National Aeronautics and
Space Administration

Environmental Assessment for NASA Renewable Energy Project at Johnson Space Center White Sands Test Facility, New Mexico

November 2011

FINAL

photo courtesy of http://www green.essexcc.com

NM8800019434
NASA Johnson Space Center White Sands Test Facility
12600 NASA Road Las Cruces, New Mexico 88012

Environmental Assessment for NASA Renewable Energy Project at Johnson Space Center White Sands Test Facility (WSTF)

Location:	White Sands Test Facility is located in Doña Ana County in New Mexico.
Lead Agency:	National Aeronautics and Space Administration (NASA) Johnson Space Center White Sands Test Facility
Proposed Action:	NASA proposes construction of a solar array to help provide renewable electricity to the site.
For Further Information:	Timothy J. Davis NASA Environmental Scientist NASA Johnson Space Center White Sands Test Facility 575.524.5024 Fax: 575.527.6731 Email: timothy.j.davis@nasa.gov
Date:	November 23, 2011

Executive Summary

Knowing the peak and average demand of a power system is critical to proper planning. The power system must be designed to serve the peak load, which is usually the busiest part of the day when the majority of the work force is present. The NASA Johnson Space Center White Sands Test Facility (WSTF) consumes approximately 1– 1.5 megawatt (MW) of energy continuously and reaches daytime peaks of energy use nearing 2.5 to 2.9 MW (WSTF Energy Database). It is expected that the need for energy will grow by at least 1.0 MW by the end of the decade as additions to the facility are brought online. These additions may include restoration treatment hardware, new test facilities, and new operations.

NASA intends to take an active role in converting WSTF from the present conventional power source usage to renewable energy sources. The Energy Policy Act of 2005 and Executive Order (EO) 13514 require federal facilities to adhere to a schedule of compliance for the use of renewable sources of energy. These documents require that renewable electricity consumption by the federal government cannot be less than five percent in fiscal year 2010 through fiscal year 2012, and 7.5 percent in fiscal year 2013 and thereafter. To incorporate renewable energy usage into WSTF's infrastructure and comply with these policy requirements, NASA has proposed developing an initial 1.0 MW photovoltaic system at WSTF which would cover approximately 7-14 acres (0.03 – 0.06 km^2) of NASA owned land. If the system is deemed successful, WSTF proposes to expand the system to a 60 – 80 MW system that would cover approximately 500 acres (ac) (2.02 square kilometers [km^2]).

This Environmental Assessment (EA) describes the purpose and need for the proposed facility construction of a solar array at WSTF. Two reasonable alternatives are considered: 1) a proposed location at WSTF, and 2) a "no action" alternative.

Table of Contents

Acronyms

ac	Acre(s)
BISON-M	Biota Information System of New Mexico
B.C.	Before Christ
BOS	Balance-of-system
°C	Degree(s) Celsius
CFR	Code of Federal Regulations
dB(A)	Decibel(s)
DC	Direct current
EA	Environmental assessment
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
EPEC	El Paso Electric Company
EO	Executive Order
°F	Degree(s) Fahrenheit
ft	Foot/feet
JSC	Johnson Space Center
km	Kilometer(s)
kph	Kilometer(s) per hour
kW	Kilowatt
kV	Kilovolt
m	Meter(s)
MVA	Megavolt ampere
mi	Mile(s)
mph	Mile(s) per hour
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act of 1969
NMDGF	New Mexico Department of Game and Fish
PV	Photovoltaic
R3E	Range 3 East
T21S	Township 21 South
TES	Threatened, endangered, and sensitive species
U.S.C.	United States Code
USCB	United States Census Bureau
USFWS	U.S. Fish and Wildlife Service
WSTF	NASA Johnson Space Center White Sands Test Facility

1.0 Purpose and Need for the Proposed Action

This environmental assessment (EA) has been prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code [U.S.C.] §§ 4321-4370d), and according to the Procedures of Implementation of NEPA for National Aeronautics and Space Administration (NASA) (Title 14, Code of Federal Regulations [CFR], part 1216 subparts 1216.1 and 1216.3). The EA describes the purpose and need for the proposed facility construction of a solar array at NASA Johnson Space Center White Sands Test Facility (WSTF). Two reasonable alternatives are considered: 1) a proposed location at WSTF, and 2) a "no action" alternative. Existing environmental conditions at the proposed location at WSTF are described and the potential environmental consequences for each action are then analyzed.

This EA was made available for public comment, and comments received are attached in Appendix A.

1.1 Background

President Obama signed Executive Order (EO) 13514, "Federal Leadership in Environmental, Energy, and Economic Performance," on October 5, 2009. This EO expanded the energy reduction and environmental performance requirements for federal agencies identified in EO 13423. One of the non-numerical targets that all federal agencies must meet included: increasing renewable energy and renewable energy generation on agency property.

The Energy Policy Act of 2005 set forth goals for federal facilities to start using renewable and sustainable sources of energy. The act established an energy research and development program covering: 1) energy efficiency; 2) renewable energy; 3) oil and gas; 4) coal; 5) Indian energy; 6) nuclear matters and security; 7) vehicles and motor fuels, including ethanol; 8) hydrogen; 9) electricity; 10) energy tax incentives; 11) hydropower and geothermal energy; and 12) climate change technology.

Title I, Section 204 sets forth procedural guidelines under which the Administrator of General Services is authorized to establish a photovoltaic energy commercialization program for the procurement and installation of photovoltaic solar electric systems for electric production in new and existing public buildings. Title IX allows federal agencies to acquire cost-effective technologies for new construction and retrofitting, and to improve the energy efficiency and environmental performance of buildings, using a whole-buildings approach, including onsite renewable energy generation. It also allows the use of advanced technologies to improve the energy efficiency, environmental performance, and process efficiency of energy-intensive and waste-intensive industries. Subtitle C, Section 931 directs the United States Secretary of State to conduct programs of renewable energy research, development, demonstration, and commercial application, including: 1) solar energy and photovoltaics; 2) wind energy; 3) geothermal energy; 4) hydropower; 5) ocean and wave energy; and 6) the combined use of renewable energy technologies and other energy technologies, including the combined use of wind power and coal gasification technologies.

1.2 Purpose and Need

A kilowatt (kW) is 1,000 watts. One megawatt (MW) is equal to 1,000 kW. According to 2005 Energy Information Administration (EIA) data, New Mexico's electricity consumption for the year was 20,639 million kW hours (39th highest in the United States). The highest energy user by sector was commerce, followed by industry and residential users. The amount of electricity consumed by a typical residential household varies dramatically by region of the country. The national average for residential electricity use per household for 2007 was 8,767 kW hours (http://www.swenergy.org).

Knowing the peak and average demand of a power system is critical to proper planning. The power system must be designed to serve the peak load, which is usually the busiest part of the day when the majority of the work force is present. The current WSTF power system demand is approximately 1 – 1.5 MW of energy continuously and reaches daytime peaks of energy use nearing 2.5 to 2.9 MW. It is estimated that the WSTF need for energy could grow by 1.0 MW by the end of the decade as additions to the facility (such as restoration treatment hardware, new test facilities, and new operations) are brought online.

NASA intends to take an active role in converting WSTF from the present use of conventional power sources to renewable energy sources. The Energy Policy Act of 2005 and EO 13514 require federal facilities to adhere to a schedule of compliance for the use of renewable sources of energy. These documents require that renewable electricity consumption by the federal government cannot be less than five percent in fiscal year 2010 through fiscal year 2012, and 7.5 percent in fiscal year 2013 and thereafter. NASA's fiscal year starts in October and ends in September. For example, fiscal year 2011 would start in October 2010 and end in September 2011. To incorporate renewable energy usage into WSTF's infrastructure and comply with these policy requirements, NASA has proposed developing an initial 1.0 – 2.0 MW photovoltaic system at WSTF. The system would be placed on 7 – 14 acres (0.03 – 0.06 km²) of NASA-owned property. If the system is deemed successful, WSTF proposes to expand the system to a 60 – 80 MW system that would cover approximately 500 acres (ac) (2.02 square kilometers [km²]).

1.3 Description of Proposed Action

The proposed solar energy system would be located in the 600 Area, west of Building 650 in Township 21 South (T21S), Range 3 East (R3E), Section 5. This area (excluding private land, cultural resources, existing roads, existing utilities, and well pads) is equivalent to approximately 500 ac (2.02 km²) with an estimated total capacity of up to 100 MW of installed power. The goal of the project would be to use the renewable energy from the photovoltaic system to provide renewable energy for the operation of activities at WSTF such as the groundwater treatment system and general facility operations. The project would initiate construction in October 2011 and expand in Section 5 in the next five to ten years depending on funding. The renewable energy would replace more traditional energy sources from El Paso Electric Company (EPEC) during peak operating hours during the day.

To materialize each one of the stages for the proposed solar array and to maximize the use of taxpayers' dollars, NASA is planning a Design-Built-Maintained procurement type, open to different vendors proposing different types of structures and technologies, where the one that offers the most power output from each dollar (along with other standard technical requirements) should be chosen.

Because of this procurement approach, the final exact dimensions, structure type, layout, etc. have not yet been determined, but the general requirements for all vendors would be the following:

- The system shall be designed and built by the vendor, and would have minimum maintenance requirements and high reliability.
- The system must have minimum 25-year design life and be capable of normal unattended operation.
- Any technology that produces electricity from solar radiation is accepted, including but not limited to photovoltaic (PV) or concentrating PV, stationary-oriented panels, sun-tracking, or any combination of these.

- Technologies that involve major use of water (other than for cleaning purposes) or any type of fuel in any stage of its production process would not be accepted.
- Maximum total height of the panels would be approximately 15 ft (4.6 m).
- The system must be simple and quiet.
- Energy storage such as the use of batteries would not be considered.

The first planned stage of this proposed solar array would be an initial 1.0 – 2.0 MW PV system which would be placed on approximately 7 – 14 ac (0.06 km²) as shown in Figure 1. PV systems use semiconductor technology to convert sunlight directly into electricity. The expansion of the system would occur throughout Section 5 from the initial 1.0 – 2.0 MW proposed location noted in Figure 1. Figure 2 provides an example of a 4.6 MW system near Tucson, Arizona to provide a frame of reference in terms of physical size. Figure 3 provides an example of an 80 MW system near Ontario, Canada. The proposed area has the potential capacity to produce many times more than the actual energy needs of WSTF, so the plan is to develop the project in different stages with the first main goal of covering the total energy consumption at WSTF (sometimes called Net-Zero). The second main goal would be to continue expanding the system up to the physical capacity of the proposed area and then be able to export clean energy, depending on applicable regulations.

In addition to the solar array system, solar panels would be placed on the roofs of existing buildings to help the buildings rely less on traditional electrical power. These additional solar panels would connect to the buildings' existing electrical system and would not be directly connected to the WSTF substation.

PV systems vary in size, ranging from a single solar cell to power a calculator or a single module (containing multiple cells) to power a light to multiple modules to power a water pump or a home. There are large arrays of modules to provide industrial-scale power. PV technology is well established and field proven, and many sizes and types of modules are commercially available from a number of different companies. PV systems require much less maintenance than conventional power generators. A PV unit consists of semi-conductive silicon wafers that are metalized (given metal properties) using special metallic inks or thick pastes that create a working solar cell. The cell assemblies are contained in watertight modules for protection from moisture and impacts. The resulting assembly is referred to as a solar panel or module. The principle components of crystalline silicon PV modules are glass glazing, cover, silicon wafers and associated wiring, and a protective back sheet. Modules or arrays, by themselves, do not constitute a PV system. There must also be structures which support and orient them to the sun, and components that take the direct-current (DC) electricity produced by the modules or arrays and then condition the electricity so that it can be utilized. These structures and components are referred to as the balance-of-system (BOS) (SNL, 2011). Solar cells power virtually all satellites. The International Space Station uses PV arrays to generate much of its electrical power (Figure 4).

The PV effect is the basic physical process through which a PV cell converts sunlight into electricity. Sunlight is composed of photons which are packets of solar energy, and these photons contain different amounts of energy that correspond to the different wavelengths of the solar spectrum generated by the sun.

When photons strike a PV cell, they may be reflected or absorbed, or they may pass through. The absorbed photons generate electricity. The energy of a photon is transferred to an electron in an atom of the semiconductor device. With its newfound energy, the electron is able to escape from its normal position associated with a single atom in the semiconductor to become part of the current in an electrical circuit. Special electrical properties of the PV cell provide the voltage needed to drive the current through an external load (Figure 5).

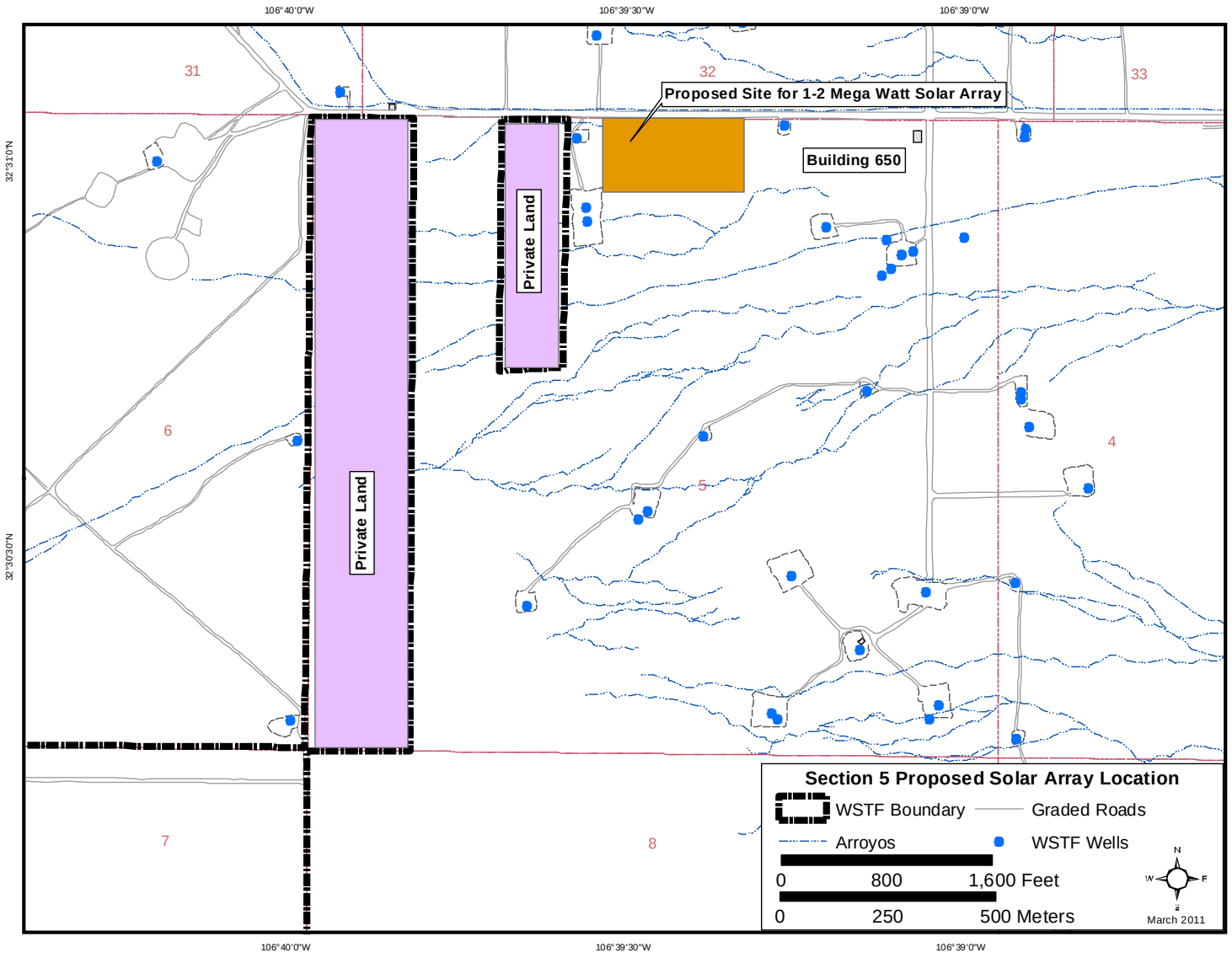


Figure 1
Location of Proposed Solar Array

www.schottsolar.com

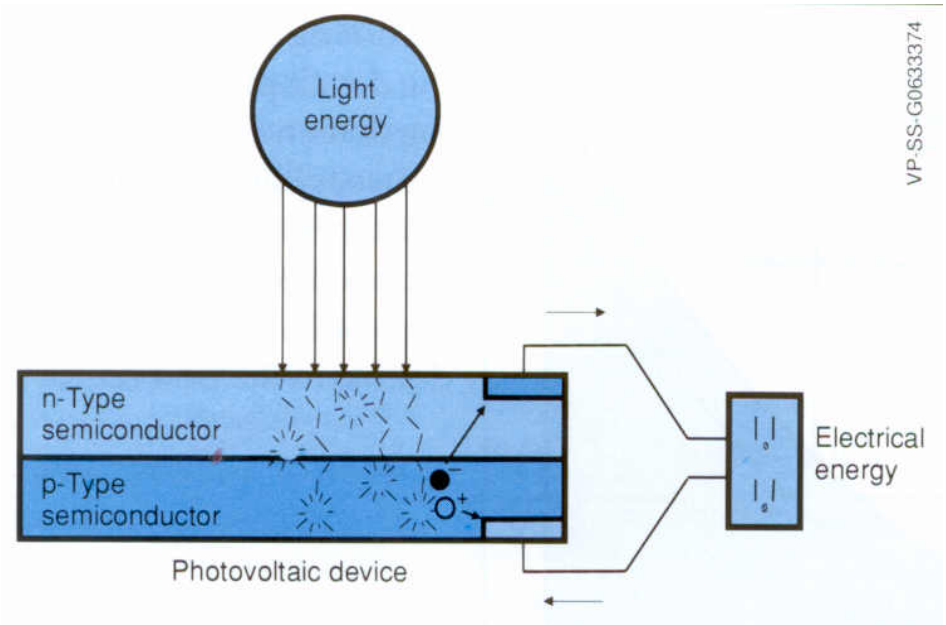
Figure 2
Tucson Electric Power Company Ground Array (4.6 MW on 44 ac [0.18 km²])

www.greenterrafirma.com

Figure 3
Sarnia Solar Project in Ontario, Canada (80 MW on 950 ac [3.84 km²])

www.nasa.gov

Figure 4
Photovoltaic System on International Space Station

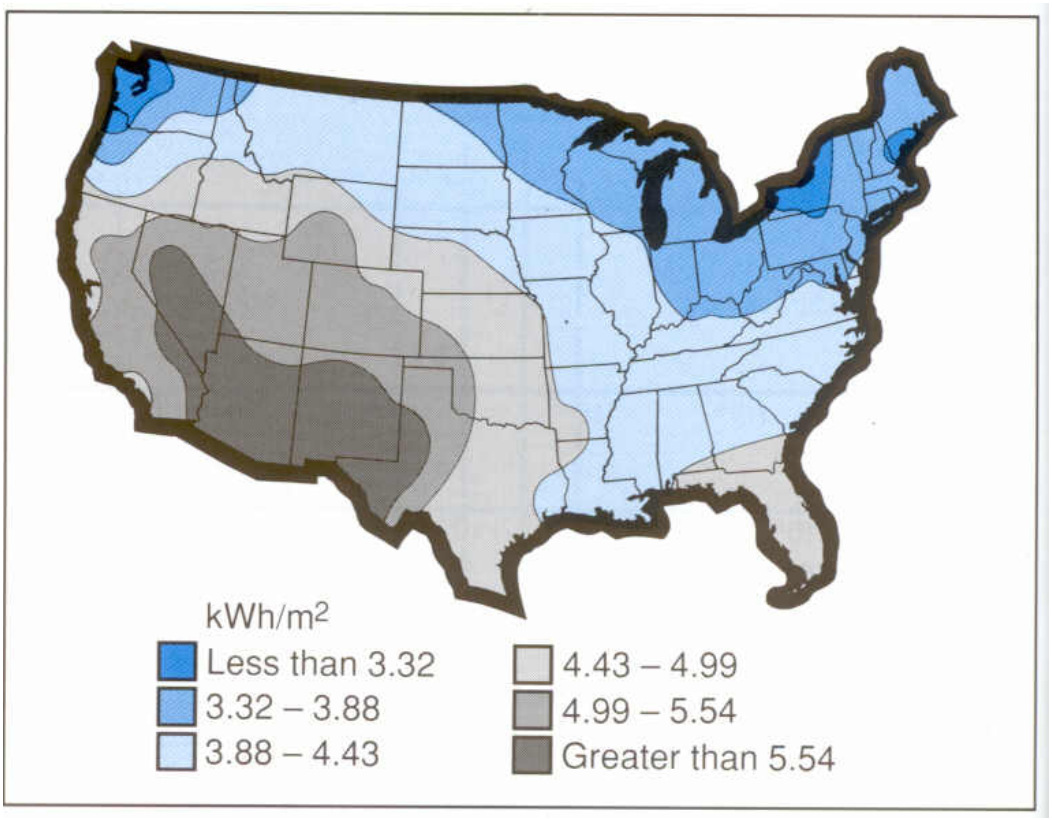


www.sandia.gov/pv

Figure 5
The Photovoltaic Effect

When sunlight reaches Earth, it is distributed unevenly in different regions. The areas near the equator receive more solar radiation than anywhere else on Earth. Sunlight varies with the seasons as the rotational axis of the Earth shifts to lengthen and shorten days as the seasons change. The quantity of sunlight reaching any region is also affected by the time of day, the climate (especially the cloud cover, which scatters the sun's rays), and the air pollution in that region. These climatic factors all affect the amount of solar energy that is available to PV systems (Figure 6).

The amount of energy produced by a PV device depends not only on available solar energy but on how well the device, or solar cell, converts sunlight to useful electrical energy. This is called the device or solar cell efficiency. It is defined as the amount of electricity produced divided by the sunlight energy striking the PV device. Scientists have concentrated their research and development efforts over the last several years on improving the efficiency of solar cells to make them more competitive with conventional power-generation technologies. Today's commercial PV systems can convert up to 19.5 percent of sunlight into electricity (http://us.sunpowercorp.com). They are highly reliable, and they last 20 years or longer.



www.sandia.gov/pv

Figure 6
Available Solar Energy

2.0 Alternative Actions

2.1 Alternative Site

Early in the planning process a second, alternative site was selected at WSTF in the 100 Area, east of the main building complex. The drawback to the site is the amount of sunlight it receives daily. Since the location is in the shadow of Quartzite Mountain until late morning, the area captures approximately three hours less each day of solar energy than the newer proposed location. As a result, WSTF is focusing on placing the proposed solar array in Section 5 as stated in Section 1.3, Description of Proposed Action, of this EA. No other potential alternative sites were identified.

2.2 No Action Alternative

With the "no action" alternative, the site would remain an undisturbed site at the proposed locations, with no solar installation. NASA would continue to buy all of its electrical power, including renewable energy, from EPEC at cost.

3.0 Affected Environment

WSTF operates as a component facility to the NASA Lyndon B. Johnson Space Center, Houston, TX with the primary purpose of providing testing services to NASA for the United States space program. However, the facility also provides test services and support for the Department of Defense, Department of Energy, private industry, and foreign government agencies. WSTF's mission is to provide the expertise and infrastructure to test and evaluate spacecraft materials, components, and propulsion systems to enable the safe human exploration and utilization of space.

WSTF is located 16 miles (mi) (26 km) northeast of Las Cruces, NM, and 65 mi (104 km) north of El Paso, TX. Geographic coordinates of WSTF are 32°30'30" north latitude and 106°36'30" west longitude. The installation occupies over 60,000 ac (250 km^2) along the western flank of the San Andres Mountains, a prominent north-south range in southwestern New Mexico.

The following sections detail environmental information associated with the proposed action and "no action" alternative. Neither the proposed action nor the "no action" alternative would be expected to produce any consequences related to ground or surface water sources. The construction and operation of the facilities is not expected to affect the quality or use of water on site.

3.1 Land Use

The general pattern of WSTF land use follows planning concepts and objectives that were established when the installation was initially conceived, designed, and constructed. The fundamental guideline for orderly growth and development at WSTF is to continually review, utilize, and/or extend these basic ideas with respect to frequently changing conditions. The current WSTF Facilities Master Plan (NASA, 2005) satisfies all foreseeable major functional requirements and relationships. For example, it protects off-site adjacent land usage from objectionable or hazardous influence, and incorporates flexibility to accommodate current long-range planning goals and objectives.

The proposed location for the 7 – 14 acre (0.03 – 0.06 km²) project as well as the potential expansion to a full 500 ac (2.02 km²) solar array would be located throughout Section 5, T21S, R3E, where there is already land disturbance and human activity due to the site's groundwater treatment system and monitoring wells. The desert vegetation would have to be removed from the area in order to install the solar array. Existing roads would be used when possible to access the solar array.

3.2 Geology and Soils

The area topography consists of relatively flat plains west of the San Andres Mountains. The area soils are primarily the sandy to silty, loamy soils of the Doña Ana-Reagan association and Nickel-Tencee association (United States Department of Agriculture, Soil Conservation Service, 1976). The Doña Ana-Reagan association consists of gently rolling soils on broad fans. The association is about 35 percent Doña Ana fine sandy loam and 35 percent Reagan loam. The Doña Ana soil occurs on sloping alluvial fans, while the Reagan soil is on nearly level to gently sloping plains and alluvial fans. The soil is deep and well drained. Permeability is moderate and the water erosion hazard is moderate. The soil blowing hazard is high when more Doña Ana soil is present. The Nickel-Tencee soils tend to be more gravelly fine sand to gravelly loam. Nickel-Tencee soils are typically related with alluvial fan deposits. These soils are moderately alkaline and permeability is moderate but slow (Seager, 1981 and Seager et al., 1987).

3.3 Climate

Located in the northern portion of the Chihuahuan Desert, WSTF has an arid to semi-arid climate with abundant sunshine, relatively low humidity, modest rainfall, and a relatively mild winter season typical of low latitude arid areas. Rainfall through the year is light and insufficient for any growth except desert vegetation. The average annual rainfall at WSTF is around 10 inches (in) (25 cm), with the majority occurring in July and August. However, it varies across site with highest amounts on or near the mountains. Temperatures at WSTF are generally warm in the summer and mild during the winter. Temperatures during the day are often near 90° to 100° Fahrenheit (F) (32° to 38° Celcius [C]) for the majority of the summer months. Mild daytime temperatures characterize winter, rising to 55° – 60 °F (12.8° – 15.6 °C) on average. The lowest temperatures occur in December and January, and night-time temperatures often drop below freezing (NASA, 2006).

Seasonal wind variations in the area are significant, with the strongest sustained winds occurring in late winter and spring months. This is primarily due to the surface winds colliding with the strong westerly winds and the natural terrain of the area. In the summer months, the surface winds are lighter except for the short term variations caused by the thunderstorms and "dust devils." Updrafts and downdrafts are always present with thunderstorms, adding to the surface wind variability by cooling the mountains and basins. Variability caused by frontal activity is generally confined to the winter and spring months, contributing to the stronger winds observed during these months. The winds may reach velocities as high as 30 – 40 miles per hour (mph) (48 – 64 kilometers per hour [kph]) or may exceed these velocities when a pressure gradient and a thermal gradient lie in the same direction.

3.4 Air Quality

The U.S. Environmental Protection Agency (EPA) regulates air quality through National Ambient Air Quality Standards (NAAQS). Air quality is assessed according to six criteria pollutants: carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, respirable particulate matter, and lead (EPA, 2006). WSTF is located in counties considered to be in attainment of NAAQS (NMED, 2011). However, high levels of particulate matter from natural sources (such as blowing dust storms) may occur temporarily during periods of high winds.

The state of New Mexico, in accordance with federal clean air standards, has adopted a set of air quality control regulations that apply to stationary sources of air pollution. These regulations apply to stationary sources, such as diesel generators. They do not apply to mobile sources, such as trucks or aircraft.

The ambient air quality and weather conditions in the proposed areas are excellent. The atmospheric visibility "seeing" conditions are in the 50 – 100 mi (80 – 160 km) range. However, Doña Ana County, where the proposed project is located, has been designated as an Air Quality Maintenance Area for carbon monoxide and total suspended particulate matter. Although the county itself is lightly populated and relatively pollution-free, air quality is affected by the cities of El Paso, TX and Juarez, Mexico.

3.5 Energy

The EPEC provides electricity to WSTF through a 69 kilovolt (kV) transmission line that runs parallel to the site's access road easement and terminates at the EPEC-owned Apollo substation located adjacent to the main entrance gate. The Apollo substation supplies all loads to WSTF through one 30 megavolt ampere (MVA) three-phase transformer, and three single-phase step voltage regulators. The feed into the WSTF switchyard is primary-metered at a pole structure located between the Apollo substation and the WSTF switching station. The monthly peak load and annual usage are approximately 2,100 kW and 11 million kW hours, respectively. Apollo Substation also provides power to three other customers.

Immediately adjacent to the Apollo substation, WSTF receives one three-phase 24.9/14.4 kV aerial feeder circuit at the WSTF-owned switching station. The power is distributed throughout WSTF by a WSTF-owned and -operated overhead electrical distribution system. From the switching station, the power is delivered in three circuits, which are simple radial configurations. Circuit No. 1 supplies power to the 100 Area. Circuit No. 2 supplies power to water wells, two water booster stations, water treatment facilities, and the Fuel Fire Test Area. Circuit No. 3 supplies the remaining WSTF locations including the 200, 300, 400, 500, 700, 800 Areas and one water booster station.

The overhead distribution line construction is Grade B as defined by the National Electrical Safety Code, suitable for service conditions of 5,000 ft (1,500 m) altitude, +15 °F (-9 °C) temperatures, and 80 mph (130 kph) winds. The various WSTF areas and buildings are supplied standard utilization voltages through substations located throughout the site.

3.6 Biological Resources

Threatened, endangered, and sensitive (TES) species lists developed by the U.S. Fish and Wildlife Service (USFWS) and New Mexico Department of Game and Fish (NMDGF) were reviewed to determine the potential for TES occurrences near the proposed sites. A list of TES faunal species known or expected to occur on WSTF is presented in Table 1. TES species lists developed by the USFWS and NMDGF were reviewed by the county. The list was created using the NMDGF Biota Information System of New Mexico (BISON-M) database (2011). No habitat for federal or state listed threatened and endangered faunal species is present at the proposed locations.

Major vegetation within the area includes a combination of woody shrubs and grasses characteristic of the Chihuahuan Desert scrub biotic community. The proposed project's locations are a xeric, poorly drained, and vegetative homogenous area. Shrubs provide a microhabitat for warm season grasses and herptiles.

The project area vegetation group contains yucca (*Yucca* spp.), broom snakeweed (*Gutierrezia sarothrae*), and honey mesquite (*Prosopis glanulosa*). Other plant species include tarbush (*Flourensia*

cernua), creosotebush (*Larrea tridentata*), Russian thistle (*Salsola kali*), fourwing saltbush (*Atriplex canescens*), silverleaf nightshade (*Solanum eleagnifolium*), desert globemallow (*Sphaeralcea ambigua*), plains pricklypear (*Opuntia polyacantha*), and the desert Christmas cactus (*Cylindropuntia leptocaulis*). The most abundant species of grasses are sand dropseed (*Sporobolus cryptandrus*), blue grama (*Bouteloua gracilis*), bush muhly (*Muhlenbergia porter*), and bristlegrass (*Setaria sp.*).

Common species of birds that could occur at or near the proposed areas include quail (Family *Odontophoridae*), mourning doves (*Zenaida macroura*), roadrunners (*Geococcyx californianus*), hawks, owls, ravens, turkey vultures (*Cathartes aura*), sparrows, wrens, flycatchers, and a variety of other songbirds. Migratory bird species frequent WSTF during the spring and fall. This is when the bird population is at its largest.

Common large and small mammals that are expected to occur at or near the proposed solar photovoltaic system include mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), raccoons (*Procyon lotor*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), woodrats, and mice.

The list of lizards and snakes includes horned lizards (*Phrynosoma* sp.), whiptails (*Aspidoscelis* sp.), collared lizards (*Crotaphytus collaris*), coachwhips (*Masticophis flagellum*), gopher snakes (*Pituophis catenifer*), prairie rattlesnakes (*Crotalus viridis*), and western diamondback rattlesnakes (*Crotalus atrox*). Amphibian species found in this area include true toads (*Bufo* sp.) and spadefoot toads (*Spea* and *Scaphiopus* sp.) (Sullivan and Houde-Nethers, 1996 and Skarsgard, 2011). There are no habitats that contain fish in the proposed project area.

Table 1
Federal and State Listed TES Fauna Known or With Potential to Occur at WSTF*

Common Name	Scientific Name	Federal Status	State Status
	MAMMALS		
Desert bighorn sheep	*Ovis canadensis mexicana*		E
Desert pocket gopher	*Geomys arenarius arenarius*	SOC	
Organ Mountains Colorado chipmunk	*Neotamias quadrivittatus australis*	SOC	T
Spotted bat	*Euderma maculatum*		T
Townsend's pale big-eared bat	*Corynorhinus townsendii pallescens*	SOC	
Western red bat	*Lasiurus blossevillii*	SOC	
White Sands wood rat	*Neotoma micropus leucophaea*	SOC	
	BIRDS		
Aplomado falcon	*Falco femoralis septentrionalis*	E	E
Arctic peregrine falcon	*Falco peregrines tundrius*	SOC	T
Baird's sparrow	*Ammodramus bairdii*	SOC	T
Bald eagle	*Haliaeetus leucocephalus alascanus*		T
Bell's vireo	*Vireo bellii*	SOC	T
Black tern	*Chlidonias niger surinamensis*	SOC	
Broad-billed hummingbird	*Cynanthus latirostris magicus*		T
Brown pelican	*Pelecanus occidentalis carolinensis*		E
Buff-collared nightjar	*Caprimulgus ridgwayi ridgwayi*		E
Burrowing owl	*Athene cunicularia hypugaea*	SOC	
Common black hawk	*Buteogallus anthracinus anthracinus*	SOC	T
Common ground-dove	*Columbina passerina pallescens*		E
Costa's hummingbird	*Calypte costae*		T

Gray vireo	*Vireo vicinior*		T
Least tern	*Sterna antillarum athalassos*	E	E
Mexican spotted owl	*Strix occidentalis lucida*	T	
Mountain plover	*Charadrius montanus*	SOC	
Neotropic cormorant	*Phalacrocorax brasilianus*		T
Northern goshawk	*Accipiter gentilis atricapillus*	SOC	
Peregrine falcon	*Falco peregrinus anatum*	SOC	T
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	E
Varied bunting	*Passerina versicolor*		T
Violet-crowned hummingbird	*Amazilia violiceps ellioti*		T
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C	

E=Endangered; T=Threatened; SOC=Species of Concern; C=Candidate
* (NMDGF BISON-M 2011)

3.7 Cultural Resources

Human habitation of the WSTF region represents an almost continuous occupational sequence encompassing a period from approximately 9,000 B.C. to the present and includes numerous Paleoindian, Archaic, Formative, Protohistoric, and Historic period cultural resources. Cultural resources include prehistoric or historic sites, structures, artifacts, or other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Several cultural resource surveys have been conducted in and around the proposed project areas. A recent survey was conducted for approximately 142 ac (0.57 km²) on the west side of Section 5. In the entire section, one site, BK210, was discovered in 1989 (Figure 7). A brief description of BK210 is attached in Appendix B. The area surrounding this site would be marked and avoided at all times during the installation of the solar array.

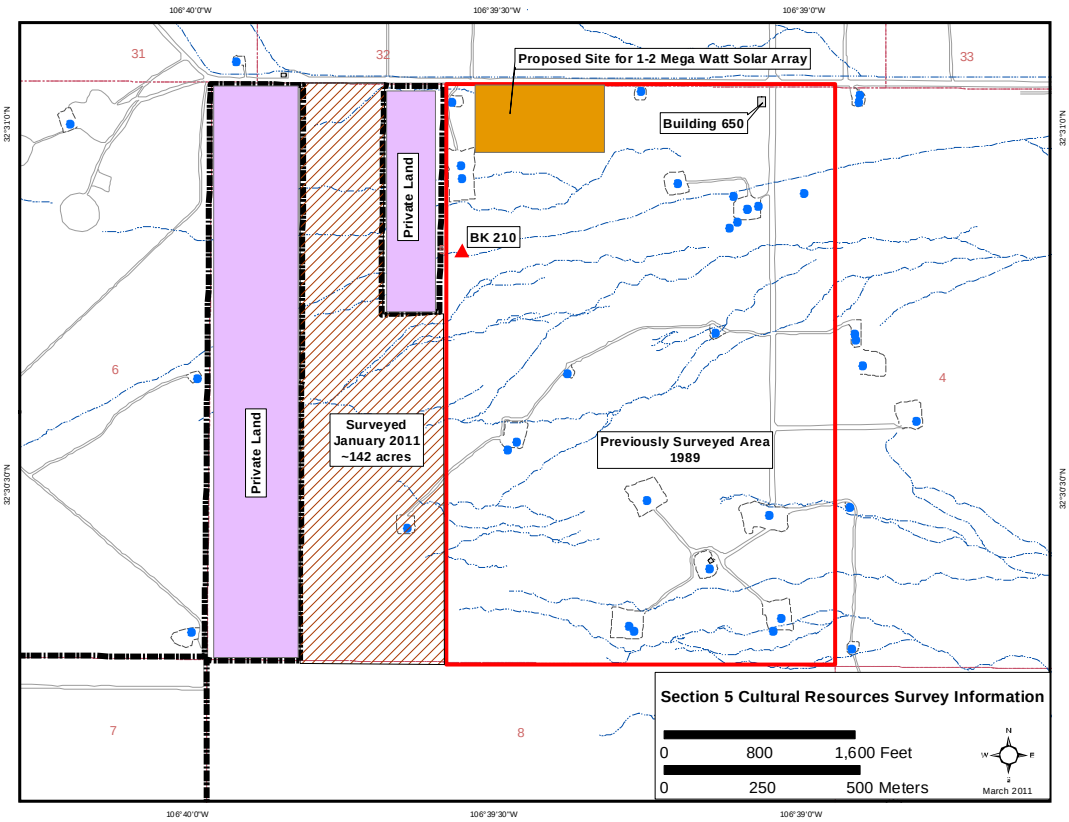


Figure 7
Cultural Resources Survey Information

3.8 Noise

There is expected to be the potential for noise during the construction phase. These noises would have minimal impacts. Noise levels during construction may at times reach levels harmful to field personnel. Proper ear protection would prevent hearing loss and tinnitus while using certain construction equipment. For individual protection, all personnel are required to use appropriate protective hearing devices if 84 decibels (dB[A]) are surpassed. The following table lists common noise sources and their dB(A) levels.

Table 2
Common Noise Sources

dB(A) Level	Source
60	Speech at three ft (0.9 m)
70	Normal street traffic
90	Operating a lawn mower
100	Operating a chain saw
140	Jet airplane takeoff at 50 ft (15 m)

3.9 Socioeconomics

Socioeconomics consists of the basic attributes and resources associated with the human environment especially in regard to population, economic activity, and environmental justice. The socioeconomic region of impact for the proposed action includes the areas surrounding Doña Ana County.

On February 11, 1994, the President of the U.S. signed EO 12898, entitled, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (Clinton, 1994). The general purposes of the EO are to: 1) focus the attention of federal agencies on the human health and environmental conditions in minority and low-income communities with the goal of achieving environmental justice; 2) foster nondiscrimination in federal programs that substantially affect human health or the environment; and 3) give minority and low-income communities greater opportunities for public participation in, and access to, public information on matters relating to human health and the environment (EPA, 2006).

The EO directs federal agencies, including NASA, to develop environmental justice strategies. Further, EO 12898 requires NASA, to the greatest extent practicable and permitted by law, to make the achievement of environmental justice part of NASA's mission. Disproportionately high adverse human health or environmental effects on minority or low-income populations must be identified and addressed. In response, NASA established an agency-wide strategy, which, in addition to the requirements set forth in the EO, seeks to: 1) minimize administrative burdens; 2) focus on public outreach and involvement; 3) encourage implementation plans tailored to the specific situation at each Space Center; 4) make each Center responsible for developing its own Environmental Justice Plan; and 5) consider both normal operations and accidents. WSTF has developed a plan to comply with the EO and NASA's agency-wide strategy.

Based on the information from the U.S. Census Bureau (USCB), minority and low income populations are believed to exist within the proposed action's region of influence. Statistics for minority populations in Doña Ana County indicate an average of 65.2 percent Hispanic of any race with a combined average of 6.1 percent minority population for "other" minority groups. Caucasians who are not Hispanic were 30.4 percent of the population. The population in poverty within the region of influence averages 23.3 percent. The general minority population in the State of New Mexico averages 45.6 percent Hispanic of any race, 14.5 percent population of "other" minority groups, and 40.9 percent Caucasians who are not Hispanic. The statewide population has 17.0 percent of the population living in poverty (USCB, 2008 – 2009).

4.0 Environmental Consequences

4.1 Land Use

The proposed location for the initial 1.0 – 2.0 MW solar array would be located on 7 – 14 acres (0.03 – 0.06 km²) west of Building 650, where there is already disturbance and human activity due to the site's groundwater treatment system. Most of Section 5, T21S, R3E, would be used for the future 500 ac (2.02 km²) 60 – 80 MW solar array (see Figures 1 and 5). Areas to avoid would include existing private land, existing wells, existing ground water treatment system structures, and existing cultural resources (BK210). The remaining desert vegetation would have to be removed from most of the proposed 500 ac (2.02 km²) in order to place the solar array. Existing roads would be used when possible to access the solar array. New roads would have to be graded for maintenance and access to the solar array. At this time the final layout of the solar array is unknown. The proposed activities would result in no significant impact to land use at WSTF.

The “no action” alternative would include no solar array at WSTF and result in no change to existing land use.

4.2 Geology and Soils

There would be minimal soil disturbance at the solar array sites due to construction of new facilities. Construction activities would take place within established roadways or areas with human activity wherever possible. Overall the soil and soil quality would not be significantly affected by the proposed projects. Design and construction of the array would include elements that reduce the potential for soil erosion. This would result in no significant impact to topography or soils.

The “no action” alternative would result in no change to the existing topography at WSTF and the surrounding area.

4.3 Climate

The proposed action would not affect the climate at WSTF or the surrounding area. The “no action” alternative would result in no construction at WSTF and would not affect the climate at WSTF or the surrounding area. The proposed action could reduce the need for electricity generated in part by the use of fossil fuels, and would have an overall reduction in climate impacts.

4.4 Air Quality

There would be minimal, short-term dust deposited in the air from the construction of the solar array and support structures. There would also be mobile sources of air emission present during the construction. Ground vehicles would be used for the installation of the new system. To minimize dust during these activities, dust control measures such as water trucks or dust suppressants would be employed before construction activities start and after the vegetation has been removed, if necessary. Portable generators may also be used during the project. Depending on their proposed use, NMED would have to be notified. Overall, there would be no significant impacts on air quality. Positive impacts, however, do exist in association with the renewable energy project. Not only are there no air polluting emissions, but also there is a regional reduction in emissions resulting from the lowered use of fossil fuels during the production of electricity at the electric power generating plants currently supporting WSTF.

The “no action” alternative would include no extensive alternative energy system at WSTF and would not affect the air quality at WSTF or the surrounding area.

4.5 Energy

WSTF would continue to consume the same amount of energy it currently uses, with an estimated need for at least 1.0 MW in additional energy by the end of the decade. The difference would be in the fuel source of the electricity. Solar energy provides electrical energy without fossil fuel emissions. The “no action” alternative would include no solar array at WSTF and would result in no change to the existing electrical source and use at WSTF.

4.6 Biological Resources

Construction and maintenance activities would create vegetation disturbances. The proposed project area would disturb approximately 7 – 14 acres (0.03 – 0.06 km²) initially with the potential growth to 400 ac (1.62 km²) of undisturbed desert vegetation. Most construction activities would take place within

established areas with human activity. Overall, there would be no long-term significant impacts to the site's vegetation. The "no action" alternative would include no solar array at WSTF and would result in no change to the existing floral community at WSTF.

Fauna could be affected by construction activities, and operation and maintenance activities of the solar array. Noise from sources, such as vehicles, heavy machinery, and general human activities, related to construction and operation and maintenance activities would lead to species-specific faunal reactions. Factors influencing faunal responses may be time and length of the noise, seasonality, time of day, stress and physiological effects, life history, naturally occurring and background noise, and habituation (Larkin, 1996 and Brown, 2001). Most small mammals would avoid excessive noise by retreating into burrows while larger species of mammals and birds would temporarily vacate the area. Reproductive activities of some small mammals and birds may be temporarily disrupted by noise and the presence of humans while other animals may become increasingly habituated and display little modification in behavior with ongoing exposure. Proposed activities would try to stay in or adjacent to the disturbed areas as much as possible to avoid disturbing migratory birds. Also, the current proposed start date for construction is after the peak spring migratory season in 2011. No threatened or endangered floral or faunal species occur in the proposed areas. Overall, there would be no long-term significant impacts to the site's faunal species.

The "no action" alternative would include no solar array at WSTF and would result in no change to the existing floral and faunal populations at WSTF and the surrounding area.

4.7 Cultural Resources

Based on previous surveys of WSTF and a recent survey conducted on-site (Damp, 2011), the proposed solar array location has no known cultural resources that would be affected by the proposed activities. One site, BK210, has been identified near the proposed project south of Well PL-6. To avoid any problems the site would be flagged prior to construction and avoided during construction activities. There is also the potential to strike a subsurface site during construction. A dig permit describing the proposed location of construction would be required prior to any activities. In the event that a previously unknown resource is located, all activity would cease and the WSTF Environmental Department would be notified. The proposed project would have no significant impact to the site's cultural resources.

The "no action" alternative would include no solar array at WSTF and would result in no change to the existing cultural resources at WSTF.

4.8 Noise

Vehicle traffic, construction, and maintenance activities would generate noise. For the safety of workers, proper protective equipment including hearing protection would be required (OSHA). In relation to other activities at WSTF, the proposed solar array would have no significant impact on conditions that currently exist. The "no action" alternative would include no large solar array at WSTF and would result in no change to the existing environment at WSTF.

4.9 Socioeconomics

Minority and low-income populations are believed to exist within the proposed action's region of influence. Cities, towns, and block groups within the region of influence were not considered to have high minority and poverty populations compared to the general population of New Mexico. Under the proposed action, there would be no significant impact on, nor a potential for, disproportionately high and

adverse effects on minority and low-income populations. The “no action” alternative would have no impact to the region’s socioeconomics.

4.10 Cumulative Impacts

Cumulative impacts are those environmental impacts that result from the incremental effects of the proposed action when compounded by other past, present, or reasonably foreseeable future actions (40 CFR §1508.7). A potential problem that occurs with PV modules is glare, or intense light reflecting off the modules. To reduce this effect, a thin film is placed on top of a module to reduce the glare. The remote location of the solar array also reduces the potential impact of glare to neighboring properties. The WSTF solar energy project would make minor contributions to impacts at WSTF. Overall air emissions for the site would improve. The renewable energy project would make minor contributions to noise during construction and operation. Noise associated with construction activities would be localized west of Building 650. Vehicle traffic associated with construction and maintenance activities would slightly increase but would not significantly increase traffic loads on the existing and future road network at WSTF. Reducing materials or recycling materials whenever possible during the project would help reduce the overall project cost and resources used.

5.0 Mitigation and Monitoring

To minimize potential environmental impacts associated with the proposed action as identified in the preceding analysis, the following mitigations would be adopted. These mitigations are central to the determination of no significant impact. Mitigation efforts would be implemented at the discretion of WSTF. Any unexpected adverse impacts to the environment would require additional mitigation measures.

5.1 Land Use

Efforts would be made to make sure that the minimal amount of land necessary for the construction of the solar array would be utilized. Existing roads, utilities, and resources would be used.

5.2 Air

There would be mobile sources of air emission present during the construction. Ground vehicles would be used for the installation of the solar array. To minimize dust during these activities, dust control measures such as water trucks or dust suppressants would be used.

5.3 Biological Resources

Vehicles would use existing roads when available. If any species listed in Section 3.6 were found following the completion of this EA, WSTF would determine if additional mitigation is necessary to prevent impact to the listed species’ populations.

5.4 Cultural Resources

Site BK210 would be flagged and avoided at all times. A dig permit describing the proposed location of construction would be required prior to any activities. In the event that a previously unknown resource is located, all activity would cease and archeologists would be consulted.

5.5 Noise

Noise levels during construction may, at times, reach levels harmful to field personnel. For individual protection, all personnel are required to use appropriate protective hearing devices if 84 dB(A) are surpassed.

6.0 Preparers, Contributors, and Contacts

Agencies and Individuals Consulted

Juan Antonio Mujica-Kohler
Engineer, Jacobs Technology Inc.
NASA White Sands Test Facility

List of Preparers

Davis, Timothy
NASA Environmental Scientist
NASA White Sands Test Facility

Skarsgard, Amanda
Primary Author, Scientist
Navarro Research and Engineering, Inc.
NASA White Sands Test Facility

7.0 References

14 CFR 1216.1. CFR Title 14: Aeronautics and Space, Part 1216: Environmental Quality, Subpart 1: Policy on Environmental Quality and Control. Code of Federal Regulations, Washington D.C.: Most current edition.

14 CFR 1216.3. CFR Title 14: Aeronautics and Space, Part 1216: Environmental Quality, Subpart 3: Procedures for Implementing the National Environmental Policy Act . Code of Federal Regulations, Washington D.C.: Most current edition.

29 CFR 1910.95. Occupational Noise Exposure. Occupational Safety and Health Administration , U.S. Department of Labor, Washington, D.C.: Most current edition.

40 CFR 1508.7. Cumulative Impact. Council on Environmental Quality . The White House, Washington, D.C.: Most current edition.

42 U.S.C. §§ 4321-4370d. The National Environmental Policy Act of 1969. U.S. Code , U.S. Department of Interior, Bureau of Land Management, Washington D.C.: Most current edition.

42 U.S.C. § 15801. Energy Policy Act of 2005. 109th Congress, Washington D.C.: Most current edition.

Brown, Lex. "Overview of Research on the Effects of Noise on Wildlife." *Proceedings of the Effects of Noise on Wildlife Conference,* 2: 10-14. Institute for Environmental Monitoring and Research, Happy Valley-Goose Bay: Labrador, 2001.

Clinton, William J. "Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." The White House, Washington D.C.: February 11, 1994.

Damp, Jonathan. "Cultural Resource Inventory for the NASA White Sands Test Facility Photovoltaic System, Doña Ana County, New Mexico." Idaho Falls, Idaho: North Wind Inc., 2011.

EIA. United States Energy Information Administration website. 2011. Last accessed online February 24, 2011: http://www.eia.doe.gov/

EPA. "Environmental Justice." Compliance and Enforcement, U.S. Environmental Protection Agency , Washington D.C., August 2006. Last accessed online February 23, 2011: http://www.epa.gov/compliance/environmentaljustice

EPA. "National Ambient Air Quality Standards." U.S. Environmental Protection Agency , Washington D.C., December 2006. Last accessed online February 23, 2011: http://epa.gov/air/criteria.html

EPEC, El Paso Electric Company website. 2011. Last accessed online February 24, 2011: http://www.epelectric.com

Larkin, Ronald P. "Effects of Military Noise on Wildlife: A Literature Review." USCERL Technical Report 96/21. Center for Wildlife Ecology, Illinois Natural History Survey: USCERL, 1996.

NASA. Environmental Resources Document, RD-WSTF-025. NASA WSTF: New Mexico 2006.

NASA. Facilities Master Plan, Lyndon B. Johnson Space Center White Sands Test Facility, and Goddard Space Flight Center White Sands Complex. NASA WSTF: New Mexico, 2005.

NMDGF. Biota Information System of New Mexico (BISON-M). New Mexico Department of Game and Fish (NMDGF): Santa Fe, New Mexico. Last accessed February 23, 2011: http://www.bison-m.org/index.aspxx

NMED. Air Quality Bureau. New Mexico Environment Department : Santa Fe, New Mexico. Last accessed February 23, 2011: http://www.nmenv.state.nm.us/aqb

Obama, Barak H. "Executive Order 13514: Federal Leadership in Environmental, Energy, and Economic Performance." The White House, Washington D.C.: October 5, 2009.

Seager, William R. "Geology of the Organ Mountains and Southern San Andres Mountains, New Mexico." Albuquerque, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Memoir 36, 1981.

Seager, W.R., Hawley, J.W., Kottlowski, F.E., and Kelley, S.A. "Geology of the east half of Las Cruces and northeast El Paso." Albuquerque, New Mexico: New Mexico Bureau of Mines and Mineral Resources, 1987.

SEEP. New Mexico State Fact Sheet. Southwest Energy Efficiency Project: Boulder, Colorado. Last accessed February 23, 2011: http://www.swenergy.org

Skarsgard, Amanda. Survey: Solar Energy Environmental Assessment Review of Habitat and Species in Section 5, T21S, R3E. Las Cruces, New Mexico: North Wind Inc., 2011.

Sandia National Laboratories Photovoltaic Research and Development website. 2011. Last accessed online February 24, 2011: http://www.sandia.gov/pv

Sullivan, Robert M., and Houde-Nethers, Deborah L. "Threatened and Endangered Species Survey of the National Aeronautics and Space Administration's White Sands Test Facility, New Mexico." Las Cruces, NM: New Mexico State University Physical Science Laboratory: , 1996.

Sunpower website. 2011. Last accessed online October 16, 2011: http://us.sunpowercorp.com

USCB. U.S. Bureau of the Census (USCB) website. 2008-2009. Last accessed online February 23, 2011: http://www.census.gov/

United States Department of Agriculture Soil Conservation Service. Soil Survey of White Sands Missile Range, New Mexico; Parts of Dona Ana, Lincoln, Otero, Sierra, and Socorro Counties, National Cooperative Soil Survey. White Sands Missile Range: White Sands Missile Range, 1976.

Appendix A
Public Comments

Appendix B

Cultural Resources Site BK210

Batcho & Kauffman Associates

AN ARCHAEOLOGICAL CLEARANCE SURVEY OF 377 ACRES OF PRIVATE LAND ADJACENT TO THE NASA WHITE SANDS TEST FACILITY DONA ANA COUNTY, NEW MEXICO

by

Trace Stuart

A REPORT PREPARED BY BATCHO & KAUFFMAN ASSOCIATES
AND SUBMITTED TO LOCKHEED ENGINEERING AND MANAGEMENT SERVICES COMPANY, INC.,
LAS CRUCES, NEW MEXICO

BATCHO & KAUFFMAN ASSOCIATES
CULTURAL RESOURCES REPORT NUMBER 93

August 31, 1989

LA/Field No._____

LABORATORY OF ANTHROPOLOGY, MUSEUM OF NEW MEXICO
ARCHAEOLOGICAL SITE SURVEY FORM

LA No._____ Site Name_____ **Other Inst.#** BK 210 I.O.

MNM Proj. #_____ **UTM:** Zone 13 [redacted]

E_____ N_____
E_____ N_____
E_____ N_____

Legal Desc. [redacted]

NE 1/4 of the SE 1/4 of the NW 1/4

Unplatted Grant Owner & Address: LEVI JONES, ST RT2, BOX 14-D, DEMING, NM. 88030

***Map Reference:** [redacted] **Date:** 1982 **Scale:** 1:24,000

County DONA ANA **Nearest Named Drainage:** [redacted]

Distance/Direction: 1 MILE / NORTH

State NEW MEXICO **Nearest Water:** [redacted]

Distance/Direction: 4 MILES / EAST

Locational Desc.: Recognized Landmarks QUARTZITE MOUNTAIN IS 5 MILES TO THE EAST, WELL ROAD IS .25 MILES TO THE NORTH.

Site Type: HISTORIC HOMESTEAD

Site Size: Length 160m E/W **Width** 130m N/S **Average Elevation (# of feet)** 4480

Square Meters 20,800 **Elevation Range:** 4475 TO 4485

Topographic Setting (Location & Access): [redacted]

arroyo/wash	flood plain/	plain/flat
base of cliff	valley bottom	playa
bench	hill top	✓ridge
blowout	hill slope	saddle
canyon rim	low rise	base talus slope
cave	mesa	terrace
cliff/scarp	mountain	other (specify)
constricted cyn	mt. front/foothill	slope: 2% GRADE
dune	open canyon floor	aspect: 360 DEGREES
		exposure: OPEN

Local Vegetation: CREOSOTE, MESQUITE, SNAKEWEED, TARBUSH, AND VARIOUS GRASSES

Ecological Zone: forest____ woodland____ scrubland____ grassland____

desertscrub X marshland____ other (specify)_____

*Form must by accompanied by photocopy portion of USGS map showing T., R., scale and quad name.

LA/Field No. BK 210

Soil Type: rocky ___ gravelly X sandy X clayey ___ other ___

Local Outcrops: sandstone ___ shale ___ limestone ___ basalt ___ tuff ___
other (specify) GRAVEL DETRITUS FROM SAN ANDRES MOUNTAINS

Nature and Depth of Fill: UNKNOWN

Arch. Status: Amount and Type of Work Past and Present

PRESENT WORK INCLUDES SITE RECORDATION, SKETCH MAP, AND BLACK AND WHITE PHOTOGRAPHS. ALSO, A TELEPHONE INTERVIEW WITH MR. LEVI JONES WHO LIVED AT THE HOMESTEAD.

National and/or State Register Status:

___ On State Register
___ On National and State Register
___ Recommended for National by State, on State Register
___ Recommended for National and State Register
___ In District, National and State
___ In District, National
___ In District, State
___ Recommended and rejected
X Insufficiently evaluated, potential unknown
___ Not nominated

Condition of Site: intact ___ grazed X eroded ___ mech. disturbance ___
vandalized ___ other ___

Mitigation: avoid X monitor ___ test ___ excavate ___ not required ___

Surveyed for LOCKHEED ENGINEERING CO.

Record Form: Surv. Forms X Excav. Forms ___ Sketch Map X Photos X

Loc. of Forms, Maps, Photos BATCHO & KAUFFMAN ASSOC., LAS CRUCES, NM

Surface and/or Subsurface Collections: yes ___ no X **Strategy** N/A

Location of Collected Artifacts N/A

Previous Collections? NO **When** N/A **Repository** N/A

Is there another site close by? NO **LA or Field Identif.#** N/A

Artifact Density: 0, 10's, (100's), 1000's.

Time Diagnostic Artifacts: PURPLE GLASS, HOLE-IN-TOP CANS,

LA/Field No. BK 210

No. of Temporal Components 1

(Earliest to Latest)

Temporal Component (1)

Features 4 TO 6 ROOM ADOBE HOUSE, CATTLE TANK, CORRAL, CISTERN, HOG PEN/CHICKEN COOP, SHED

Culture BLACK-AMERICAN Period HISTORIC Phase DEPRESSION ERA

Site Function: HABITATION Best Date 1927 TO 1947

Method of Date: INTERVIEW WITH MR. LEVI JONES, FORMER OCCUPANT OF THE HOMESTEAD

Temporal Component (2)

Features

Culture Period Phase

Site Function: Best Date

Method of Date:

Temporal Component (3)

Features

Culture Period Phase

Site Function: Best Date

Method of Date

Additional Temporal Components

LA/Field No. BK 210

Published Reference:

Date AUGUST 1989

Institution BATCHO & KAUFFMAN ASSOCIATES, LAS CRUCES, NEW MEXICO

Author and Title TRACE STUART, BATCHO & KAUFFMAN ASSOCIATES, CULTURAL RESOURCES REPORT NO. 93

Remarks: SITE BK210 IS A LARGE HISTORIC HOMESTEAD. THE SITE CONSISTS OF AN ADOBE HOUSE, ASSOCIATED OUT-BUILDINGS, A CATTLE TANK, CORRAL, SEVERAL TRASH DUMPS, AND AN HISTORIC ROAD. THE SITE WAS OCCUPIED FROM 1927 TO 1940 BY MR. WILL JONES, A BLACK HOMESTEADER FROM TEXAS.

LEVI JONES IS THE SON OF WILL JONES, AND THE CURRENT OWNER OF THE LAND. WILL JONES WAS BORN IN 1889 IN TEXAS. HE CAME TO LAS CRUCES TO HOMESTEAD IN 1927 AND WAS ONE OF THE EARLIEST BLACK PERSONS TO HOMESTEAD IN THE AREA. WILL JONES WAS MARRIED TO CORNELIA HARRIS, ALSO FROM TEXAS. WILL JONES DIED IN 1948.

LEVI JONES GREW UP ON THE HOMESTEAD AND HELPED TO RUN IT. THE HOMESTEAD WAS OCCUPIED FROM 1927 UNTIL 1940 AT WHICH TIME THE FAMILY MOVED INTO LAS CRUCES, ALTHOUGH LEVI WOULD OCCASIONALLY GO BACK TO THE HOMESTEAD TO DO VARIOUS CHORES UP TILL 1947.

THE EXISTING REMAINS OF THE MAIN HABITATION STRUCTURE CONSIST OF A ONE METER HIGH MOUND OF ADOBE WITH A FEW IDENTIFIABLE WALLS. THE STRUCTURE APPARENTLY CONTAINS A ROW OF THREE SMALL ROOMS IN THE NORTH HALF AND TWO SLIGHTLY LARGER ROOMS IN THE SOUTH HALF. THE SMALLER ROOMS MEASURE 2.5 BY 5 METERS. THE REMAINS OF A DOORWAY ARE PRESENT IN THE NORTHEAST CORNER, OR BACKSIDE, OF THE STRUCTURE.

ARTIFACTS ASSOCIATED WITH THE MAIN STRUCTURE INCLUDE A SET OF BOX SPRINGS FOR AN ADULT SIZE BED, BOX SPRINGS FOR A CHILD'S BED, SHEET METAL, BAILING WIRE, WOOD PLANKS, WINDOW FRAMES, BARREL HOOPS, BOTTLES AND BOTTLE FRAGMENTS, LARD CANS, MASON JAR LIDS, (CONT. ON NEXT PAGE)

Field Recorder FREDRICO ALMAREZ **Date** 8/17/89

Lab Recorder TRACE STUART **Date** 8/22/89

Published Reference:

Date AUGUST 1989

Institution BATCHO & KAUFFMAN ASSOCIATES, LAS CRUCES, NEW MEXICO

Author and Title TRACE STUART, BATCHO & KAUFFMAN ASSOCIATES, CULTURAL RESOURCES REPORT NO. 93

Remarks: PROCELAIN FRAGMENTS, AND A CONCENTRATION OF BUTTONS AND SNAPS. ASSOCIATED WITH THE CHILD'S BOX SPRINGS ARE A TOY METAL PISTOL, AND A TOY METAL GOLF CLUB.

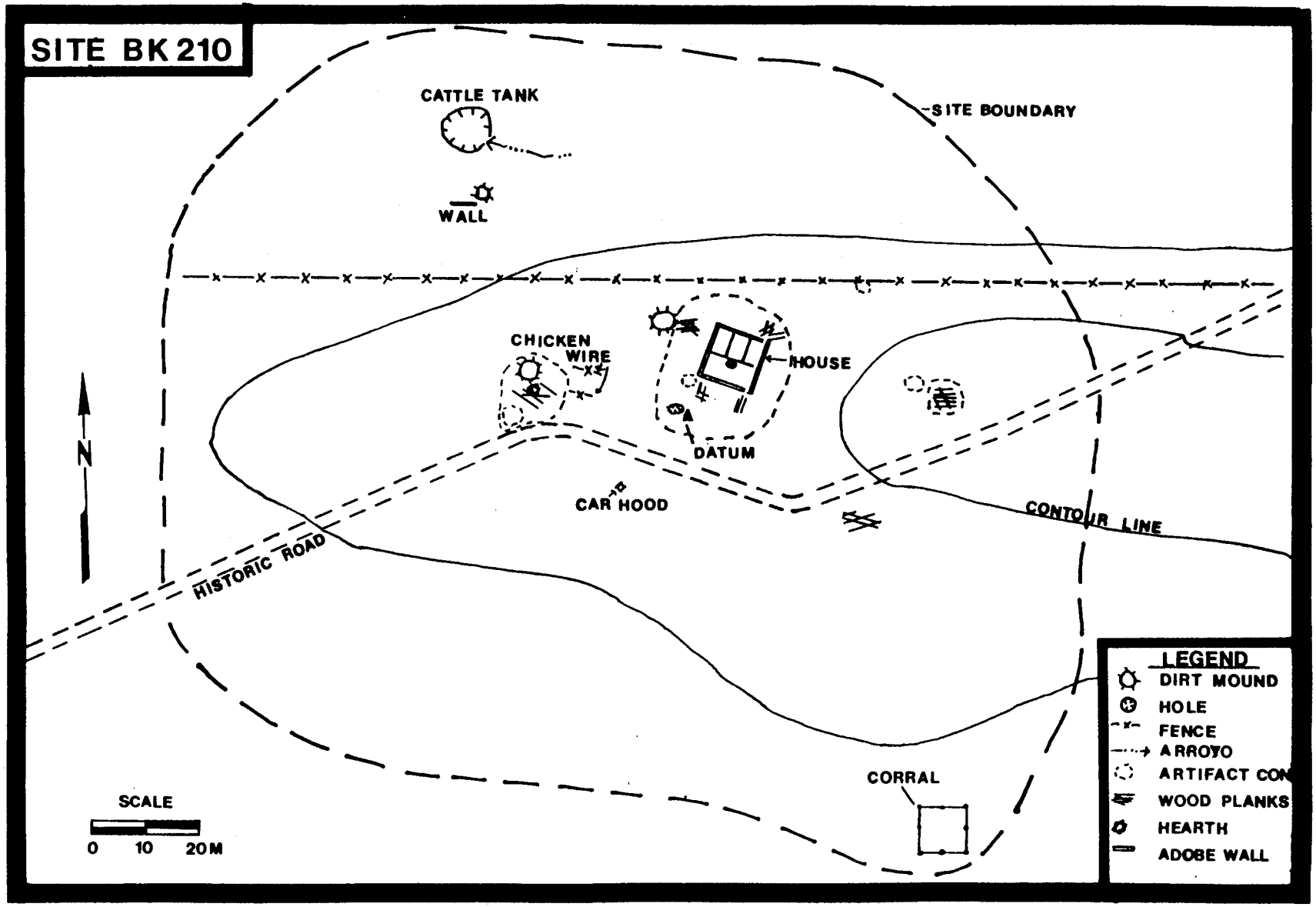
TWO ADDITIONAL AREAS OF WOOD PLANKS AND ARTIFACTS APPARENTLY REPRESENT OUT-BULDINGS. ONE OF THESE AREAS IS 20 METERS WEST OF THE MAIN STRUCTURE AND IS THE REMAINS OF A HOG PEN AND CHICKEN COOP. MATERIALS ASSOCIATED WITH THE FEATURE CONSIST OF WOOD PLANKS, CHICKEN WIRE, BARBED WIRE, SHEET METAL, METAL TUBING, VARIOUS TYPES OF GLASS, PAINT CANS, A COFFEE TIN, AND EARTHENWARE CERAMICS WITH A BLACK GLAZE. A SET OF BOX SPRINGS AND A SMALL HEARTH ARE ALSO PRESENT IN THIS AREA.

THE OTHER POSSIBLE OUT-BUILDING IS 30 METERS EAST OF THE MAIN STRUCTURE AND CONSISTS OF WOOD PLANKS, NAILS, GLASS, SHEET METAL, BAILING WIRE, TIN CANS, EARTHENWARE CERAMICS, MASON JAR LIDS, AND BUTTONS. ALSO PRESENT ARE A METATE FRAGMENT AND A FEW PIECES OF FIRE-CRACKED ROCK. LEVI JONES INDICATED THAT THIS FEATURE IS THE REMAINS OF A SMALL BARN OR STORAGE SHED.

OTHER FEATURES ON THE SITE INCLUDE A CATTLE TANK 50 METERS NORTHWEST OF THE HOUSE, A CORRAL 70 METERS SOUTHEAST OF THE HOUSE, AND AT LEAST ONE DEPRESSION A FEW METERS SOUTHWEST OF THE HOUSE. ACCORDING TO MR. LEVI JONES THE DEPRESSION REPRESENTS A CISTERN FOR THE CATCHMENT AND STORAGE OF RAIN WATER. AN ADOBE WALL SOUTH OF THE CATTLE TANK IS PART OF AN UNFINISHED STORAGE SHED. LATRINES WERE APPARENTLY LOCATED NEAR THE CORRAL.

Field Recorder FREDRICO ALMAREZ **Date** 8/17/89

Lab Recorder TRACE STUART **Date** 8/22/89



SKETCH MAP OF SITE BK210