ATTACHMENT 1
GENERAL FACILITY DESCRIPTION

1.1 SITE LOCATION

The White Sands Test Facility (WSTF) occupies over 60,000 acres and is located along the western flank of the San Andres Mountains, one of the most prominent north-south ranges in southwestern New Mexico. The main entrance to the installation is six miles north of Organ, New Mexico. Geographic coordinates of WSTF are 32º30'30" north latitude and 106º36'30" west longitude. The Facility is located in Doña Ana County, 18 miles northeast of Las Cruces, New Mexico and 65 miles north of El Paso, Texas. Figure 1 provides a WSTF location map. Access to the site is provided by a paved road, which intersects U.S. Highway 70 one mile west of Organ, New Mexico.

WSTF's primary activities are in support of the national space program and include:

- Development, qualification, refurbishment, and testing of spacecraft propulsion systems, subsystems, and ground support equipment;
- Investigation of flight hardware anomalies;
- Testing of materials and components; and
- Performance of hazard and failure analyses.

1.2 PERMIT AND REGULATED UNITS

Hazardous wastes are generated during the course of the WSTF's operations. WSTF is a treatment, storage, and disposal (TSD) facility with a Resource Conservation and Recovery Act (RCRA) Operating Permit issued in February 1993 and Post-closure Permit issued in September 1994. WSTF operates its hazardous waste management activities under the Environmental Protection Agency (EPA) identification number NM8800019434.

WSTF is a large quantity generator of hazardous waste. This Permit includes requirements for the two operating units on site where hazardous waste is treated, - the Evaporation Treatment Unit (ETU) and Fuel Treatment Unit (FTU), - and requirements for corrective actions for the five closed hazardous waste areas, two in the 200 Area, and one in each of the 300, 400 and 600 Areas. The location of these units is depicted in Figure 2 of Attachment 1. In addition, WSTF stores hazardous waste in Waste Accumulation Areas and less than 90-day storage areas, and ships hazardous waste off-site.

1.2.1 Evaporation Treatment Unit (ETU)

Various waste streams at WSTF are treated by evaporation at the ETU. The unit consists of two 147,000 gallon, open top steel tanks and a four-inch drain line with a 370 gallon in-line sump. Hazardous waste is conveyed to the tanks either through gravity flow drain lines from nearby waste generators or by truck from other remote generation points to the drum pumping station between the tanks. The system has secondary containment, leak detection, and cathodic protection system.

1.2.2 Fuel Treatment Unit (FTU)

Waste fuel (hydrazine and hydrazine derivatives) is treated by dilution and stored at the FTU until shipment for off-site disposal. Components of the unit consist of two 4,000-gallon storage tanks, tank secondary containment systems, and numerous connecting pipelines with in-line valves, meters, gauges, and pumps. All components are suspended above the containment pads on legs or mounts.

1.2.3 200 Area Closed Hazardous Waste Areas

The closed units in the 200 Area consisted of four underground steel storage tanks. The closure of the areas was finalized in 1989, and the environmental covers are a parking lot and a concrete floor beneath an existing building.

1.2.4 300 Area Closed Hazardous Waste Area

The closed units in the 300 Area consisted of two above-ground surface impoundments and a multi-chamber concrete mixing tank. The closure was finalized in 1989, and the environmental cover is an asphalt emulsion-sealed concrete bottom of the surface impoundments and a concrete cover for the mixing tank.

1.2.5 400 Area Closed Hazardous Waste Area

The closed units in the 400 Area are similar to the units in the 300 Area. The hazardous waste area consisted of two above ground surface impoundments and a multi-chamber concrete mixing tank. The closure was finalized in 1989, and the environmental cover is an asphalt emulsion-sealed concrete bottom of the surface impoundments and a concrete cover for the mixing tank.

1.2.6 600 Area Closure Hazardous Waste Area

The closed units in the 600 Area consisted of two surface impoundments. The units were closed under one cover, and the closure was finalized in 1989. The environmental cover is constructed of low permeability clay.

1.3 HISTORY OF WSTF

1.3.1 Construction

WSTF began operation on July 6, 1962, when NASA headquarters announced the site selection. From the date of the official announcement until January 1965, the site was officially known as the Propulsion System Development Facility (PSDF). From January until June 1965, the official designation was White Sands Operation (WSO). On June 16, 1965, the official name of the installation was changed to White Sands Test Facility.

Actual construction at the site began in May 1963, with construction of the access road from U.S. Highway 70. The road was completed in October 1963. The first permanent personnel move-in was accomplished in April 1964, and the official WSTF dedication occurred in June 1964.

1.3.2 Propulsion Testing

Propulsion systems testing began in September 1964, in the “300” Area Test Stand (TS) 301, with firings of the Apollo Service Propulsion Subsystem (SPS) engine in a heavyweight rig labeled F-2. A Block 2 configuration SPS test article (F-2A) was installed and tested at TS-301 from early 1966 until mid-1969, followed by development and qualification testing until mid-1971 of the Command and Service module (CSM) Reaction Control System (RCS) engines used for the Skylab project.

Test Stand 302 was originally constructed as an ambient test stand and was first used for SPS firings of the SC 001 test rig during 1965. In 1966, the stand was significantly modified by removing the ambient thrust structure, and installing a tall vacuum chamber, similar to those at TS-401 and 403. In 1972, TS-302 was further modified by lengthening the vacuum chamber by 20 feet. This test stand was equipped with mechanical vacuum pumps, and was used to characterize the start transient and minimum-impulse performance of the Lunar Module (LM) ascent engine at higher simulated altitudes (240,000 ft) than could be obtained with the steam ejector system in the “400” Area. The effects of different rocket engine configurations on soil erosion, displacement, and contamination by exhaust products were evaluated during these tests, resulting in recommendations for design changes incorporated into the flight article.

Other “300” Area tests through the mid-1970’s included Navy solid rocket plume/microwave interaction tests, characterization of filters for gasses, hypergolic propellants, and cryogenic liquids, and evaluation of effects of dumping residual Apollo command module propellants on the recovery parachute risers before splashdown (Apollo 15 parachute failure).

Following the Apollo-Skylab era, the facilities in the 300 Area were modified, including propellant supply systems, environmental control, improved electrical and data systems, articulated thrust structures, and moveable shelters to accommodate extensive testing of the primary and vernier reaction control systems of the Space Shuttle Orbiter.

Exhaustive testing of the ARCS, from development through operational qualification, took place at TS-301 from early 1978 through 1982, with emphasis on evaluating Aft Reaction Control System (ARCS) and Orbital Maneuvering System (OMS) interactions and thruster duty cycle effects, as well as characterization of the RCS tank propellant acquisition devices (screens) and development of checkout and servicing procedures.

Similarly, rigorous testing of the Forward ARCS was conducted at TS-328 (adjacent to TS-302) during the same time period (1978-1982) as ARCS testing. Both the 870-lb thrust primary engines and the 25-lb thrust vernier engines on each ARCS and Forward Reaction Control System (FRCS) test article were thoroughly investigated during the development and qualification tests.

Facilities in the “400” Area were originally designed around testing the Apollo LM propulsion system, and the two vacuum test chambers could contain a full-size mated LM while performing simulated vacuum firing of the descent, ascent, and RCS engines. Initial testing of the LM Ascent Propulsion Subsystem was conducted at the ambient TS-402 using the HA-3 rig beginning in 1965. Subsequent LM APS and RCS testing was conducted mostly in the TS-403, using a flight-representative test article dubbed PA-1, and encompassing the period from 1966 through late 1970.

A LM ascent stage thermal test rig TM-2 and the LM descent test rig LTA-5 were also tested at the TS-403 during this period.

Vacuum Test Stand 401 (TS-401) was dedicated to testing the LM descent propulsion subsystem, using several configurations of heavyweight and flight test articles such as HD-1, PD-1, PD-2, and LTA-5. These tests were conducted from early 1966 through late 1970.

During the transition years between the Apollo and Shuttle eras, an extensive series of tests of a second stage satellite booster engine was conducted in 1972 for the Japanese Space Agency, and a pair of planetary probe insertion solid rocket motors was fired at TS-401. A program to develop rocket engine extendable nozzle technology was also conducted during this period at TS-403.

Testing of Shuttle Orbital Maneuvering Engine (OME) technology and prototype engines began in mid-1973, and all candidate OMS engines from several manufacturers were tested at TS-401 to select the OME manufacturer and define baseline data in the official OME design. The selected Aerojet engine was subject to extensive prototype, development, and qualification testing from 1974 through 1980, undergoing numerous design and operational modifications along the way.

A simulated OMS "pod" containing flight weight and configuration OMS propulsion system (but only simulated RCS) underwent development and early qualification tests at TS-403 between 1978 and mid-1979. This OMS pod was then revised to reflect correct configuration and retested at WSTF from 1981 through 1982 to the more stringent operational flight conditions of Qual II.

Other programs conducted in the "400" Area during the Shuttle era include several high-altitude tests of the primary and vernier RCS engines. These tests include helium bubble ingestion and simulated propellant leakage, tests of a DOD technology demonstration warhead intercept propulsion system, extensive characterization of the solubility of iron (from steel storage vessels and transport lines) in an oxidizer, and evaluation of methods like molecular sieves for removal of the iron nitrate from oxidizer.

In the early 1990s, WSTF performed development testing of the proposed Space Station Freedom propulsion modules. Additionally, WSTF is an Orbiter and International Space Station Depot Repair Facility and performs flight hardware assembly, repair, and acceptance testing for private aerospace manufacturers. Today, six test stands provide vacuum test capability, and three test stands provide ambient testing; 5,000 feet (1,100 meters) above sea level, for the Space Shuttle, International Space Station, or government agencies.

1.3.3 Materials Testing

Beginning in 1967, the WSTF laboratories developed a basic capability to evaluate the flammability and toxicity characteristics of non-metallic materials used in the Apollo spacecraft. This program expanded rapidly in the following years to include the measurement of properties such as total organics, odor, comparability in propellants, and mechanical and pneumatic impact. Test pressures were initially at Apollo cabin pressures with 100% oxygen. The testing is presently performed with any oxygen mixture up to 20,000 pounds per square inch absolute (psia). Standardized test fixtures, test procedures, and acceptance criteria have been developed for these environments. The need for materials testing continued from the Apollo program through Skylab, ASTP, and the Space Shuttle.

In order to provide standard facilities, efficiency, and fast response to the many materials test requirements, the many scattered facilities were consolidated into a single materials test facility that was built in 1974. Twelve permanent remote test cells were provided for conducting tests using hazardous fuels and oxidizers. Eight additional cells were provided to perform standard high pressure oxygen tests and other tasks that are hazardous to perform due to pressure, fire, and other hazards, but do not use hazardous fluids. The most recent addition to the materials testing capability consists of a high temperature, high flow rate oxygen facility that allow testing of high flow rate components and performance of particle impact investigations at elevated temperature.

In 1967, the WSTF precision cleaning laboratory began the cleaning of tools, sample collection devices, packages, and related materials for the Lunar Receiving Laboratory at Johnson Space Center (JSC). In 1973, at the request of the Lunar Curator, an intensive effort was initiated to upgrade the precision cleaning and control capabilities of this laboratory. This effort led to cleaning the Viking Lander soil samples hardware to very low levels of organic contaminants.

The WSTF laboratories have also performed a wide variety of special tests for all of the manned space efforts under many different conditions. These special tests include microelectronic circuit screen and burn-in testing, component evaluations, qualification testing of electrical and mechanical components and subsystems, failure analysis, chemical and metallurgical investigations, plus many more such activities.

1.4 GEOLOGY

The WSTF is in the Mexican Highland Section of the Basin and Range Province and within a major tectonic feature – the Rio Grande Rift Zone. North-trending mountain ranges and intermountain basins characterize the Rift Zone, which extends from southern Colorado to northern Mexico. WSTF is located along the western flank of the San Andres Mountains. The elevation of the adjacent plains is about 4000 feet above mean sea level.

The uppermost alluvial layers upon which WSTF is located consist of silt, sand, gravel, boulders, and locally-cemented conglomerates, and range from 400 to 700 feet thick adjacent to the mountains to 100 to 200 feet thick in the basin floor. The surface of the uppermost alluvium layer is a sandy silt containing some gravel and occasional boulders, with the gravel and boulder content gradually increasing with depth.

1.5 HYDROLOGY

The primary water supply in the area for potable, industrial, and agricultural use is from underground water resources. Immediately adjacent to the Rio Grande, water for agricultural use is from the river via irrigation canals. The quantity of water from this source, however, is a minor amount of the total water consumption.

In the WSTF area, all water is from underground sources. Recharge of the ground water aquifers of the Jornada del Muerto Basin is primarily runoff from the adjacent San Andres Mountains. Approximately 75 percent of total rainfall migrates off-site as surface runoff. The runoff that does not evaporate or transpire after it reaches the alluvial fans at the base of the mountains, infiltrates and constitutes ground water recharge. Although the volume of this recharge is small and sporadic in nature, it is a continuing source of recharge.