.

- Personal hygiene and health maintenance education promoted by personal conferences, pamphlets, posters, and SSC communication media.

- Medical care of non-occupational (personal) injury and illness, diagnosis, and treatment. While non-occupational injury or illness is not the primary responsibility of the medical clinic, medical care will be provided in the case of an emergency to prevent loss of life or limb or to relieve suffering until the patient can be placed under the care of a personal physician. First aid treatment will be provided if the condition is not serious enough to require the attention of a personal physician or if treatment will enable the employee to complete the current work shift.

The medical program is designed to satisfy all obligations under the provisions of the Mississippi Workmen's Compensation Law and/or the Office of Workers' Compensation programs of the United States Department of Labor.

Table 13-6
Public Schools

Location	Number of Districts	Number of Schools	Enrollment 1993-1994	Students per Teacher
Hancock	2	12	6,200	23/1
Harrison	5	51	36,040	20/1
Pearl River	3	14	8,500	23/1
St. Tammany	1	52	32,502	21/1
Washington	9	12	4,600	25/1

Sources: Hancock County School Board, 2000
Harrison County School Board, 2000
Pearl River County School Board, 2000
St. Tammany Parish School Board, 2000
Washington Parish School Board, 2000

13.10 Health Care Facilities

In addition to the medical facility at SSC, there are 19 hospitals in the five-county/parish area providing 3,221 beds for patient care (Table 13-7). In addition to these primary care facilities, there are numerous physician-run clinics and nursing homes in the area.

13.11 Environmental Justice Strategy

On February 11, 1994, two Executive Orders were issued to integrate Environmental Justice issues and concerns into all of NASA's programs, policies, and activities. In accordance with these Orders and NASA Headquarters directive, Stennis Space Center developed an Environmental Justice Implementation Plan. The SSC Environmental Justice Implementation Plan will take into account the activities conducted at SSC and their environmental impacts, its organizational structure and existing processes, the nature of the surrounding community and the most effective means of communication with external stakeholders. More specifically, the SSC Environmental Justice Plan Implementation will achieve the following goals:

- Identify existing activities and programs that may have a potential environmental effect within a 5 to 10 mile radius of the Buffer Zone

- Determine the nature, level, and geographic distribution of potential environmental impacts caused by Center activities and programs

Table 13-7

Health Care Facilities (2000)

Location	Number of Hospitals	Number of Beds
Hancock	1	78
Harrison	9	2267
Pearl River	2	125
St. Tammany	4	529
Washington	3	222
Totals	19	3221

Sources: Washington Industrial Development Foundation, Inc., Louisiana Department of Health and Hospitals, 2000.
Mississippi Department of Economic and Community Development, 2000, Area Profile, Picayune, Mississippi.
Harrison County Development Commission, 2000, Book of Lists.
Data Summary, 2000, St. Tammany Economic Development Department.

- Identify minority populations and/or low-income populations and/or minority populations that may be adversely affected by the Center's impact on the environment

- Identify environmental impacts on these low-income populations and/or minority populations as a result of the Center's activities

- Determine which existing activities and programs have a disproportionately high adverse human health or environmental effect on minority populations and/ or low income populations

- Develop prudent measures for eliminating or mitigating, to the extent practicable, the disproportionately high adverse human health or environmental effects on such populations of existing activities

- While developing the measures to eliminate or mitigate existing Environmental Justice concerns, communicate the situation to the affected populations and seek their input

- Adapt the Center's NEPA process to ensure that, when required by NEPA, Environmental Justice concerns are addressed in each Environmental Assessment and Environmental Impact Statement (EIS), prepared for proposed new projects, programs, and activities; where the Center determines that the proposal has no Environmental Justice implications, the basis for that finding will be presented

- Communicate identified problem areas to affected communities and develop a corrective action plan for implementation which reduces/eliminates adverse effects; hold public information meetings with community leaders and the general public to gain stakeholder feedback

- Assess the effectiveness of emergency response plans and the adequacy of resources to enforce crisis management procedures for the protection of minority populations and/or low-income populations.

13.12 Utilities

13.12.1 Potable Water

Three deep wells, pumps, chlorinators, two elevated storage tanks, automatic controls, and a distribution system supply the support and test areas with water for drinking, sanitation, and fire protection.

The elevated tanks supply water to the system and maintain system pressure at 4.6 to 4.9 kilograms per square centimeter (65 to 70 pounds/square inch gauge (psig)). Chlorination operates in conjunction with booster pumps, adding a chlorine solution to the water while the pumps are operating. The water supply is sampled regularly for chlorine and contaminant content to meet state and local requirements.

Three-way hydrants for building and storage area fire protection are designed to have a water flow of 5,700 liters per minute (1,500 gallons per minute) for a four-hour period at 1.4 kilograms per square centimeter (20 psig) minimum pressure.

Fire hydrants are located according to the recommendations of the National Board of Fire Underwriters to meet fire protection requirements. Hydrants provide fire protection for every 2800 cubic meters (100,000 cubic feet) of open storage.

13.12.2 Industrial Water

A High Pressure Industrial Water (HPIW) system furnishes water to the test complexes to cool the test stand flame deflectors and provide fire deluge protection on the test stands. It also furnishes water for fire protection of the propellant barges at the test stands.

13.12.3 Telecommunications

SSC has a hardwired communications system, a fiber optics communication system, an oral-warning system, and radio system. In addition, radio communication, facsimile, and teletype systems are available.

Telephone - The telephone system provides 1,500 service lines owned and maintained by the South Central Bell Telephone Company.

Oral-Warning System - The Oral-Warning System is a facility-wide communications system. The system is used to page individuals, make announcements, issue oral signals for safety coordination in test complexes, and inform and advise personnel of pending or existing hazardous conditions.

Operational Intercom - Two-way voice communication within each test complex and the administration facility is provided by the Operational Intercom System. This system contains 19 channels common to all administrative stations. A main console permits channel hookup as necessary, and trunk lines permit the extension of the console for site-wide communication.

Radio Communication - Services such as transportation, fire, security, safety and maintenance operations are handled through the government-owned SSC Radio Communication System. A GSA contract lease and maintenance agreement provides radio communication for other services such as acoustical taxi and lock and barge communications.

13.12.4 Electrical

Dual overhead 110 KV transmission lines normally supply electricity to SSC. The lines are owned and operated by the Mississippi Power Company, and an alternate power service is available from the Louisiana Power and Light Company.

13.12.5 Helium

Helium is primarily used for servicing the test articles to minimize stratification of liquid oxygen (LOX) in run tanks, and to pressurize the propellant tanks. The helium system at SSC provides and distributes refined helium gas at 320 kilograms per square centimeter (4,500 psig) to the test complexes. Compressed gaseous helium is received via railcar or tube bank trailer at the High Pressure Gas Facility (HPGF). The helium is then transferred either to low-pressure storage spheres, to the compressors, or directly into the site distribution system through the system valving.

13.12.6 Hydrogen

The liquid hydrogen (LH_2) system provides for barge unloading, storage, and distribution of large quantities of LH_2, the fuel used for testing. The LH_2 is brought in barges to SSC for use at test complexes. Barge and associated equipment capabilities are as follows:

- A two tank truck unloading station located at Test Stand A-1.
- Three 910,000-liter (240,000-gallon) (usable volume) barges with storage and transfer capabilities.
- A nitrogen pressure controlled system at 53 kilograms per square centimeter (750 psig), which supplies control gas for operations of all barge mounted valves.
- A Water Deluge System which provides fire protection for the LH_2 barges and accessories.
- Interface with the main LH_2 fill, hydrogen vent, control and instrumentation, electric power, ground connection, gaseous nitrogen, and deluge water systems.

Docking facilities for two LH_2 barges are available at each "A" Test Stand, with the distribution system necessary for LH_2 transfer from the barge to the run tank, and for defueling the tank.

The gaseous hydrogen provides and distributes hydrogen gas at 210 kilograms per square centimeter (3000 psig) to the test complex. The system consists of LH_2 storage and vaporization equipment and a distribution system to convey filtered hydrogen gas to the test complexes.

LH_2 is delivered to the High-Pressure Gas Facility by railcar or trailer truck and transferred to storage. The liquid is stored in a 190,000-liter (50,000-gallon) tank. Two pump vaporizer units generate hydrogen gas. The high-pressure hydrogen gas is then pumped to the test complexes using either of two cryogenic pumps. Vented gas is discharged into a flare stack header onto a flare stack and burned.

Gaseous nitrogen and helium are provided for purging hydrogen lines and high-pressure pumps.

13.12.7 High Pressure Air

The high-pressure air system provides and distributes filtered air to the test complexes, the engineering area, the propellant storage area, and the maintenance area. The system consists of compressors and purifiers located in the Central Compressor Building at the High-Pressure Gas Facility, a facility-wide distribution system, and high-pressure storage containers.

The air compressors draw air from outside the building through an oil-bath filter. Both compressors are equipped with intercoolers, which use cooling tower water. Automatic controls are provided on each compressor for protection against excessive pressure, temperature, and vibration. Coolers and scrubbers, ahead of the purifiers, remove most of the oil from the air, and filters placed after the purifiers complete the conditioning operation.

Each site facility has its own storage tanks, all of which are designed for a maximum working pressure of 200 kilograms per square centimeter (2,850 psig).

The average daily use since activation of the Main Propulsion Test Article (MPTA) Complex has been 25,000 cubic meters (900,000 scf). The storage at the test complexes and the combined pumping capacity of the compressors are expected to meet all present program requirements.

13.12.8 Nitrogen

The purpose of the nitrogen system is to generate and distribute missile-quality nitrogen gas at 320 kilograms per square centimeter (4,500 psig) to the test complexes; to service areas for environmental test and control; to maintain an inert atmosphere; and to purge and pressurize propellant tanks, lines, power control valves, and instruments.

Nitrogen gas is generated at the site from liquid nitrogen, which is received at the HPGF by tank trailer. Gas is delivered to the various test and service areas through an underground distribution system and is stored in high-pressure gas containers.

In addition to the liquid nitrogen used for the generation of gas, an amount equal to less than 3 percent of the total site consumption is used for test purposes at the Electronics, Instrumentation, and

Materials Laboratory and the Repair and Fabrication Shop. Nitrogen gas is required at the propellant dock area for purging, operation of valve controls, and fire suppression.

13.12.9 Oxygen

The oxygen system provides storage and transfer capabilities for large quantities of the LOX used as the oxidizer in various tests. The LOX system consists of the Storage and Transfer Facility located at the Cryogenic Propellant Dock, five 360,000 liter (95,000 gallon) LOX transfer barges, the "B" Test Complex LOX Dock and Transfer Facility, and the "A" Test Complex LOX Dock and Transfer Facility.

LOX is delivered to the land-based transfer system at the Cryogenic Propellant Storage Facility by tank truck. Barge mounted pumps transfer LOX from the barges through the transfer system directly into the test stand LOX tank. LOX may be returned to the barge.

13.12.10 RP-1 Fuel

Rocket testing programs proposed for the future; beginning in late 1997, include the use of RP-1 hydrocarbon fuel. New storage tanks will be installed in 1997 and 1998 at the E-1 and B2 Test Stands. Some existing infrastructure to accommodate RP-1 fuel use still exists from Apollo Era rocket testing.

13.12.11 Natural Gas

Natural gas is purchased from the United Gas Pipeline Company and is supplied to SSC facilities through 13 kilometers (eight miles) of 0.15-, 0.20-, and 0.25-meter (6-, 8-, and 10-inch) pipeline and 3.2 kilometers (two miles) of 0.03-meter (1-inch) branch line. A pressure reducing and metering system supplies the gas to SSC at 7 kilograms per square centimeter (100 psig).

Magnesium anodes, buried at intervals along the pipeline, provide protection against corrosion of the piping system. Gas enters the Site Natural Gas System at the north boundary of the Fee Area through a main supply valve to an odorizing station where a liquid odorant is added to the gas.

Natural gas is used as fuel for emergency back-up motors, flare stacks, and for laboratory use in the Engineering and Administration Building and the Environmental Laboratory.

13.12.12 Transportation

Interstates 10 and 59, US Highway 90 and Mississippi Highway 607 serve the SSC area. Interstate 10 is the primary corridor linking Biloxi, Gulfport, Bay St. Louis, and other coastal cities with New Orleans. It is located approximately 5 kilometers (3 miles) south of SSC. Interstate 59 joins Interstate 10 near Slidell, Louisiana and extends northeastward to Hattiesburg, Mississippi and on into Alabama, passing about 8 kilometers (five miles) from the northwestern corner of SSC. Direct access to and through SSC from I-10 and I-59 is provided by Mississippi Highway 607. The highway is closed to the general public within the Fee Area and checkpoints exist at both entrances to SSC. Highway 607 connects with US 90 approximately 14.5 kilometers (9 miles) southeast of SSC.

13.12.13 Water Transportation

Approximately 13.7 kilometers (8.5 miles) of canals inside the Fee Area are being used to transport material into SSC. Large volumes of propellants and heavy cargo are transported via the canals. Main and secondary canals provide water access to several storage areas and the "A" and "B" test areas.

The East Pearl River links SSC to the national waterway transportation system. It is 33.8 kilometers (21 miles) from the main canal entrance along the East Pearl River to the Gulf Intracoastal Waterway. The Gulf Intracoastal Waterway connects with the Mississippi River system approximately 105 kilometers (65 miles) west of the Pearl River mouth.

13.13 Major Environmental Considerations for Proposed Actions

Construction and testing at the facility could increase population slightly in the area. The increase may put a strain on area waste disposal, sewer systems, and groundwater wells. Increased traffic from commuter and construction vehicles could potentially strain the local roads. In addition, increased transportation of facility materials could also have noticeable effects with congestion on roads and waterways. A potential for more accidents could exist due to an increase in traffic.

Schools, health services, law enforcement, and fire protection would also feel the effects of a population increase. Departments that are already understaffed would be further strained.

Increased solid waste generated by additional employees and their families would only be a fraction of current generation. However, landfills in the area are very limited. Proposed actions must be coordinated with NASA Environmental Management to assess impacts in these areas.

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