

FY 2009 NNSA/NSO ENERGY EXECUTABLE PLAN



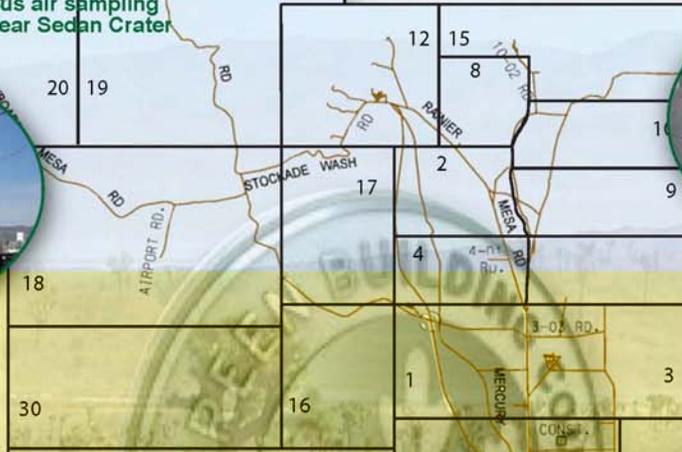
Solar powered low-volume continuous air sampling station near Sedan Crater



Maintenance at Valley Substation



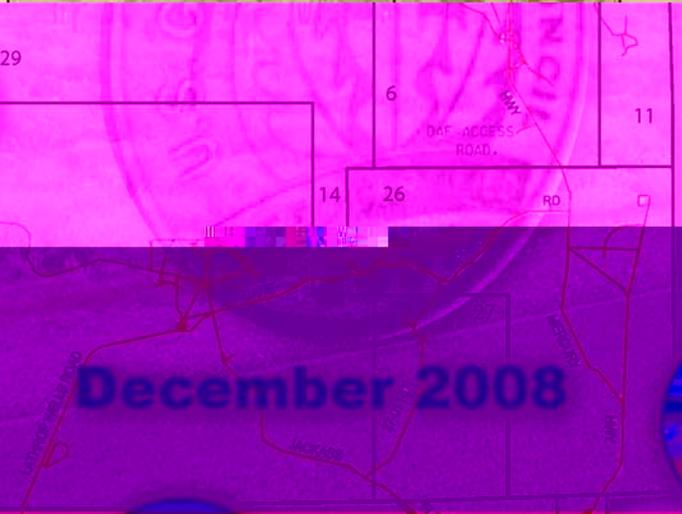
Workers checking voltage on electrical panel



Solar lighting for pedestrian footpaths



Solar post light at the Mercury Cafeteria



NTS Electrical System Control Room in Mercury



E-85 Station



Solar powered monitoring station



North Las Vegas Facility wells

65 miles to Las Vegas

APPROVAL

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**DOE ORDER 430.2B EXECUTABLE PLAN
TEAM GOAL SUMMARY**

Goal Elements	Plan Meets Goal	Plan Exceeds Goal	Plan Falls Short of Goal	Comments
Energy Efficiency	X			On track to meet 30 percent reduction of BTUs by 2015 with certain facilities excluded by waiver
Renewable Energy	X			Will meet, as a minimum, 7.5 percent from onsite renewable energy by 2010
Water				A water study will be performed in FY 09 to baseline potential water reduction and identify water reduction projects
Transportation/ Fleet Management		X		Goals currently met, on track to exceed goals
High Performance Sustainable Buildings			X	Plan meets goal for new buildings; goals for retrofit of existing buildings not achievable

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APPENDICES

Appendix A: Energy Savings Performance Contract Projects	A-1
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ACRONYMS

AFV	Alternative Fuel Vehicles
AHU	Air-Handling Unit
AP	Accredited Professional
BTU	British Thermal Unit
CAS	Condition Assessment Survey
CD-1	Critical Decision One
CLFR	Compact Linear Fresnel Reflectors
CMMS	Computerized Maintenance Management System
CoFA	Consequence of Failure Analysis
CRD	Contractors Requirements Document
DDC	Direct Digital Control
DEMP	Departmental Energy Management Program
DES	Detailed Energy Survey
DOE	U.S. Department of Energy
ECM	Energy Conservation Measure
EMC	Emergency Management Center
EMS	Environmental Management System
EOC	Emergency Operations Center
EPACT	Energy Policy Act
EPEAT	Electronic Product Environmental Assessment Tool
ESCO	Energy Services Company
ESPC	Energy Savings Performance Contracts
FAMS	Facility Asset management System
FEMP	Federal Energy Management Program
FIMS	Facilities Information Management System
FTE	Full-Time Equivalent
FY	Fiscal Year
GSA	General Services Administration
HQ	Headquarters
HVAC	heating, ventilation, and air conditioning
ISMS	Integrated Safety Management System
JCI	Johnson Controls, Incorporated
JIC	Joint Information Center
LEED	Leadership in Energy and Environmental Design
M&V	Measurement and Verification
MW	Megawatt
NLVF	North Las Vegas Facility
NNSA/NSO	National Nuclear Security Administration Nevada Site Office
NREL	National Renewable Energy Laboratory
NSF	Nevada Support Facility
NSTec	National Security Technologies, LL
NTS	Nevada Test Site
OCC	Operations Coordination Center

PdM	Predictive Maintenance
PHEV	plug-in-hybrid electric vehicles
PIH	plug-in-hybrid
PWS	Portable Water System
Retro-C	Retro-commissioning
REC	Renewable Energy Credits
RSL	Remote Sensing Laboratory
RTBF	Readiness and Technical Base Facilities
SEZ	Solar Enterprise Zone
TEAM	Transformational Energy Action Management
TOC	Tactical Operations Center
TYSP	Ten-Year Site Plan
UESC	Utility Energy Services Contract
WSI	Wackenhut Services, Incorporated

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1.0 INTRODUCTION

This Plan was developed in accordance with the Instructions for Developing the Executable Plan and the U.S. Department of Energy (DOE) Order 430.2B, *Department of Energy, Renewable Energy and Transportation Management Requirements*. This Plan will assist National Nuclear Security Administration Nevada Site Office (NNSA/NSO) in communicating its plan to maximize compliance with Executive Order (EO) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* while protecting the core missions. In addition, Transformational Energy Action Management (TEAM) objectives are discussed and compared to current practices to determine any gaps for compliance with EO 13423. Energy, buildings, and fleet management programs will be developed, maintained, and annually updated as part of the annual update for this Plan. This Plan was not integrated into the NNSA/NSO fiscal year (FY) 2009 Ten-Year Site Plan (TYSP) since FY 2009 TYSP Guidance did not include provisions for Executable Energy Plan discussions.

1.1 Overview

The NNSA/NSO manages the Nevada Test Site (NTS) and auxiliary sites located in California, Maryland, Nevada, and New Mexico. As a unique national resource, the NTS is a massive, remote, and secure outdoor laboratory and national high-hazard experimental center that cannot be easily replicated. Larger than the state of Rhode Island, the NTS is approximately 1,375 square miles, making it one of the largest restricted access areas in the United States. The remote site is surrounded by thousands of additional square miles of land withdrawn from the public domain for use as a protected wildlife range and an Air Force test range, creating an unpopulated land area comprising some 5,470 square miles.

The NTS and its auxiliary sites offer a diverse compilation of unique facilities, equipment, and expertise making it an unequalled resource for many of the nation's key scientific and security projects. Since the nuclear weapons testing moratorium in 1992, and under the direction of the DOE, the NTS and its auxiliary sites have diversified into many other programs such as conducting integrated, science-based experiments that ensure the safety and reliability of the U.S. Nuclear Weapons Stockpile. NTS technical support capabilities have substantially advanced in such areas as diagnostics and analysis, target chamber operation, defense systems testing and demonstration, hazardous chemical spill testing, and emergency response training.

1.2 Energy Management Program

The NNSA/NSO Energy Management Program's goal is to implement the requirements of the DOE Order 430.2B through reducing the use of energy and water in NNSA/NSO facilities by advancing energy efficiency, water conservation, and the use of solar and other renewable energy sources. The Program is performance oriented and strives to ensure continuous life cycle cost-effective improvements to increase energy efficiency and effective management of energy, water, and transportation fleets, while increasing

the use of clean energy sources. NNSA/NSO currently utilizes electricity, fuel oil, natural gas, and steam in their facilities. Vehicles and equipment are powered by unleaded gasoline, diesel, bio-diesel, E-85, and jet fuel.

The unique nature of the operational activities that occur at the NTS prevents NNSA/NSO from managing the NTS as a steady state routine operational site that can demonstrate a consistent pattern of energy and water reduction. The number and type of experiments are highly variable and some activities fall within a National Security domain that does not allow detailed reporting. Therefore, energy and water production must be measured on a subset of facilities that will be established once energy audits and sustainability assessments are performed in FY 2009. It is NSO's policy to exclude mission-critical facilities that have a variable mission tempo.

The energy management program considers all potential sources of funds with primary consideration given to the maximum use of private sector, third-party financing applied on a life-cycle cost effective basis. Of particular interest are Energy Savings Performance Contracts (ESPCs) awarded by NNSA/NSO in conjunction with the NNSA Service Center for energy efficiency management projects, water management projects, and renewable energy projects with energy conservation measures having long- and short-term payback periods.

ESPCs can accomplish and accelerate completion of large projects that can incorporate energy conservation measures with long- and short-term payback periods, through life-cycle cost-effective performance contracts. Verified savings from energy and water conservation projects will be reinvested consistent with Federal regulations to further the energy and water conservation and operations and maintenance efforts.

Additional funding from recapture is considered in the event that energy efficiency and water conservation improvements can not be effectively achieved by private sector or third-party financing. However, use of indirect funds to support initiatives detailed in this plan is in opposition to goals that require a reduction of indirect funds. Appropriations will continue to be requested in an on application on projects that a not bedonte tr-

of the ISMS is implemented. DOE Order 450.1A, *Environmental Protection Program*, also requires contractors to have an EMS, which is incorporated into an ISMS program. This EMS Description is the framework used to implement the NSTec EMS.

NSTec has obtained certification of its EMS through the International Organization for Standardization by meeting the requirements of ISO 14001, *Environmental Management Systems*. NSTec meets the requirements of the 17 elements of the ISO 14001 Standard. Included in the EMS is the development and implementation of measurable environmental, energy, and transportation objectives and targets that are reviewed annually and updated when appropriate.

PD-0442.001, *Environmental Management System Description*, describes commitments and methods used to integrate environmental management requirements into work planning and execution. When implemented, these methods identify and communicate applicable standards, criteria, and corporate goals to all employees. NSTec conducts performance assessments and program reviews to ensure that all system elements are in place and to identify opportunities to continually improve the overall environmental program.

1.4 The Plan

This Plan presents an overview of the execution of the Energy Management Program and planned execution, for those government-owned and leased facilities that are the responsibility of NNSA/NSO at the following locations as shown in Figure 1-1:

- NTS, Mercury, Nevada
- North Las Vegas Facility (NLVF), North Las Vegas, Nevada
- Remote Sensing Laboratory – Nellis, Nellis Air Force Base, North Las Vegas, Nevada
- Remote Sensing Laboratory – Andrews , Andrews Air Force Base, Camp Springs, Maryland
- Los Alamos Operations, Los Alamos, New Mexico
- Special Technical Laboratory, Santa Barbara, California
- Livermore Operations, Livermore, California

This Plan introduces the requirements for DOE Order 430.2B, EO 13423, and TEAM initiatives. Each requirement (in green text) is followed by the NNSA/NSO status and site-specific goals planned to meet that requirement. More detailed discussion of projects and activities, funding plans, and milestones for achieving the goals is presented in subsequent sections that correspond to the five goals outlined in the *Instructions for Developing the Executable Plan*. This Plan has received a classification review and is determined to contain information that is fully releasable under the *Freedom of Information Act*).



Figure 1-1 Locations of Government Owned and leased Facilities

This Plan is organized into the following five goals:

- Energy Efficiency
- Renewable Energy
- Water
- Transportation/Fleet Management
- High Performance and Sustainable Buildings

Each goal is discussed in terms of the following:

- Current status
- Site-specific goals as negotiated between DOE, NSO and NSTec are included
- Description of projects and activities
- Funding plan
- Milestones for reaching the goals

In addition, the following specific issues were considered for the current status of each goal:

- Implementing Plan
- Audits
- Life-cycle costs
- Metering
- Commissioning and retro-commissioning (Retro-Cx)
- Personnel resources
- Renewable energy applications
- Emergency conservation
- Data collection

1.4.1 Energy Efficiency

1.4.1.1 Requirements for DOE Order 430.2B (1), EO 13423 (a), and TEAM Initiative (1)

By FY 2015, reduce energy intensity by no less than 30 percent on average across the entire Department, relative to the Department's energy use in FY 2003. Energy intensity means energy consumption per gross square foot of building space, including industrial and laboratory facilities.

Improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003.

By 2008, DOE have in place executable plans for all facilities to reduce energy intensity by 30 percent.

NSO Status

The new baseline for energy intensity established in FY 2003, is 115,729 BTUs/square foot/year. This Plan was developed to institutionalize goals for NSO facilities. Energy goals are presented below and discussed throughout this Plan. As part of the activities planned in FY 2009, NNSA/NSO will assess the facilities planned for inclusion in the baseline. The facilities that relate to unique experimentation and other National Security activities have highly variable missions from year to year. Most of these facilities do not have meters and this historical energy and water use cannot be quantitatively established.

Site-Specific Goals

In FY 2009, NSO will focus on sustainability and energy audits, development of a more robust energy management program, and development of specific execution plans for certain elements identified in DOE Order 430.2B Guidance.

Table 1-1 presents energy intensity reduction goals from the FY 2003 baseline through FY 2015 based on the *Energy Independence Security Act*, Section 431, energy reduction goals. NNSA/NSO has provided incentives for accomplishing energy intensity reduction goals for FY 2009. Additional mission requirements may preclude accomplishing this goal at the NTS.

Table 1-1 Energy Intensity Reduction Goals

Year	Annual BTU/SqFt	Cumulative Percent Reduction
2003	115,729	Base Year
2006	113,414	2
2007	111,100	4
2008	105,313	9
2009	101,842	12
2010	98,370	15
2011	94,898	18
2012	91,426	21
2013	87,954	24
2014	84,482	27
2015	81,010	30

1.4.1.2 Requirements for DOE Order 430.2b (3)

The installation of advanced electric metering systems at all Department sites in accordance with the DOE metering plan for site monitoring of electric energy. Standard metering systems for steam, natural gas and water must also be installed and centrally monitored at all Department sites for steam, natural gas and water consumption. Advanced meters are defined as having the capability to measure and record interval data (at least hourly for electricity) and communicate the data to a remote location in a format that can be easily integrated into an advanced metering system.

NSO Status

Approximately 40 percent of NSO facilities are individually metered. Additional metering requirements will be quantified during FY 2009 sustainability assessments.

Site-Specific Goals

NSO will install advanced meters to the maximum extent practicable at all NTS buildings and participate in the centralized data collection, reporting, and management system. Currently, the meter installation for NLVF is included under ESPC Delivery Order 2. Additional metering will be explored in a follow-on ESPC Delivery Order. Table 1-2 identifies the energy saved, implementation cost, implementation year, funding source, and date of delivery award.

Table 1-2 Energy Efficiency

		2003		2007	
Gross Square Feet		3,048,176		2,763,591	
Total Buildings Energy Use (MBtu)		261,400		329,900	
ESPC Project or separate Energy Conservation Measure*	Actual or Estimated Energy Saved MBTU/yr	Actual or Estimated Implementation Cost (does not include support cost)	Expected Year of Implementation	Funding Source (ESPC, UESC, Overhead, GPP, Other)	For ESPCs, Indicate Expected Date of Delivery Order Award
DO2	18,717	\$5,837,322	FY 2009-2010	ESPC	Dec 17, 2008

1.4.1.3 Requirements for DOE Order 430.2b (7)

The utilization of standardized operations and maintenance and measurement and verification (M&V) protocols coupled with real-time information collection and centralized reporting capabilities.

NSO Status

NSTec has implemented several procedures that identify the requirements on how maintenance is conducted at NSO facilities. In conjunction with the procedures, routine assessments of the process are performed. Reliability Centered Maintenance has recently been established that will allow the maintenance program to evolve from the typical preventive maintenance approach to a predictive approach. A Computerized Maintenance Management System (CMMS) is utilized to schedule and capture maintenance on all real property assets. In addition, a work breakdown structure has been developed that is aligned with the CMMS maintenance and financial system that allows for cost collecting and reporting of facility operating costs in accordance with the Federal Real Property Council guidelines. M&V is performed based on a graded approach and is applied and utilized much more in support of mission critical versus not mission dependent facilities. M&V is generally captured in the CMMS and/or reports/documents that reside in the CMMS. This system also supports centralized reporting capabilities, and a variety of real time performance metric results from the CMMS, such as preventive maintenance completion ratio against scheduled work, work order cycle time, emergency work hours versus total maintenance hours, etc.

Site-Specific Goals

For FY 2009, several site-specific goals have been established. NNSA/NSO has the performance expectation that NSTec will build, modernize, and maintain facilities and infrastructure to achieve mission goals, and ensure a safe and secure work place. To meet this expectation, NSTec is tasked with completing the reliability centered maintenance analyses processes and develop requirements for 11 substations and 1 switching station. This includes development of a Consequence of Failure Analysis

(CoFA) and Predictive Maintenance (PdM) Requirements. CoFA includes identifying the functions of the equipment, functional failures, different failure modes, effects of the failure modes, and consequences of the failure effects. Development of PdM includes specifying appropriate preventive maintenance tasks. At this time, other equipment/construction is excluded because the reliability centered maintenance process is coming on-line and others have yet to be identified.

1.4.1.4 Requirements for DOE Order 430.2b (13)

The expedited improvement in the quality, consistency and centralization of data collected and reported through the use of commercially available software.

NSO Status

NSTec is in the process of developing an enterprise-wide automation system that will result from the integration of the Facility Asset Management System (FAMS) and other information databases to provide more versatility in data manipulation and analysis.

Site-Specific Goals

The following activities are taking place: (1) Software licensing; (2) Information Services Department Integration Support; (3) FAMS and software development; and (4) documentation development.

1.4.2 Renewable Energy

1.4.2.1 Requirements for DOE Order 430.2B (4) (11), EO 13423 (b), and TEAM Initiative (2)

The installation of on-site renewable energy (electric and thermal) generation at all Department sites.

The Department maximize installation of secure, on-site renewable energy projects at all DOE sites and/or optimize affordable purchases of renewable electricity.

Ensure that (i) at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources, and (ii) to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use.

The increase in development, generation and consumption of electric and steam, natural gas from renewable energy sources and combined heat and power sources.

NSO Status

To achieve the goal of 7.5 percent of the NTS's annual electricity and thermal consumption from on-site renewable sources by FY 2010, a Concentrating Solar Power (CSP) Plant project is being pursued (see Table 1-3). To date, Johnson Controls, Inc. (JCI), the ESPC has performed an initial feasibility study showing technical and financial viability based on available information. Based upon their review of the feasibility study, the NNSA/NSO Executive Council and Headquarters (HQ) Review Board have issued a Notice of Intent to Award. The NTS will not meet the renewable energy goals in FY 2009-FY 2011 since the CSP Plant is projected to come on-line in 2012.

The NTS has very limited use of thermal energy. The only thermal energy used is in a small number of buildings that use electrically heated boilers for generating steam for heating. Use of geothermal energy at the NTS was evaluated during the ESPC review in FY 2007 and excluded, as more research and development is necessary. In addition, drilling in various portions of the NTS may raise compliance issues with Nevada Department of Environmental Protection.

Currently, Nevada Energy gets a portion of its power from 27 renewable energy sources. Those plants operate using geothermal, solar, hydro, and biofuel. By year-end 2007, Nevada was the number one state in the nation in solar watts per capita and solar as a percentage of retail sales. The ranking incorporates two major solar projects that went online in 2007: Nevada Solar One and the 10-megawatt SolarStar project built at Nellis Air Force Base; the largest solar-photovoltaic project in the country. In 1997, Nevada lawmakers first moved to require the state's largest electric utilities to acquire power from renewable resources. At that point, the goal was for 1 percent of the energy sold to customers to come from sources such as solar, geothermal, or wind power by 2010. In 2001 the state toughened the standard significantly, making the requirement 15 percent by 2013, and in 2005 lawmakers raised the bar again, requiring 20 percent by 2015.

Site-Specific Goals

NNSA/NSO and NSTec are working towards maximizing installation of on-site renewable energy projects at the NTS where technically and economically feasible. The goal is to acquire at least 7.5 percent of the NTS's annual electricity and thermal consumption from on-site renewable sources by FY 2010. Accomplishing the goal will require funding the construction of a CSP plant. Table 1-3 identifies energy savings, implementation cost, funding source, and implementation year. NNSA/NSO will seek a waiver until the CSP comes on-line in FY 2012. Without the CSP, NNSA/NSO will not meet the renewable energy goal.

Table 1-3 NTS's Renewable Energy Chart

Renewable Energy/Thermal Energy Technology Including RECs	System Size (capacity)	Total MWh/yr	Total Energy Savings (Mbtu/Yr)	Renewable Energy Initial Project Capital Cost (does not include support costs)	Funding Source (ESPC, UESC, PPA, Other)	Expected Year of Implementation
CSP	125 MW	11,700	39,848	\$500.0 M	ESPC	FY 2012
ECM 11.3 Solar Lighting Installation	170 W/ per pole	15,300kWh	120	\$ 79.9 K	ESPC	FY 2009

1.4.3 Water

1.4.3.1 Requirements for DOE Order 430.2B (3), EO 13423 (a), and TEAM Initiative (4)

By FY 2015, reduce potable water use by no less than 16 percent, relative to the Department's potable water use in FY 2007.

Beginning in FY 2008, reduce water consumption intensity, relative to the baseline of the agency's water consumption in fiscal year 2007, through life-cycle cost-effective measures by 2 percent annually through the end of fiscal year 2015 or 16 percent by the end of fiscal year 2015.

DOE benchmark and monitor water use and implement a plan-and begin saving water-by Fiscal Year 2008 to reduce consumption by at least 16 percent.

NSO Status

In FY 2007, NSTec established a water production baseline in accordance with EO 13423. This production baseline will be utilized during FY 2008 to identify, trend, and make recommendations for the implementation of site wide water conservation measures. The NTS potable water production for FY 2007 was 210.6 million gallons. Actual water consumption figures are not available because none of the NTS facilities have water meters attached to the buildings. Instead, water production data are currently used to provide metrics in this area. NNSA/NSO sites began saving water through several water conservation measures. Examples include the installation of WaterSense™ products, xeric landscaping, using non-potable water for dust suppression, and the institution of 4-day work weeks.

The site will continue to utilize Best Management Practices for Water Efficiency in the following areas: water management planning; system audits, leaks, and repairs; water efficient landscaping; water efficient irrigation; toilets and urinals; faucets and showerheads; boiler systems; and other water use.

Site-Specific Goals

Table 1-4 presents potable water production goals from the FY 2007 baseline through FY 2015. Installation of water meters on the potable water consumption facilities was one of the ESPC projects identified, but was eliminated from consideration due to the financial evaluation results.

Table 1-4 Potable Water Production Goals

Year	Gallons of Potable Water Production (in millions)	Cumulative Percent Reduction
2007	210.6	Base Year
2008	206	2
2009	202	4
2010	198	6
2011	194	8
2012	190	10
2013	185	12
2014	181	14
2015	177	16

Energy and water production must be measured on a subset of facilities that will be established once energy audits and sustainability assessments are performed in FY 2009. It is NSO's policy to exclude mission-critical facilities that have a variable mission tempo. A water study will be performed in FY 2009 to baseline potential water reduction and identify water reduction projects.

Installation of water meters on the potable water fill stands is planned for FY 2009. In addition, employee awareness and the installation of water meters for high water usage buildings are necessary to create a baseline in order to deal with conservation measures. The funding for the 16 water meters at the NLVF is included in ESPC Delivery Order 2. Table 1-5 identifies water savings, implementation year, implementation cost, and funding source for Water Meters-ECM 3.1. Additional meters are contingent upon additional funding being received.

Table 1-5 Water ECM 3.1

ESPC Project or ECM	Actual or Estimated Water Saved kgal/yr	Expected Year of Implementation	Actual or Estimated Implementation Cost (does not include support costs)	Funding Source (ESPC, UESC, Overhead, GPP, Other)
ECM 3.1 (Water)	Estimated 3,700 kgal/yr Water saved	Full implementation FY 2015	\$760,000	ESPC

1.4.3.2 Requirements for DOE Order 430.2b (12)

The increase in the use of non-potable water sources such as reclaimed, recycled and grey water for appropriate applications.

NSO Status

The NTS does not have a water recycling program. Water and sewage are discharged into either sewage lagoons or septic systems. Recycling gray water at the NTS was examined. It was determined that the cost would be prohibitive given the quantity of flow and lack of means to redistribute the recycled water. The water could be used for dust control in some cases, but depending on the extent of treatment, there are restrictions on how the water may be used.

Site-Specific Goals

Reduction of 2 percent per year goal is in place but cannot be measured from production meters since water metering at user locations still does not exist. A water study will be performed in FY 2009 to baseline potential use of non-potable water resources.

1.4.4 Transportation/Fleet Management

1.4.4.1 Requirements for DOE Order 430.2B (10), EO 13423 (g), and TEAM Initiative (5)

The provision of access to alternative fuel infrastructure throughout the Department to ensure that all alternative fuel vehicles will operate on alternative fuels to the greatest extent practicable, and the replacement of DOE conventional-fuel vehicles with alternative fuel and hybrid technology vehicles, including plug-in hybrid electric vehicles as they become available.

Ensure that, if the agency operates a fleet of at least 20 motor vehicles, the agency, relative to agency baselines for fiscal year 2005, (i) reduces the fleet's total consumption of petroleum products by 2 percent annually through the end of fiscal year 2015, (ii) increases the total fuel consumption that is non-petroleum-based by 10 percent annually, and (iii) uses plug-in hybrid (PIH) vehicles when PIH vehicles are commercially available at a cost reasonably comparable, on the basis of life-cycle cost, to non-PIH vehicles.

DOE's entire Alternative Fuel Vehicles fleet operates exclusively on clean, alternative fuels.

NSO Status

The use of plug-in hybrid (PIH) electric vehicles and the use of electric drive vehicles is considered to the extent feasible. Hybrid vehicles have been considered when ordering vehicles. The NSO fleet has one hybrid in its fleet. The challenge with this vehicle is that the air conditioner does not operate on hybrid mode, which makes the vehicles less economical especially in the summer when temperatures can top 110 degrees. Also, the cost for these vehicles is higher than a regular vehicle.

A process is already in place to procure alternative fuel vehicles (AFVs) when available from General Services Administration. The current Fleet has 540 AFVs which equates to 96 percent of the covered fleet. The AFV goal of acquiring 75 percent of AFVs for the fleet has been met and exceeded.

NNSA/NSO requires that its fleet operate any AFVs exclusively on alternative fuels to the maximum extent practicable. In FY 2007, NSTec constructed an E-85 service station in Mercury and implemented a successful plan to promote the use of the alternative fuel. In FY 2007, the total actual usage of E-85 was 135,141 gallons; the consumption for FY 2008 was 182,997 gallons, a 35 percent increase in usage. The plan called for a 10 percent increase in usage over the FY 2007 baseline. NSO continues to provide incentives for increased use of alternative fuels in FY 2009. The goal is to increase usage by an additional 10 percent in FY 2009. The E-85 and petroleum filling stations are co-located on the NTS and there appears to be a direct correlation between reduced usage of petroleum and an increased usage of E-85.

For every gallon of E-85 that is used, 85 percent of the petroleum base fuel is reduced; for every gallon of B-20 Biodiesel, 20 percent of the petroleum base fuel is reduced; and another 10 percent for every gallon of unleaded that is used. Biodiesel fuel is used in all equipment with the exception of emergency generators and boilers and is currently at the maximum possible usage level.

Site-Specific Goals

NSTec will continue to pursue the procurement of AFVs to replace the existing conventional-fuel fleet as well as maintain the AFV fleet that currently exists. The site performs utilization studies each year to provide feedback on rightsizing of the current fleet. Recent studies continue to support the current size of the fleet.

In order to continue to meet/exceed the petroleum reduction goal, NSO will continue to have a pool vehicle fleet of 18 vehicles at the NLV Facility that is available to all departments in North Las Vegas. In addition, videoconferencing established at several buildings at the NTS and NLVF will continue to be utilized.

The alternative fuel usage is projected to increase by 10 percent over FY 2008 as well as for FY 2009. Goals for fuel usage are presented in Table 1-6.

Table 1-6 Fuel Usage Goals

Fuel Use (Gallons)		
	FY 2009	FY 2010
E-85 Fuel	210,000	231,000

Buildings Memorandum of Understanding (2006), and (ii) 15 percent of the existing Federal capital asset building inventory of the agency as of the end of fiscal year 2015 incorporates the sustainable practices in the Guiding Principles.

The meeting of the 15 percent goal in EO 13423, dated January 24, 2007, (EO 13423) section 2(f)(ii) for incorporating the sustainable practices of the Guiding Principles for energy and water and related principles into the Department's capital asset building inventory.

NSO Status

This is a new initiative that will be included in projects costs for all new buildings. As new requirements for new facilities come on line, then line-item funding or third-party financing will be pursued. If the funding does not get approved, then a waiver will be pursued. New construction and major building renovations in excess of \$5 million will incorporate the Guiding Principles of EO 13423 to the extent practical and life cycle cost effectiveness. As of the Plan date, there are no new buildings and major buildings renovation projects at Critical Decisions (CD)-1 or lower with a value exceeding \$5 million. All new construction or major renovation projects will incorporate renewable energy equipment into building design to the maximum extent feasible.

NNSA/NSO currently has 449 real-property facilities (owned, leased, and/or permitted) listed in the Facilities Information Management System (FIMS). NSO will exclude the following from the sustainability assessments:

- 151 facilities (including real-property trailers) that are 1,000 square feet or less.
- 28 facilities that are currently listed as non-operating.
- 88 facilities proposed for demolition as part of Transformation Disposition and National Nuclear Security Administration Nevada Site Office's (NNSA/NSO's) Integrated Resource Management Plan.
- Pre-engineered buildings that cannot meet the requirements for sustainability.
- Buildings which are critical for maintaining national security and whose inclusion in energy-savings initiatives would be damaging to the mission.
- Non-core mission facilities, e.g., Office of Secure Transportation.
- Other exemptions based on guidance from the Office of Energy Efficiency and Renewable Energy.
- Additional facilities identified during sustainability audits.

The specific buildings that will require sustainability assessments are not currently identified. A Sustainability Plan is in development and will be completed by March 2009. It is anticipated that all buildings recommended for assessment will be assessed in FY 2009. Assessment results will provide initial data to determine the path forward. It is anticipated that more facilities than those currently listed will require waivers or exemptions.

NNSA/NSO will not meet the guiding principles for 15 percent of existing buildings. However, NNSA/NSO will incorporate sustainable practices in a variety of ways. Audits and assessments will be conducted to identify building areas that can potentially be upgraded using sustainable features. The Transformation Disposition Program will facilitate disposition of buildings not suitable for retrofitting with sustainable features. Consolidation, as part of the Integrated Resource Management Plan, will also reduce the square footage in use by NNSA/NSO. This also assumes that the goal is 15 percent of enduring facilities based on square footage.

Annually, NSTec is required to submit a High-Performance Building Plan to NNSA/NSO that addresses how NSTec will ensure that (1) all new construction and renovation projects implement design, construction, maintenance, and operation practices in support of design/high-performance buildings goals of EO 13423 and statutory requirements; and (2) existing facilities' maintenance and operation practices in support the goals of EO 13423. The High-Performance Building Plan will also align with EO 13327 and the Department's real property asset management plan. At a minimum, the High-Performance Building Plan will include employment of integrated design principles, optimization of energy efficiency, use of renewable energy, protection and conservation of water, enhancement of indoor environmental quality, and reduction of environmental impacts of materials in accordance with the Guiding Principles of DOE Order 430.2B, Attachment 1 and construction related to EO 13423. NNSA/NSO assumes planning data and goals are based on square footage.

Site-Specific Goals

The first step will be to determine which buildings will require sustainability assessments with guidance provided by DOE/HQ. Exemptions will be tracked in FIMS through the 25 new fields that DOE/HQ has added to this database. The projects created by the sustainability assessments will also be tracked in the new database.

NSTec will develop standards and criteria for energy efficiency/sustainable design. A graded approach will be used to evaluate implementation. As a minimum, the following will be developed:

- Engineering plan to address all new construction and renovation projects in support of high performance building goals of EO 13423.
- Site Maintenance plan to replace equipment-in-kind, or more efficient standards in support of existing facilities maintenance and operations practices to meet the goals of EO 13423.
- Procurement plan to address the purchasing of ENERGY STAR qualified or Federal Energy Management Program designated projects.

Specific technical engineering standards and design criteria for new construction and major building renovations will be developed to achieve LEED Gold certification, comply with the requirements of 10 CFR Part 433, standardize cooling operations of data centers to maximize energy efficiency, and incorporate the Guiding Principles of

EO 13423 to the extent practical. Standards and criteria will incorporate energy efficiency/sustainable design. Completion of specific technical engineering standards and design criteria for new construction and major building renovations will be developed as part of the initiation of new projects or as part of a future indirect support function.

1.4.5.2 Requirements for DOE Order 430.2b (8)

The commissioning of new equipment or retrofit construction to be performed to ensure that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with the project intent.

NSO Status

Procedure OP-2110.822, *Process for Inspecting Hazardous Electricity-Producing Equipment Prior to Start up of Inbound Equipment*, identifies the process to identify, inspect, and mitigate hazardous conditions prior to the start up or activation of all inbound hazardous electricity-producing equipment. The procedure applies to Construction Equipment Section personnel responsible for inspecting, repairing, starting, activating, and rendering electricity-producing equipment electrically safe.

Site-Specific Goals

For FY 2009, several site-specific goals have been established. NNSA/NSO has the performance expectation that NSTec will build, modernize, and maintain facilities and infrastructure to achieve mission goals and ensure a safe and secure work place. To meet this expectation, NSTec is tasked with completing the Reliability Centered Maintenance analyses processes and develop requirements for 11 substations and 1 switching station by September 18, 2009. This includes development of a CoFA and development of PdM Requirements. CoFA includes identifying the functions of the equipment, functional failures, different failure modes, effects of the failure modes, and consequences of the failure effects. Development of PdM includes specifying appropriate preventive maintenance tasks. At this time, other equipment/construction is excluded because the reliability centered maintenance process is coming on-line and others have yet to be identified.

1.4.5.3 Requirements for DOE Order 430.2b (9)

The Retro-Cx to review the condition of building systems to be performed and return equipment that has fallen out of desired operating parameters back into appropriate tolerances. Retro-Cx is the process of optimizing an existing building's operation and maintenance through the implementation of low-cost and no-cost improvements, and does not involve equipment replacement. Retro-Cx focuses on energy using equipment, such as mechanical systems, controls, and sometimes lighting.

NSO Status

NSTec has established the key components for a comprehensive approach to effectively using resources to provide maintenance support for facility managers in optimizing an existing building's operation and maintenance through the implementation of low-cost and no-cost improvements. Management provides a guide for prioritized maintenance activities over a five-year period and empowers the maintenance program to progress in a proactive rather than a reactive mode. The results of facility and infrastructure assessments, prior-year maintenance performance, and future programmatic requirements are combined with projections by maintenance managers and facility managers to form a site-wide vision for maintenance. Forging this common vision, for facilities and infrastructure, yields dividends in a coordinated and cost-effective application of maintenance for NSO facilities. This shared vision is leading to a more balanced planning approach for both facilities and infrastructure, departing from the trend to focus maintenance planning primarily on buildings. This redirection will allow NSO to support NNSA's corporate goals for deferred maintenance.

Site-Specific Goals

For FY 2009, several site-specific goals have been established. NNSA/NSO has the performance expectation that NSTec will build, modernize, and maintain facilities and infrastructure to achieve mission goals and ensure a safe and secure work place. An additional performance target is establishing, implementing, and maintaining a sustainment methodology that addresses the unique aspects of the NTS.

Permanent federal government facilities and infrastructure are generally designed for a life expectancy of 50 years if they are properly maintained. Buildings that are allowed to run to fail will last 25 years. Keeping any building economically functional requires regular recapitalization planning and investment. This is especially true if the facilities and infrastructure are kept in operation beyond their design life.

Because of requirements to support leading-edge technology and to provide economically functioning buildings, the target life cycle for buildings requires updated technology systems every ten years and refurbishment of buildings at least once during their life cycle. This includes buildings targeted for retro-Cx. It will include the optimization of

NSO Status

NSTec uses an EMS to establish, track, and review its progress towards the energy efficiency, water conservation, greenhouse gas reduction, and renewable energy goals as reflected in this Executable Plan. PD-0442.001, *Environmental Management System Description*, describes commitments and methods used to integrate environmental management requirements into work planning and execution. These methods identify and communicate applicable standards, criteria, and corporate goals to all employees. NSTec conducts performance assessments and program reviews to ensure that all system elements are in place and identify opportunities to continually improve the overall environmental program. In addition, environmental targets are a key part of the continual improvement requirement in the ISO 14001 *Certified Environmental Management System*. Periodic progress reports are used to track status and report to the Executive Leadership Council.

Site-Specific Goals

Execution of PD-0442.001, *Environmental Management System Description*, has earned ISO certification. Therefore, no additional execution strategies are planned beyond periodic revision.

1.4.5.5 Requirements for EO 13423 (d)

Require in agency acquisitions of goods and services (i) use of sustainable environmental practices, including acquisition of biobased, environmentally preferable, energy-efficient, water-efficient, and recycled-content products, and (ii) use of paper of at least 30 percent post-consumer fiber content.

NSO Status

The NSTec Environmental Services Department has issued PD-0442.002, *Pollution Prevention Plan, December 2007*. The plan was written to ensure that pollution prevention is an integral part of EMS and is fully integrated into work processes through ISMS. The plan has been implemented and the results present an established Computer Lease Purchasing Program which has 100 percent of the company computers (laptops and desktops) identified as Electronics Product Energy Assessment Tool (EPEAT) “green computers.” The Material Exchange Program established identifies materials that employees no longer has a use for and swaps out with another group that may require the product. The Recycling Program deals with recycling lead acid batteries, anti-freeze, used oil, haylon and Freon, as well as paper, cans, and cardboard.

Site-Specific Goals

Execution of PD-0442.001, *Environmental Management System Description*, has earned ISO certification. Therefore, no additional execution strategies are planned beyond periodic revision.

1.4.5.6 Requirements for EO 13423 (e)

Ensure that the agency (i) reduces the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of by the agency, (ii) increases diversion of solid waste as appropriate, and (iii) maintains cost effective waste prevention and recycling programs in its facilities.

NSO Status

NSTec *Environmental Protection Policy*, PY-0442.001, states the following: “Continually strive to protect valued natural resources and to prevent pollution by minimizing the generation of hazardous and non-hazardous waste and the discharge of pollutants from permitted air and wastewater sources. Preferred methods of achieving waste minimization objectives are source reduction, material substitution, recycling, and process modification through process knowledge and pollution prevention opportunity assessments.” Reduction of hazardous and chemical substances is managed through procurement processes and subcontracts which ensure that quantity restriction (ordering only quantity required) and product substitution is procured. Chemical inventory reduction is also controlled through the procurement process; ensuring the product with the least amount of risk is purchased for the job. All material is disposed of according to the Material Safety Data Sheets and, if hazardous, is shipped off-site to be disposed of properly.

NSTec’s Pollution Prevention Plan identifies Pollution Prevention policy, the scope of the Pollution Prevention Program, and the regulatory drivers; establishes a responsibility matrix; and describes the elements necessary for a compliant Pollution Prevention program. The Pollution Prevention Plan is a reference tool and guidance document for NSTec employees that is reviewed annually and updated, at a minimum, every three years.

Site-Specific Goals

NSTec sets environmental goals within the framework of the EMS. These goals are reviewed and adjusted annually in July. These goals are based on significant environmental aspects, identified as *National Environmental Policy Act* compliance, Waste Generation and Management, Industrial Chemical Use, Drinking Water Quality, Air Quality, and Wastewater Management.

1.4.5.7 Requirements for EO 13423 (h)

Ensure that the agency (i) when acquiring an electronic product to meet its requirements, meets at least 95 percent of those requirements with an EPEAT-registered electronic product, unless there is no EPEAT standard for such product, (ii) enables the Energy Star feature on agency computers and monitors, (iii) establishes and implements policies to extend the useful life of agency electronic equipment, and (iv) uses environmentally sound practices with respect to disposition of agency electronic equipment that has reached the end of its useful life.

NSO Status

NSTec CD-0442.017, *Recyclable Material*, identifies the appropriate pathways for recycling various waste streams generated by each location and assigns responsibility for tracking and reporting those recycling activities. The NSTec Information Services Department Client Care Manager ensures all leased computer equipment contracts contain language that requires the following:

- Computer equipment must be Energy Star 4.0 compliant.
- All central processing units, laptops, and monitors must be EPEAT registered.
- Utilize reduced packaging that is recyclable (no Styrofoam or non-recyclable plastic) and arrange for packaging to be taken back for reuse.
- Returned equipment must be refurbished and reused; disassembled and the parts reused, or recycled through an International Association of Electronic Recyclers certified recycler.

NSTec Information Services Department Client Care Manager also ensures all leased computer equipment returned to the vendor for reuse/recycle is tracked and reported to the Environmental Services Pollution Prevention Subject Matter Expert at the end of each quarter.

Site-Specific Goals

Plans are in development for including language in Procurement procedures that will ensure that the Energy Manager will review procurements of parts or equipment that could impact energy goals. NSTec Engineering standards will be developed pending funding identification to include equipment or parts that meet standards established by the Federal Energy Management Program. NSTec's Maintenance Supply will order Federal Energy Management Program-authorized replacement parts, as appropriate.

1.5 Waivers

Waivers being requested are as follow:

- 2 percent reduction in annual water consumption intensity.
- 7.5 percent thermal energy usage requirement.
- 7.5 percent onsite renewable energy requirement (if CSP not built).
- Incorporate sustainment practices consistent with the guiding principles in 15 percent of NSO facilities.
- Third party verification of excluded buildings.
- NSO will exclude the following from the sustainability assessments and energy audits:
 - 151 facilities (including real-property trailers) that are 1,000 square feet or less.
 - 28 facilities that are currently listed as non-operating.

-
- 88 facilities proposed for demolition as part of Transformation Disposition and NNSA/NSO's Integrated Resource Management Plan.
 - Pre-engineered buildings that cannot meet the requirements for sustainability.
 - Buildings which are critical for maintaining national security and whose inclusion in energy-savings initiatives would be damaging to the mission.
 - Non-core mission facilities, e.g., Office of Secure Transportation.
 - Other exemptions based on guidance from the Office of Energy Efficiency and Renewable Energy.
 - Additional facilities identified during sustainability audits.

1.6 Schedule of Milestones

DOE O 430.2B Energy Goals	Activity	Start	Complete	Funding Source
ENERGY EFFICIENCY				
	DO2 ESPC Projects	12/17/08	07/09/10	ESPC
	ECM 3.1 Building Controls Installation	04/24/09	04/15/10	
	ECM 3.1 Electrical Subpanel Replacement	04/17/09	01/08/10	
	ECM 3.1 Electrical and Gas Meter Installation	04/13/09	08/10/09	
	ECM 5.1 Lighting Retrofit/Lighting Controls	04/30/09	11/24/09	
	Continuity of Operations Implementation Plan	12/01/08	09/30/09	Indirect
	FAMS software development	10/01/08	09/30/09	Indirect
	Work Control procedure to purchase energy efficient products	02/02/09	09/30/09	Indirect
RENEWABLE ENERGY				
	Concentrating Solar Power (CSP) Plant	04/28/08 (Initial Proposal)	2012	ESPC
	CSP Construction	11/01/09	06/30/12	
	CSP Operation	06/30/12	06/30/42	
	ECM 11.3 Solar Lighting Installation	05/28/09	06/18/09	ESPC
WATER				
	Water Study	04/30/09	09/30/09	Indirect
	Track replacement w/WaterSense products	01/30/09	09/30/09	Indirect
	ECM 3.1 Water Meter Installation	04/13/09	08/10/09	ESPC
TRANSPORTATION/FLEET MANAGEMENT				
	E-85 availability project	02/02/09	03/31/09	Indirect
	Tracking and reporting mileage	02/02/09	09/30/09	Indirect
HIGH PERFORMANCE SUSTAINABLE BUILDINGS				
	HPSB Plan	02/02/09	07/30/09	Indirect
	Audit Plan	12/01/08	03/31/09	Indirect
	Sustainability Plan	12/01/08	03/31/09	Indirect
	Energy/sustainability audits	04/01/09	09/30/09	Indirect
	Revise procurement document to reflect LEED requirements for leased buildings	04/06/09	09/30/09	Indirect

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2.0 ENERGY EFFICIENCY

The purpose of this goal is to reduce energy intensity by no less than 30 percent on average by fiscal year (FY) 2015, relative to the site/facility energy use in FY 2003, (U.S. Department of Energy [DOE] Order 430.2B, 1.b.(1) and Attachment 1, 5.a)

2.1 Current Status

Several onsite renewable energy lighting projects have been implemented at the Nevada Test Site (NTS):

- Solar lighting installed for pedestrian footpaths
- Solar post in front of the cafeteria lighting
- Solar-powered monitoring stations
- Solar powered low volume continuous air sampling systems
- Solar powered pedestrian crosswalk lighting

Leased facilities at auxiliary sites have utilities provided by local utility companies. The power for the 423 facilities identified for electrical meter installation at the NTS is transmitted through a 138 kilovolt (kV) loop that supplies eight substations, one switching center, and one 138 kV radial. The power distribution involves an extensive 34.5 kV system and short 69 kV and 12 kV systems. These voltages are transformed to a 4.16 kV distribution voltage and then subsequently to 480-208/120 V working voltages. The NTS is served by approximately 600 miles of transmission and distribution lines. Executive Order 13423 calls for a reduction in energy consumption by 3 percent annually or a total of 30 percent through the end of fiscal year 2015. In FY 2007, National Security Technologies, LLC (NSTec) was required to meet the established NSO 2 percent per year reduction (from 2006) in power consumption. The goal was met and exceeded by 5 percent. In addition, the FY 1985 baseline was reset to reflect FY 2003 total consumption (87,760 MWh). Figure 2-1 is a display of the actual FY 2007 energy consumption, the FY 2008 3 percent reduction goal, and the FY 2008 actual usage. In FY 2008, the goal of 73,766 MWh was reduced further by 9 percent (67,570 MWh).

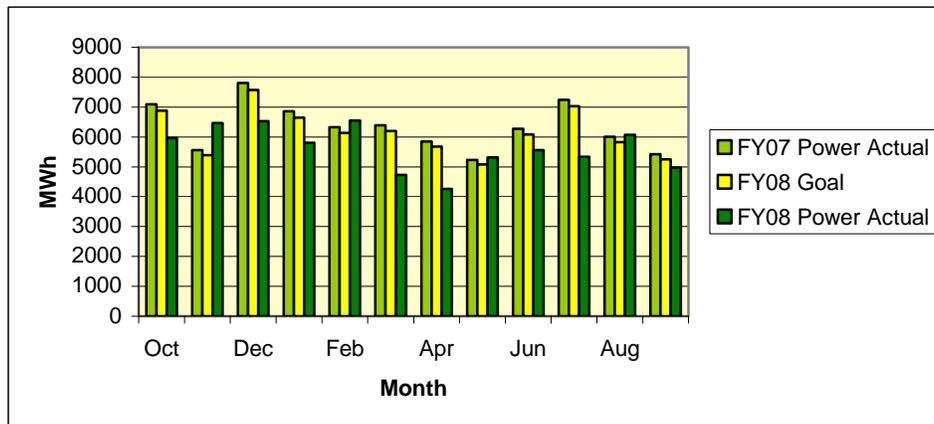


Figure 2-1 Display of Power Consumption, Reduction Goal, and Actual Usage

2.2 Energy Program Implementation

2.2.1 Accomplishments

Prior years' accomplishments in energy savings was through qualified Energy Saving Performance Contract (ESPC) funding to perform energy savings projects. The projects included retrofitting lighting for the Remote Sensing Laboratory (RSL) - Nellis, and NTS Buildings 23-117 and 23-132; installing programmable thermostats for 100 buildings; installing electrical meters for 282 buildings at NTS; and an ESPC was expected to retrofit lighting at all North Las Vegas (NLV) buildings and the RSL- Nellis hangar. All NLV Facility (NLVF) buildings are controlled by an energy management system which controls lighting and heating, ventilation, and air conditioning 24 hours a day, 7 days a week.

2.2.2 Purchased Energy

NSTec purchases electricity and natural gas from sources that use high efficiency and low-carbon generating technologies in order to reduce greenhouse gas intensity. The utilities that provide electricity and natural gas to the complex are pursuing the use of high efficiency generating equipment; however, they are all private entities with self directed agendas. Currently, two utility companies have demand-side management programs available in which the National Nuclear Security Administration Nevada Site Office (NNSA/NSO) participates: the Express Efficiency Rebate Program from Pacific Gas and Electric Company and Sierra Pacific Power Company. The rebates from Pacific Gas and Electric Company and Sierra Pacific Power Company offer NNSA/NSO reduced savings on the utility bill when efficient products, such as lighting and programmable thermostats, are installed.

2.2.3 Comprehensive Energy Management Program and Plan

The existing site-wide energy management program includes a Comprehensive Energy Management Program and Plan developed by the NSTec to meet the requirements of DOE Order 430.2A. In addition, a policy statement and procedure for no cost/low cost energy conservation opportunities has been issued. NSTec implemented a company procedure to define internal energy controls for new buildings and building alterations. Beginning with the Conceptual Design Phase, and prior to actual construction, new buildings will automatically be evaluated for life cycle cost-effective energy-efficient technologies. New building commissioning principles will be used in all new design and construction projects.

2.2.3.1 Purchasing

NNSA/NSO utilizes energy star computer systems, copiers, and printers and, in conjunction with NSTec Procurement, has set forth requirements to purchase products within the 25 percent energy efficiency barrier from vendors who provide such products. Over 50 percent of the energy-consuming products purchased by NSTec meet the Federal

Energy Management Program's criteria for energy efficiency. In FY 2000, NTS Buildings 23-117 and 23-132 were labeled as Energy Star Buildings. These were the first two facilities in the DOE complex to receive an Energy Star rating. Building B-3 at the NLVF is Leadership in Energy and Environmental Design (LEED) certified Silver, and an Energy Star Building.

2.2.3.2 Employee Awareness

NSTec has implemented an employee incentive program to reward exceptional individual and team performance in increasing energy efficiency and water conservation, deploying renewable energy, minimizing waste, reducing utility costs, and reducing greenhouse emissions. NSTec established an energy-savings process improvement project to sponsor a contest for employees to provide ideas and look for energy and costs savings opportunities. It determined that the best no cost energy-saving efforts will be to increase awareness. This would involve employees and provide incentives to save energy. It would also include sponsoring activities to ensure that thermostat temperatures are moderated; lights are turned off when not in use, and other energy-saving actions. A NSTec website was established to link to federal and local sites which promote energy saving ideas. An employee incentive energy-savings suggestion program was launched in FY 2006. The results of the suggestions implemented through this program and progress towards a 10 percent energy savings goal are tracked and reported. For both FY 2007 and FY 2008, low standby power devices that are Energy Star rated were purchased, e.g., computers, copiers, etc.

Buildings that use greater than 100,000 BTUs per square foot annually and that are more than 3,000 sq ft in size were considered for energy conservation trending. Each month at least three of these facilities are highlighted in *The Joule*. *The Joule*, a monthly newsletter, was initiated in October 2006 and is published by the NSTec Facilities and Infrastructure Planning Department to provide facility managers with supporting information and articles to increase energy conservation awareness and to assist them in more effectively managing energy in their facilities. *The Joule* communicates energy conservation news, policy changes, and trends energy conservation in buildings meeting trending criteria. Energy usage is compared to the previous two calendar years. The conservation trending should facilitate the ready identification of energy anomalies and serve as a foundation for discussions to ensure conservation measures are being adequately implemented. This will also highlight tracking of energy savings to ensure NSTec reaches or exceeds its commitments to NNSA.

An energy conservation contest yielded a checklist developed by one of the contest winners. Facility managers are encouraged to use this checklist to ensure energy conservation practices are implemented, especially in those buildings that have a high energy use per square foot index.

An Open House took place on November 1, 2008, at the B-3 building at the NLVF. One presentation focused on the energy saving features of the B-3 building and provided employees and their families with energy saving strategies that can be used at home.

While the focus of the campaign is energy savings, the concept for delivering the message is awareness. The goal is to create an environment that lends itself to people implementing energy conservation measures as a lifestyle rather than a cyclic fashion.

2.2.3.3 Annual Energy Goals

For FY 2008, energy conservation objectives were identified:

- Improve employee awareness by company-wide distribution of energy conservation newsletter, *The Joule*, and a poster contest.
- Investigate 95 percent of identified spikes in electrical energy.
- Develop a series of energy analyses that measure impact of energy-saving initiatives.

The first objective is to restructure and expand distribution of *The Joule*. *The Joule* is a monthly newsletter, which was initiated in October 2006 and is published by the NSTec Facilities and Infrastructure Planning Department. In its initial inception, it was intended to provide facility managers with supporting information and articles to increase energy conservation awareness and to assist them in more effectively managing energy in their facilities. *The Joule* was restructured in the first quarter of FY 2008 to communicate energy conservation news, policy changes, and to trend energy conservation in buildings meeting trending criteria. In addition, distribution of *The Joule* was expanded to all NSTec employees, and the computer links to the newsletters moved under the Energy Management heading. *The Joule* serves as an outreach vehicle to motivate employees to become more efficient in their use of energy, water, and green products and services, and minimize waste. In addition, a poster contest was held to aid in increasing awareness among employees. Participants were asked to submit a photo and a one line caption to answer the question, “Why are you saving energy?” One hundred copies of the winning poster were distributed for display in various NSO facilities.

The second objective was to investigate 95 percent of identified spikes in electrical energy. A program is being developed to monitor power by facility. The purpose of this objective was to investigate the number of identified spikes in electrical energy to determine if corrective measures can be implemented to reduce or eliminate spikes in the future. This objective was developed to identify potential energy savings. Approximately 95 percent of identified energy spikes are investigated. Energy usage was monitored and Facility Managers notified when a spike occurred in a facility assigned to them. The Facility Manager is required to investigate the potential causes of the spike and suggest potential corrections so that energy spikes are reduced or eliminated at that facility. This investigation is documented. The value of this objective is that it provides energy feedback to Facility Managers and allows them to work with facility users to ensure energy usage at each facility is reduced as much as practical.

The third objective was to develop a series of energy analyses that measure impact of energy-saving initiatives. Data from water production (since there is no way to measure water consumption) is tracked and analyzed. Energy was tracked, analyzed, and reported

monthly to NSO. Buildings that use greater than 100,000 BTUs per square foot annually and that are more than 3,000 sq ft in size are considered for energy conservation trending. Each month at least three of these facilities are highlighted in *The Joule*. Their energy usage is compared to the previous two calendar years. The conservation trending should facilitate the ready identification of energy anomalies and serve as a foundation for discussions to ensure conservation measures are being adequately implemented in every facility. This highlights tracking of energy savings to ensure NSO reaches or exceeds its commitments to NNSA. Facility managers are encouraged to use an energy conservation contest checklist to ensure energy conservation practices are implemented, especially in those buildings that have a high energy use per square foot index.

2.3 Path Forward

During FY 2008, NSTec took steps to improve the way energy management is exercised within the company and the entire NTS complex. An Energy Management Council was assembled to provide a comprehensive approach on conservation measures. Council members were hand picked from within company ranks and consisted of subject matter experts from Engineering, Facilities, Maintenance, and Infrastructure. The Council meets regularly to create and enforce policy for energy issues.

2.3.1 Consolidation of Facilities

Consolidation of facilities will relocate materials, excess equipment, and relocate personnel to consolidate operations. This effort supports Readiness in Technical Base and Facilities program goals of achieving program objectives for aggressive deferred maintenance reduction and buydown strategies, Facility Condition Index reduction, and facility management that occur when reducing footprint, consolidating operations, and improving operational efficiency. In completing the consolidation, the NLVF is further enhanced to ready other facilities to allow for consolidation. A total of 18,533 gross sq ft are proposed for consolidation in the FY 2009 NNSA/NSO Ten-Year Site Plan (TYSP).

2.3.2 Disposition of Facilities

This project will provide for the planning, project management, characterization, demolition, and disposal of excess facilities that are over 45 years old and in adequate to fair condition. The facilities proposed for disposal are no longer required to support the NNSA/NSO mission and will assist in meeting the footprint reduction effort to support Transformation Disposition. The facilities are part of the NSTec Facility Disposal Plan that is in accordance with the FY 2009 TYSP. A total of 97,343 gross sq ft are proposed for disposition in the FY 2009 TYSP.

2.3.3 Audits

For FY 2007, a percentage of building square footage was audited during the fiscal year to identify cost effective energy and water projects. For FY 2008, a number of cost effective energy and water retrofit projects have been identified and remain on a backlog to be accomplished in the future. Additional audits will be performed in FY 2009 which will provide sufficient data to develop a baseline that can then be used to develop plans

for future activities. Currently, Condition Assessment Survey (CAS) inspections are conducted by certified CAS inspectors who have training in energy management objectives and are able to identify areas of facilities that are wasting energy.

Maintenance personnel developed a facility condition inspection program to prevent additional deterioration and minimize the impact of system failure on operations within the facility. The inspection program ensures that facilities and installed equipment are maintained in an energy-efficient condition that adequately supports the present mission and long-range planning requirements associated with the structures, systems, and components. A total of 300,000 square feet of existing facilities were audited for energy consumption.

In addition, NSTec is tasked with supporting the Federal Site Office Personnel, by providing full and open access to the maximum extent practicable to NNSA/DOE-contracted ESPCs, to facilitate on-site assessments of opportunities to improve the site's energy efficiency, water reduction, and renewable energy improvements. NSTec is also tasked with providing advisory assistance in reviewing ESPCs recommendations as directed by the Contracting Officer.

2.3.4 Life-Cycle Costs

All new buildings built in subsequent years will be evaluated for life cycle cost-effective energy efficient technologies. New building commissioning principles will be used in all new design and construction projects beginning with the Conceptual Design Phase, and prior to actual construction.

2.3.5 Metering

To date there are 395 electrical meters installed in the 423 buildings identified for electrical meter installation at the NTS with a projected 28 facilities identified for future installations. The NLVF consists of 32 buildings, of which three are metered. The Delivery Order 2 ESPC will install electrical, gas, and water meters at the NLVF. Annual metered electrical data is available for all major buildings and operations of greater than 50,000 gross square feet.

Table 2-1 below provides information on the number of meters required and number of meters installed for the various utilities listed at the NTS and NLVF.

Table 2-1 Utility Meters Installed and Required

Utility	Gas		Water		Electricity		Steam	
	Required	Installed	Required	Installed	Required	Installed	Required	Installed
NTS	1	0	423	0	423	395	0	0
NLVF	10	0	16	0	18	3	0	0

2.3.6 Commissioning and Retro-Commissioning

NSO consistently allocates funding for retro-commissioning buildings systems. Roofs, boilers, HVAC systems, and other systems that have fallen out of desired operating parameters are retro-fit to bring them back into system tolerances as part of the Roof Asset Management Program, Facilities and Infrastructure Recapitalization Program, and Maintenance and Repair.

Obtaining an Energy Star Rating for more than the three facilities already identified as Energy Star, e.g. NLVF B-3, NTS 23-132, NTS 23-117, would require obtaining energy use data for NLVF for the past year and inputting the data into the U.S. Environmental Protection Agency's Energy Star process to determine if any qualify for Energy Star Rating. Data required to select additional buildings for retrofit are not currently available. Some data will be available in FY 2009 upon completion of energy audits. NSO will continue to identify additional systems for retrofit as part of the annual planning process.

2.3.7 Personnel

NSTec has trained personnel to direct energy and water management programs and dedicate a substantial portion of their time to the effective implementation of energy and water management plans. Multiple NSO staff are assigned to meet various portions of DOE Order 430.2B. The NSTec Energy Manager is the Facilities and Infrastructure Planning Manager. The Facilities and Infrastructure Planning Manager is assisted in this effort by Facility Specialists, Architects, and Engineers within the organization. In addition, Facility Managers provide support for facility energy reduction. As additional requirements are identified, increased time will be spent by staff members to complete activities to meet the new requirements.

Energy team members and supporting personnel have achieved or are pursuing several certifications related to energy management. One Architect is pursuing LEED certified in addition to an Architect who already possesses LEED certification. Only one LEED-certified architect is sufficient to achieve a point under LEED. One Architect is a member of the United States Green Building Council. A Facility Specialist is pursuing certification as an Energy Manager. One Senior Engineer is certified by Project Management Institute as a Project Management Professional. These additional certifications add to the professional credibility of the engineering and planning staff. Other personnel involved in the implementation of Energy Management are four full-time equivalents, which are tasked with ordering vehicles and reporting data in FAST.

2.3.8 Renewable Energy Applications

The ESPC program was moved into the Detailed Energy Study (DES) phase in FY 2008 and was completed in October 2008. The Energy Conservation Measure (ECM) Contract is in final stages of the award process. The DES for the Concentrating Solar Power (CSP) plant is in the initial stage. Along with the traditional energy conservation

measures identified, NNSA/NSO, NSTec, and the Energy Savings Contractor, with support from the National Renewable Energy Laboratory are actively pursuing the construction of an 80 to 125 MW utility scale Concentrating Solar Plant at the NTS.

In the event that the Concentrating Solar Plant is not built at the NTS, the generation of 7.5 percent of renewable energy from onsite sources will not be possible. Renewable energy credits (RECs) will only be available until FY 2011 when the program will end. NSO will pursue a waiver for the onsite renewable energy goal.

2.3.9 Emergency Conservation

A continuity of operations implementation plan is being developed to meet DOE Order 150.1, *Continuity of Operations*. A continuity of operations plan and gap analysis will be developed during FY 2009 and will be integrated with existing emergency response core capabilities. Full integration is anticipated by the end of FY 2011.

Emergency conservation measures for power, water, and fuel are not addressed in current emergency response plans. Current plans address power, water, and fuel only in the following contexts:

- Refuge chambers are located in several underground complexes on the NTS, and include water and portable toilets. There are no other facilities at NNSA/NSO having a requirement for sanitation and survival equipment.
- Various transportation equipment is available for emergency use and to aid in the swift and safe evacuation of personnel throughout the NTS, including buses, pickup trucks, sports utility vehicles, vans, and sedans.
- Emergency power generators and various utility trucks are available on NTS. The available generators range from 6.5 to 600 kilowatts.

2.3.10 Data Collection and Reporting

NSTec currently uses the Headquarters assigned EMS4 system to report fossil fuel and water consumption. The EMS4 data energy management system is a web-based data collection and reporting system. EMS4 in its current format is not capable of collecting data in real time. Furthermore the NTS and NLV sites are in the process of building the communication software and hardware peripherals to support real time reporting.

NSTec prepares an annual report to the DOE Program/Site Office in order to assist DOE in meeting its obligations under the National Energy Conservation Policy Act and in accordance with E.O. 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*.

NSTec monitors power consumption by facility. If consumption exceeds 10 percent of its monthly average, an energy audit is conducted and a determination made whether or not to exclude the facility based on the Federal Energy Management Program (FEMP) established criteria. NSTec submits an annual Exclusion Self-Certification in electronic

spreadsheet format to the DOE Program/Site Office by November 1, of each year. Excluded Buildings are, to the extent practicable, separately metered. Currently there are only 61 buildings identified as excluded and all of the buildings have meters.

Third party verification has not been provided to FEMP that each Excluded Building has undergone a comprehensive energy audit and implemented all practicable, life cycle cost-effective energy conservation measures within the past four years. NSO has allocated funding for FY 2009 to begin the sustainability audits. An Audit Plan is being developed as part of a Sustainment Plan that details how audits will be conducted. Audits will begin in the second quarter of FY 2009. It is anticipated that all buildings recommended for assessment will be assessed in FY 2009. As the Audit Plan is developed and as audits are initiated, early indicators may determine that a facility is not appropriate for auditing. These facilities will be identified for exclusion. The Audit Plan discusses which facilities will be excluded, including those already exempted from the sustainability assessments by NSO:

- 151 facilities (including real-property trailers) that are 1,000 square feet or less.
- 8 facilities that are currently listed as non-operating.
- 88 facilities proposed for demolition as part of Transformation Disposition and National Nuclear Security Administration Nevada Site Office's (NNSA/NSO's) Integrated Resource Management Plan.
- Pre-engineered buildings that cannot meet the requirements for sustainability.
- Buildings that are critical for maintaining national security and whose inclusion in energy-savings initiatives would be damaging to the mission
- Non-core mission facilities, e.g., Office of Secure Transportation
- Other exemptions based on guidance from the Office of Energy Efficiency and Renewable Energy.
- Additional facilities identified during sustainability audits.

2.3.11 Description of Projects and Activities

2.3.11.1 Data Energy Management System (CRD 1d)

The data energy management system is a web-based data collection and reporting system. This management system will be put in place to report the site's energy consumption and cost for fuels by fuel type and energy category; it will document and measure progress toward the Department's energy efficiency leadership goals. Currently, NSTec uses the EMS4 system to report fossil fuel and water consumption. EMS4, in its current format, is not capable of collecting data in real time. The site will require the installation of communication software and hardware peripherals to support real time reporting.

2.3.11.1.1 Funding Plan

The existing EMS4 system approaches the Energy Management Program requirements. However, a gap analysis is necessary to compare the current system against the requirements to identify additional information needs. Commitments from EMS4 System Administrators regarding any changes to the system will be addressed and approved.

2.3.11.1.2 Implementing Plan

- Analyze and research current EMS4 system capabilities
- Select/Purchase either new system or upgrade software for EMS4
- Train selected staff members on new system/process
- Implement new system to meet DOE Order requirements

2.3.11.2 Emergency Conservation Plan (CRD 2b)

The Emergency Conservation Plan will layout the process/procedure for the NTS Complex on how the effects of a sudden disruption in the supply of fuel oil, natural gas, electricity, and other critical energy supplies would be mitigated in an emergency.

2.3.11.2.1 Funding Plan

Funding is not available. NSO plans on using the steps established in Continuity of Operations Planning documents to address this requirement.

2.3.11.2.2 Implementing Plan

- Develop Continuity of Operations documents
- Ensure documents discuss how the effects of a sudden disruption in the supply of fuel oil, natural gas, electricity, and other critical energy supplies would be mitigated in an emergency.
- Identify current conservation measures
- Identify additional conservation measures necessary

2.3.11.3 Third Party Verification Audits (CRD 4c)

NSO will seek a teaming agreement with another NNSA site to investigate the option of providing third-party verification between sites. Audits for the NTS are not anticipated to be appropriate until FY 2010 due to the need for an internal plan to be developed and a data baseline to be collected in FY 2009.

2.3.11.3.1 Funding Plan

The auditing of excluded facilities by a third party is a new initiative. This requirement will be accomplished as part of the NSO Energy Program allocations from indirect funds.

2.3.11.3.2 Implementing Plan

- Develop an approved excluded facility audit list as part of the Audit Plan
- Develop teaming agreement to perform audits
- Report results to FEMP to meet DOE Order requirements

2.3.11.4 Energy Audits (CRD 6e)

An Audit Plan for energy and sustainability audits is in development and will be completed by March 2009. It is anticipated that all buildings recommended for assessment will be assessed in FY 2009. Once all major site facilities have been audited, facilities will continue to be audited every four years. The energy performance of buildings will be scored using the ENERGY STAR® Portfolio Manager rating tool as part of comprehensive facility audits.

2.3.11.4.1 Funding Plan

This requirement will be accomplished by reprioritization of indirect funds. A portion of annual funding can be used for energy audits each year.

2.3.11.4.2 Implementing Plan

- Obtain funding
- Prepare an audit plan that includes prioritization for buildings to be audited
- Complete audits of buildings in FY 2009

2.3.11.5 Internal Demand Response System (CRD 6j)

Integrate the Facility Asset Management System into ISD Core Server, thus providing NSTec with an enterprise wide automation system.

2.3.11.5.1 Funding Plan

This will be accomplished in conjunction with existing ongoing activities and integrated to the greatest extent possible.

2.3.11.5.2 Implementing Plan

- Obtain software licensing
- ISD Integration support
- Facility Asset Management System and software development

2.3.11.6 Data Center Energy Efficiency Program (CRD 6k)

Reduce the energy consumption of data center and server operations by specifying the acquisition of energy efficient electronic equipment for data centers, operating the equipment to improve load management and server innovation, and configuring the cooling operations to maximize energy efficiency opportunities.

2.3.11.6.1 Funding Plan

At this time, funding for a supplemental program is not possible. As data center retrofits are performed, these goals will be incorporated.

2.3.11.6.2 Implementing Plan

- Develop specifications for acquisition of energy efficient electronic equipment for data centers
- Operate the equipment to improve load management and server innovation
- Configure the cooling operations to maximize energy efficiency opportunities
- Develop procedures to ensure data centers will reduce the energy consumption and server operations

2.3.12 Delivery Order 2 Energy Savings Performance Contract (ESPC) Projects (CRD 6a)

Table 2-2 Energy Efficiency

		2003		2007	
Gross Square Feet		3,048,176		2,763,591	
Total Buildings		261,400		329,900	
Energy Use (MBtu)					
ESPC Project or separate Energy Conservation Measure*	Actual or Estimated Energy Saved MBTU/yr	Actual or Estimated Implementation Cost (does not include support cost)	Expected Year of Implementation	Funding Source (ESPC, UESC, Overhead, GPP, Other)	For ESPCs, Indicate Expected Date of Delivery Order Award
DO2	18,717	\$5,837,322	FY 2009-2010	ESPC	Dec 17, 2008

2.3.12.1 ECM 3.1- Building Management System Improvements

This ECM will install, replace, upgrade, or connect compatible control system components in 10 buildings at Mercury Complex, 4 buildings at Area 6, and the Underground Area to provide improved monitoring and control of heating, ventilating, and air-conditioning (HVAC) equipment. Many of the facilities included in this ECM

will be upgraded to direct digital control (DDC) system using BACnet® protocol and LON-based controllers with a Web-based communication backbone. Other buildings will have programmable thermostats or time clock controllers installed.

The scope of this ECM also includes the replacement of multiple lighting electrical panels with smart electrical panels and the installation of electric, natural gas, and water meters at selected buildings at the NLVF.

Energy savings will be realized by optimizing the operation of the HVAC systems using control strategies via the DDC system and programmable controllers. Energy conservation strategies include the scheduling of HVAC equipment, implementing established space temperature setpoints during occupied and unoccupied periods, shutting down equipment during unoccupied periods, resetting cold and hot deck supply air temperatures, and resetting hot water temperatures with respect to outside air temperature. Programmable thermostats will control space temperature and runtime.

A description of the existing and proposed conditions of the controls for the buildings in this ECM scope of work is included in Appendix A.

2.3.12.1.1 Funding Plan

These projects are ESPC funded with a cost impact of \$1M in site support costs for NSTec for the Delivery Order 2 ESPC project. M&O support costs do not include ongoing M&O costs for the total performance period of 23 years because that cost will be integrated with other ongoing M&O costs. The M&O is already being paid to maintain equipment.

2.3.12.1.2 Implementing Plan

- Proposal Development (Data Collection, DES review, RFP Review, JCI/NSTec Workshops, Tri-Party Agreement, NSTec Support Cost Estimate)
- Award of Contract to JCI (by NSO)
- JCI Pre-Construction Phase (Subcontractor Badging, Subcontractor Training, Submittal Reviews/Approvals, Coordination meetings, Detailing/Field Measurements)
- JCI Mobilization to NTS (Work Package development, Project Launch Meeting, ECM NSTec Oversight)
- Project Close-Out
- JCI Testing Measurement and Verification

2.3.12.2 ECM 5.1- Energy Efficient Lighting Upgrade and Lighting Controls

This ECM will upgrade the lighting systems in 23 buildings. Occupancy sensors will be installed in 17 of those 23 buildings. Existing standard-efficiency lighting fixtures will be upgraded to include energy-efficient components. In cases where lighting fixtures are damaged or it is more cost-effective to replace the fixtures than to retrofit existing

equipment, the lighting fixtures will be replaced. Energy cost reduction is due to lowering the power requirement (kW) of the lighting fixtures through the use of more efficient lighting equipment and the reduction in lighting burn hours through the use of occupancy sensor-based controls and exterior lighting photocell controls. The reduction in interior lighting load will reduce energy used for space cooling and slightly increase energy used for space heating.

Replacing existing lamps and ballasts with new equipment will virtually eliminate the material cost of spot relamping for several years. Further, the use of long-life fluorescent lamps, the reduction in annual lighting burn hours, and the reduction in the number of lamps by installing reflectors and delamping will reduce lighting system maintenance costs. This ECM provides the additional benefit of increased productivity through improved lighting quality and improvements to the environment due to lower greenhouse gas emissions and lower mercury levels in the new fluorescent lamps.

A description of the existing and proposed conditions for the lighting systems in this ECM scope of work is included in Appendix A.

2.3.12.2.1 Funding Plan

ESPC is funded as described in Section 2.3.12.1.1.

2.3.12.2.2 Implementing Plan

- Proposal Development (Data Collection, DES review, RFP Review, JCI/NSTec Workshops, Tri-Party Agreement, NSTec Support Cost Estimate)
- Award of Contract to JCI (by NSO)
- JCI Pre-Construction Phase (Subcontractor Badging, Subcontractor Training, Submittal Reviews/Approvals, Coordination meetings, Detailing/Field Measurements)
- JCI Mobilization to NTS (Work Package development, Project Launch Meeting, ECM NSTec Oversight)
- Project Close-Out
- JCI Testing Measurement and Verification

2.3.12.3 Facility and Infrastructure Improvements – Power

This project will de-energize and disconnect distribution lines DAH, DDC, DDG, and a portion of DTE (approximately 17 miles) in Areas 3, 5, 6, 7, 9, and 16 at the NTS. This project will also decommission/abandon in place, except transformers and other devices containing oil (which will be removed and stored in Area 6 Site Utilities Yard), seven substations (SS16-1, SS16-2, SS3-8, SS7-2, SS7-3, SS5-2, and SS5-14), including all associated relaying, controls, and hardware. This project will decommission selected substations and overhead power lines associated with power system at the NTS which are no longer being used or needed for the NTS operations and to improve system reliability.

2.3.12.3.1 Funding Plan

Current improvements funding is identified in existing direct funds being received. Future improvement projects will be identified, project data sheets developed, and funds requested from direct and indirect sources.

2.4 Milestone for Reaching the Goals

Development of the Executable Plan has identified a number of areas where NSO will focus on in FY 2009 that includes sustainability and energy audits, development of a more robust energy management program, and development of specific execution plans for certain elements identified in DOE Order 430.2B Guidance.

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3.0 RENEWABLE ENERGY

3.1 Current Status

The National Nuclear Security Administration Nevada Site Office (NNSA/NSO) is governed by EPACT 2005, Section 203(a) [42 U.S.A. 15,852 (a)], which requires the U.S. Department of Energy (DOE) to consume increasing amounts of renewable energy over time. National Security Technologies, LLC (NSTec) assists NNSA/NSO in meeting its obligations under this statute. The availability and cost of renewable energy varies greatly by geographical location, market maturity and availability over time, and individual contracts may be affected at different levels than the thresholds set out in the statute to ensure the Department as a whole meets its obligations.

NNSA/NSO and NSTec are working towards maximizing installation of on-site renewable energy projects at the Nevada Test Site (NTS) where technically and economically feasible. The goal is to acquire at least 7.5 percent of the NTS's annual electricity and thermal consumption from on-site renewable sources by FY 2010.

Currently, Nevada Power gets a portion of its power from 22 renewable energy sources. Those plants operate using geothermal, solar, hydro and biofuel. By year-end 2007, Nevada will be the No. 1 state in the nation in solar watts per capita and solar as a percentage of retail sales. The ranking incorporates two major solar projects that went online in 2007: Nevada Solar One and the 10-megawatt SolarStar project built at Nellis Air Force Base, the largest solar-photovoltaic project in the country. In 1997, Nevada lawmakers first moved to require the state's largest electric utilities to acquire power from renewable resources. At that point the goal was for 1 percent of the energy they sell to customers to come from sources such as solar, geothermal, or wind power by 2010. In 2001 the state toughened the standard significantly, making the requirement 15 percent by 2013, and in 2005 lawmakers raised the bar again, requiring 20 percent by 2015.

3.1.1 Implementing Plan

To achieve the goal of 7.5 percent of the NTS's annual electricity and thermal consumption from on-site renewable sources by FY 2010, a concentrating solar thermal power (CSP) plant project is being pursued. To date, Johnson Controls, Inc. (JCI), the Energy Savings Performance Contractor (ESPC), has performed an initial feasibility study showing technical and financial viability based on available information. Based upon their review of the feasibility study, the NSO Executive Council and Headquarters Review Board have issued a Notice of Intent to Award. The CSP is projected to come on-line in 2012.

The JCI 90-Day Presentation concluded that at this time there are no fatal flaws. Currently, JCI is seeking confirmation to continue to the Headquarters Review Board. Progress to date indicates a mutually beneficial project for JCI and the government. An initial proposal was completed, April 23, 2008. The final proposal for the CSP is tentatively scheduled for completion in May 2009.

3.1.2 Audits

JCI performed energy audits of 25 buildings during the detailed energy study phase of the ESPC. An Audit Plan is in development and will be completed by March 2009. It is anticipated that all buildings recommended for assessment will be assessed in FY 2009. Assessment results will provide initial data to determine path forward. NNSA/NSO currently has 449 real-property facilities (owned, leased, and/or permitted) listed in the Facilities Information Management System (FIMS). NSO will exclude the following from the energy audits:

- 151 facilities (including real-property trailers) that are 1,000 square feet or less
- 28 facilities that are currently listed as non-operating
- 88 facilities proposed for demolition as part of Transformation Disposition and National Nuclear Security Administration Nevada Site Office's (NNSA/NSO's) Integrated Resource Management Plan
- Pre-engineered buildings that cannot meet the requirements for sustainability
- Buildings that are critical for maintaining national security and whose inclusion in energy-savings initiatives would be damaging to the mission
- Non-core mission facilities, e.g., Office of Secure Transportation
- Other exemptions based on guidance from the Office of Energy Efficiency and Renewable Energy
- Additional facilities identified during sustainability audits

3.1.3 Life-Cycle Costs

The CSP power plant project can eliminate the purchase of a significant portion of NTS's most expensive on-peak utility power. The government may retain approximately \$800k of saving in the first year of the contract as a result of the discounted, firm electricity price. The retained savings may total more than \$25 million over the life of the ESPC (22 years). This savings stream is based on the following: 11,700 megawatt-hour (MWh) at \$0.01/ kilowatt-hour (kWh), escalating at 1% per year as well as being dependant upon the price of the energy sold to the commercial marketplace.

3.1.4 Metering

Metering will be used to track the amount of energy used and subsequently replaced by renewable energy. To the maximum extent practicable, metering will be installed for devices that measure consumption of potable water, electricity, and natural gas in each building and other facilities and grounds. Steam is not purchased for the NTS or its auxilliary sites. Fuel oil is used and consumption of fuel oil will be tracked and reported. The proposed DOE centralized tracking system for collecting advanced metering data for electrical energy will be used for data collected from advanced metering devices. Metering requirements will be incorporated, as appropriate, in ESPCs and Utility Energy Services Contracts (UESCs).

3.1.5 Commissioning and Retro-Commissioning

Lighting for the Remote Sensing Laboratory-Nellis and North Las Vegas Facility will be retrofitted. Solar lighting for footpaths, crosswalks, and public facilities, e.g., cafeteria, at the NTS have been installed and additional opportunities will be considered. Installing programmable thermostats is also under consideration. In addition, air samplers and other low-energy usage equipment often located in remote areas will be powered by solar panels whenever possible.

3.1.6 Personnel Resources

NSTec personnel will need to be trained and certified on how to perform energy audits.

3.1.7 Renewable Energy Application

CSP plants produce electric power by converting the sun's energy into high-temperature heat using various mirror configurations. In most configurations, the heat is transferred to a fluid used to drive a conventional generator. Simply put, solar energy is converted to heat, and heat is converted to electricity. Some systems utilize thermal storage to generate electricity when the sun is not shining and others employ natural gas to create a hybrid system with increased dispatchability. CSP technologies include a number of configurations, each with different characteristics of cost, performance, efficiency, and reliability. These include parabolic trough systems, power towers, dish/engine systems, and Compact Linear Fresnel Reflectors (CLFR). This discussion will focus on parabolic trough systems and CLFR technology as these are the mostly likely applications at the Solar Enterprise Zone.

Parabolic trough systems are the most proven of today's CSP technology. Direct radiation from the sun is concentrated by a parabolically curved reflector onto a receiver tube positioned along the parabola's focal point. A high temperature heat transfer fluid flowing through the receiver captures the concentrated energy which is used to make steam in a steam generator. Parabolic troughs are constructed on a north-south axis and use single axis tracking systems that allow the troughs to track the sun as it travels from east to west throughout the day. The plant would be similar in design to the proven SEGS (Solar Electric Generating Station) plants built in the late 1980s and early 1990s in Southern California, and Nevada Solar One, a 64 MW plant recently commissioned by Solargenix Energy/Acciona Solar Power in Boulder City, Nevada.

A second technology option which is relatively new to the CSP industry is the CLFR. Using flat rather than parabolic mirrors to focus the sun's energy on a stationary, linear receiver, CLFR is being touted as a lower-cost alternative to the parabolic trough. Reduced costs are derived from utilization of less expensive, flat mirrors. CLFR plants also require less land area than parabolic troughs. The potential downside of this technology is the lack of field-tested applications, uncertain costs, and lower conversion efficiencies.

An increase in thermal energy usage to offset the use of electricity is not technically or economically feasible for the NTS. The NTS has very limited use of thermal energy. The only thermal energy used is in a small number of buildings that use electrically heated boilers for generating steam for heating. Use of geothermal energy at the NTS was evaluated during the ESPC review in FY 2007 and excluded as not a practical. The CSP output will be used to satisfy both the electric and thermal renewable energy requirements.

3.1.8 Emergency Conservation

Emergency conservation of power will not be required as the solar power generated will provide any power needs for the CSP. A water tank that serves the CSP will facilitate continued water use in the event of emergency conservation needs for a period of time. Once the tank is depleted the CSP will be placed in warm standby until water issues are resolved.

3.1.9 Data Collection

The current data collection systems will be compared against requirements for real-time energy data collection to determine what additional information is necessary and what methods and systems (e.g., commercial off the shelf software) will be used to capture that information. The capability to report these data in the Facility Data Warehouse will be added to meet the requirements for (1) to report the site's energy consumption and cost for fuels by fuel type and energy category; (2) to document and measure progress towards energy efficiency leadership goals and requirements; and (3) to confirm that renewable energy infrastructure development, energy and utilities management, water conservation, and fleet performance expectations are being met or exceeded.

3.2 Site-Specific Goals

The concentrating solar power plant project uniquely supports the desires and goals of the DOE to be a renewable energy leader:

- The Energy Policy Act (EPACT 2005) requires that the total amount of electric energy consumed by the Federal Government not be less than 3 percent from renewable sources in FY 2007- 2009; not less than 5 percent in FY 2010-2012; and not less than 7.5 percent in FY 2013 and beyond.
- Executive Order 13423 directs that "...to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use."
- Executive Order 13423 directs "The installation of on-site renewable energy (electric and thermal) generation at all Department sites."

The Transformational Energy Action Management (TEAM) Initiative requires that the DOE maximize installation of secure, on-site renewable energy projects at all DOE sites and/or optimize affordable purchases of renewable electricity. This on-site CSP project

has the potential to satisfy the entire DOE renewable goal in a single project, while also reducing NTS reportable energy intensity.

NNSA/NSO and NSTec are working towards maximizing installation of on-site renewable energy projects at the NTS where technically and economically feasible. The goal is to acquire at least 7.5 percent of the NTS's annual electricity and thermal consumption from on-site renewable sources by FY 2010. Accomplishing the goal will require funding the construction of a CSP plant. If awarded, construction of the CSP will take two years. NSO plans to use the CSP output to satisfy the requirement for both electric and thermal renewable energy. The KWh generated by the CSP for use by NSO is 11,700,000 KWh/yr or 13.5 percent of onsite energy will be renewable energy. This represents a savings of 39,848 MBtu/yr. RECs may be pursued in FY 2010 to meet the renewable energy goal. NSO will seek a waiver for renewable and thermal energy from FY 2011 until the CSP comes on-line in FY 2012.

In the event the CSP is not constructed, NSO will request a waiver for this requirement and installation of smaller renewable energy systems at the NTS and NLV complex will be pursued.

3.3 Description of ESPC Projects and Activities

3.3.1 125 Megawatt Concentrating Solar Power Plant

Johnson Controls has proposed construction of a 125 MW CSP plant within the NTS's Solar Enterprise Zone (SEZ) to produce clean, renewable electricity that is life-cycle cost effective. The proposal responded to an NTS interest in on-site renewable energy sources that would lower operating costs. A distributed generation will be used and excess renewable power generated by a site can be sold to other power users to the extent authorized by Federal law and the state of Nevada. The National Renewable Energy Laboratory (NREL) and JCI have determined that CSP is the lowest cost method of producing on-site renewable energy compatible with the NTS mission.

Site Selection (per NSO M 412.X-2) is one of the key development tasks and requires input from valued stakeholders. Site selection has far-reaching impact to other development tasks including applications for electrical interconnection and water rights. Site selection for the concentrating solar power plant is limited to the pre-defined SEZ. The SEZ consists of two distinct and separate locations in Area 22 and Area 25. Four potential sites have been identified in Area 22 and one potential site has been identified in Area 25. The locations shall be evaluated in accordance with Project Screening and Site Approval Process (NSO M 412.X-2).

3.3.1.1 Funding Plan

The project will be executed as an ESPC. JCI will design and construct these projects and arrange for financing to pay for it. JCI guarantees that the improvements will generate savings sufficient to pay for the project over the term of the contract and that they are repaid from the realized savings. Contract terms up to 25 years are allowed.

Savings will be delivered in the form of a pre-determined block of electric power sold to NSO at a fixed rate lower than current electricity costs for the term of the ESPC contract. Electricity will also be sold to commercial or other Federal agency customers willing to pay a premium for renewable energy. Site support costs are being evaluated. Options for funding are being discussed.

3.3.1.2 Implementing Plan

- Complete 90-day development study for CSP
- Proposal development
- Award of contract to JCI (by NSO)
- JCI pre-construction phase
- JCI mobilization to NTS JCI construction start/complete
- Project close-out

3.3.1.3 Waiver

The goal is to acquire at least 7.5 percent of the NTS’s annual electricity and thermal consumption from on-site renewable sources by FY 2010. Accomplishing the goal will require funding the construction of a CSP plant. RECs may be pursued in FY 2010-2011 for the thermal and renewable energy goal. NSO may seek a waiver from FY 2011 until the CSP comes on-line in FY 2012. In the event that construction of the CSP plant is not approved, NSO will not meet this goal and will pursue a waiver.

3.3.1.4 Renewable Energy Metrics Table

Table 3-1 Renewable Energy Chart

Renewable Energy/Thermal Energy Technology Including RECs	System Size (capacity)	Total MWh/yr	Total Energy Savings (Mbtu/Yr)	Renewable Energy Initial Project Capital Cost	Funding Source (ESPC, UESC, PPA, Other)	Expected Year of Implementation
CSP	125 MW	11,700	39,848	\$500.0 M	ESPC	FY 2012
ECM 11.3 Solar Lighting Installation	170 W/ per pole	15,300kWh	120	\$ 79.9 K	ESPC	FY 2009

3.3.2 Delivery Order 2 Energy Savings Performance Contract (ESPC) Projects (6a)

3.3.2.1 ECM 11.3- Solar Lighting Installation

This ECM proposes nine solar electric lights at seven locations to replace three diesel-powered mobile light towers at the Wackenhut Services, Incorporated (WSI) range. Without electrical grid access, some portions of the shooting range are over lighted with mobile light towers when less light would satisfy the lighting requirement. Solar electric lighting assemblies are self-contained structures which capture energy with solar modules

during the day, store the energy in batteries, and energize outdoor lighting when needed. The solution is environmentally benign and will eliminate unnecessary diesel fuel consumption, maintenance costs, rental charges, and generator emissions as well as generate .04 percent of renewable energy of the total site electricity requirements.

A description of the existing and proposed conditions of solar lighting installation in this ECM scope of work is included in Appendix A.

3.3.2.2 Funding Plan

This project is ESPC-funded as described in Section 3.3.1.1 and Section 2.3.12.1.1.

3.3.2.3 Implementing Plan

- Proposal Development (Data Collection, DES review, RFP Review, JCI/NSTec Workshops, Tri-Party Agreement, NSTec Support Cost Estimate).
- Award of Contract to JCI (by NSO).
- JCI Pre-Construction Phase (Subcontractor Badging, Subcontractor Training, Submittal of Reviews/Approvals, Coordination meetings, Detailing/Field Measurements).
- JCI Mobilization to NTS (Work Package development, Project Launch Meeting, ECM NSTec Oversight).
- Project Close-Out.
- JCI Testing Measurement and Verification.

3.4 Milestones for Reaching the Goals

Development of the Executable Plan has identified a number of areas where NSO will focus on in FY 2009 that includes sustainability and energy audits, development of a more robust energy management program, and development of specific execution plans for certain elements identified in DOE Order 430.2B Guidance. For the renewable energy goal, that includes pursuing development of a CSP and ESPC solar lighting installation projects.

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4.0 WATER

4.1 Current Status

Water production and distribution systems have been in place at the Nevada Test Site (NTS) for over fifty years serving work populations of up to 10,000 workers. The systems provide potable, fire protection, construction, and wildlife preservation water throughout a 1,375 square mile area that cannot otherwise be obtained on the sprawling expanse of the NTS. The NTS's comprehensive water production and distribution system consists of 10 water systems, 2 wildlife preservation reservoirs, and 2 isolated environmental sampling wells. Three of the water systems are permitted by the state of Nevada, one is a Non-Transient Non-Community Public Water Systems and two are a Transient Non-Community Public Water System. Eight of the water systems are non-permit required systems (private water systems). Four of these private water systems are potable and four are non-potable. The NTS water system includes 12 wells (3 non-operating and 1 environmental sampling), 36 water storage tanks (11 non-operating), 12 booster pump stations (2 non-operating and 1 non-potable), 18 pressure reducing stations (1 non-operating), 1 potable water truck filling station (gravity-operated), 12 non-potable water truck filling stations (5 pump-operated, 6 gravity-operated, and 1 non-operating gravity-operated), 7 construction water open-pit reservoirs (2 non-operating), and approximately 140 miles of pipeline.

The site continues to utilize Best Management Practices for water efficiency in the following areas: water management planning; information and education program; system audits, leak detection and repair; water efficient landscaping; water efficient irrigation; toilets and urinals; faucets and showerheads; boiler systems; alternate water sources; and other water use.

4.1.1 Funding Plan

Funding for water reduction initiatives will come from a variety of sources: ESPC, indirect, and maintenance dollars. The type and level of funding received will drive the implementation schedule and approach used to meet requirements.

4.1.2 Implementing Plan

- Complete water study
- Utilize data to develop additional energy conservation initiatives
- Install water meters in 16 NLVF buildings
- When meters are installed, connect to the complex wide energy management system for monitoring and reporting
- Purchase and install WaterSense labeled products

4.1.3 Audits

Boyle Engineering Corporation (Boyle) was retained by the NTS to review the fiscal year (FY) 2003 projects and costs identified for water system improvements for the NTS water systems. Boyle discussed rehabilitation of the NTS Water Systems with NTS operations staff in terms of reconfiguration to continue to meet current programmatic needs and environmental standards. FY 2002 and 2003 assessments offered the following findings:

- 6 of 12 wells require near term replacement based on the Safe Drinking Water Act
- 6 tanks require rehabilitation, 3 require replacement, and 7 new tanks are required; 6 tanks have been built and 3 refurbished in the past eight years
- 7 of 10 Booster Stations require facility and/or equipment replacement
- 40 percent of the pipeline segments require rehabilitation, replacement, or relocation

This assessment can be used as a baseline from which to build and expand for water conservation. To that end, an additional water conservation/efficiency study is needed. This water conservation/efficiency study will identify specific measures to be taken. It also will identify costs for various proposed projects and water savings that will be realized once water projects are implemented. This water conservation/efficiency study is scheduled to begin in late FY 2009.

4.1.4 Life-Cycle Costs

Life-cycle cost data for water will be part of the water conservation/efficiency study and will be used as the basis for identifying projects suitable for water conservation and/or efficiency.

4.1.5 Metering

The NTS potable water usage is measured by water production. Actual water consumption figures are not available because none of the NTS facilities have water meters attached to the buildings. Instead, water production data are used since wells at the NTS measure how much potable water is produced for consumption.

4.1.6 Commissioning and Retro-Commissioning

Institutional Site Support is being sought to fund the NTS Replace Area 6 Potable Water Fill Stand project (NTS-00-108) during the FY 2012-2013 timeframe. In addition, a number of water retrofit projects have been identified and remain on a backlog to be accomplished in the future as presented in Table 4-1.

Table 4-1 Unfunded Water Retrofit Projects

NO-YEAR PROJECTS - WATER SYSTEMS		
Project Description	Infrastructure Number	CPL Estimate (\$000)
NTS Install Water Tank Controls - Area 27	NTS-02-071	\$160.0
NTS Extend Water Distribution System To US 95 Gate	NTS-02-031	\$1,300.0
NTS Upgrade Wells 4 and 4a Motor Starters	NTS-02-068	\$760.0
NTS Install Wellhead Diversion Valves	NTS-02-032	\$850.0
NTS Install Water System SCADA (8 Areas)	NTS-00-021	\$1,090.0
NTS Replace Water Main into Mercury	NTS-05-004	\$9,460.0
NTS Install Perm. Water Supply System to Area 27	NTS-02-034	\$3,600.0
NTS Upgrade Water Recovery System, Shaker Plant	NTS-02-066	\$220.0
NTS Construct Water Storage Tank at Well 16d	NTS-02-067	\$1,350.0
NTS Const. Well Cable Pull Test Facility	NTS-02-095	\$2,300.0
NTS Renovate Area 12 North Water Storage Tank	NTS-04-021	\$600.0
NTS Refurbish 4a, CP & C-1 Water Storage Tanks (6 each North and South)	NTS-05-006	\$453.6
NTS Refurbish Mercury No. & Well 16d So. Tanks (2 each)	NTS-05-007	\$594.0
NTS Replace Well 8 to Hilltop Tank Pipeline	NTS-05-013	\$464.6

4.1.8 Renewable Energy Application

The NLVF and Remote Sensing Laboratory- Nellis are provided water by the Las Vegas Valley Water District (LVVWD). The LVVWD has instituted a water recycling program. Recycling water is the practice of capturing waste water from homes and businesses, treating it to a high quality, then delivering the water for reuse. The LVVWD delivers recycled water to golf courses, parks, and other large-turf facilities, which would otherwise use drinking water for irrigation. Using recycled water is an effective tool in managing the valley's local water resources. LVVWD's Recycled Water System is the result of a partnership between the LVVWD, Clark County Water Reclamation District,

4.1.10 Data Collection

Figure 4-1 represents the month by month FY 2007 baseline, the mandated goal reduction of 2 percent per year when compared to the FY 2007 baseline, and the actual production for FY 2008. Total NTS water production for FY 2008 was 136,644 Kgal. This represents a 20 percent reduction in water production from the FY 2008 goal.

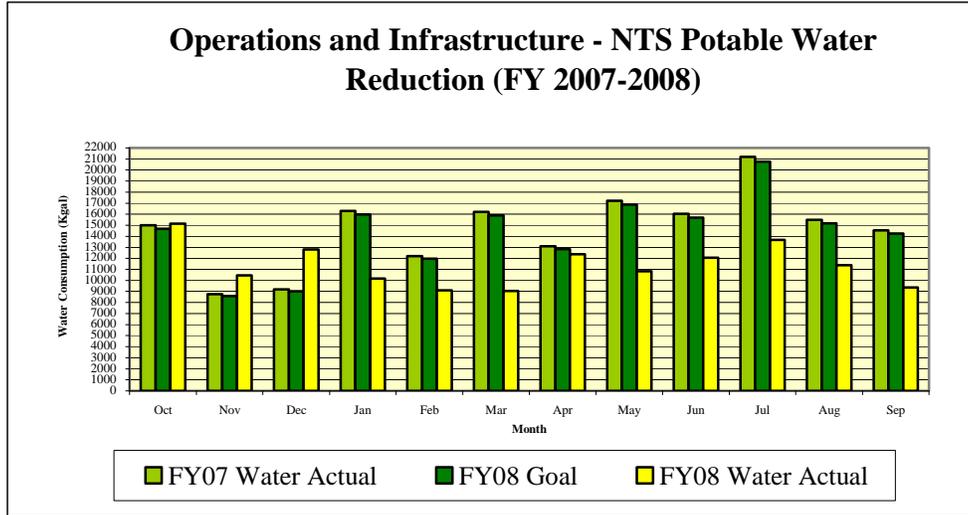


Figure 4-1 FY 2007-2008 Month by Month Baseline

4.2 Site-Specific goals

NSTec will examine the cost effectiveness of participation in local demand response programs. The NTS potable water production for FY 2007 was 210.6 million gallons. Actual water consumption figures are not available because none of the NTS facilities have water meters attached to the buildings. Instead, water production data are used. Table 4-2 presents potable water production goals from the FY 2007 baseline through FY 2015. The plan is to switch to measure actual potable water consumed, when feasible.

Table 4-2 Potable Water Production Goals

Year	Gallons of Potable Water Production (in millions)	Cumulative Percent Reduction
2007	210.6	Base Year
2008	206	2
2009	202	4
2010	198	6
2011	194	8
2012	190	10
2013	185	12
2014	181	14
2015	177	16

4.3 Description of Projects and Activities

Table 4-3 Water Efficiency Energy Conservation Measure (ECM)

ESPC Project or ECM	Actual or Estimated Water Saved kgal/yr	Expected Year of Implementation	Actual or Estimated Implementation Cost (does not include support costs)	Funding Source (ESPC, UESC, Overhead, GPP, Other)
ECM 3.1 (Water)	Estimated 3,700 kgal/yr Water saved	Full implementation FY 2015	\$760,000	ESPC

4.3.1 Delivery Order 2 Energy Savings Performance Contract (ESPC) Projects (6a)

ECM 3.1- Meter Installation-NLV: The NLV Complex consists of 32 buildings of which two are metered. Under the ESPC DO2, 16 facilities will receive a water meter. This ECM will allow NLV to interface with the water meters to accurately monitor water usage in each building. Energy Savings will result from implementing various control strategies. The NSO metering plan will select/prioritize an additional 200 plus facilities based on their usage rate to determine the facilities to receive installation when funding is available.

4.3.1.1 Funding Plan

Currently, this project is part of the ESPC funded proposal and completion of this project assumes approval of the ESPC contract.

4.3.1.2 Implementing Plan

- Proposal Development (Data Collection, DES review, RFP Review, JCI/NSTec Workshops, Tri-Party Agreement, NSTec Support Cost Estimate)
- Award of Contract to JCI (by NSO)
- JCI Pre-Construction Phase (Subcontractor Badging, Subcontractor Training, Submittal Reviews/Approvals, Coordination meetings, Detailing/Field Measurements)
- JCI Mobilization to NTS (Work Package development, Project Launch Meeting, ECM NSTec Oversight)
- Project Close-Out
- JCI Testing Measurement and Verification

4.3.2 WaterSense Labeled Products Purchase and Installation Program

NSTec will purchase WaterSenseSM labeled products and other water efficient products and choose irrigation contractors who are certified through a WaterSenseSM labeled program. Existing fixtures would be changed to WaterSense products when existing fixtures fail and no replacement part is available. If current fixtures/parts are still on the shelf for Site Maintenance, WaterSense products will not be installed until the current stock is depleted. If no additional funding is received for this new initiative, other repair/replacement work will scale back due to the increased cost to purchase WaterSense Products. (The cost of WaterSense products is double the cost of current fixtures.)

4.3.2.1 Funding Plan

Space charges are used to generate indirect funds for facility maintenance. In addition, appropriations will continue to be requested in annual budget requests and prioritized for application in projects.

4.3.2.2 Implementing Plan

- Existing fixtures would be changed to WaterSense Products when existing fixture fails and no replacement part is available.
- If current fixtures/parts are still on the shelf for Site Maintenance, WaterSense products will not be installed until the current stock is depleted.
- If no additional funding is received for this new initiative, other repair/replacement work will scale back due to the increased cost to purchase WaterSense products.

4.4 Milestone for Reaching the Goals

Development of the Executable Plan has identified a number of areas where NSO will focus in FY 2009 that include sustainability and energy audits, development of a more robust energy management program, and development of specific execution plans for certain elements identified in DOE Order 430.2B guidance. For the water consumption goals, FY 2009 plans include a water study to baseline potential water reduction and identify water reduction projects, an ESPC project to install water meters at NLV, and WaterSense labeled products purchase and installation.

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5.0 TRANSPORTATION/FLEET MANAGEMENT

5.1 Current Status

The National Nuclear Security Administration Nevada Site Office (NNSA/NSO) requires that National Security Technologies', LLC (NSTecs') fleet operate any Alternative Fuel Vehicles (AFVs) exclusively on alternative fuels to the maximum extent practicable. In fiscal year (FY) 2005, NSTec constructed an E-85 service station in Mercury and implemented a successful plan to promote the use of the alternative fuel. The plan called for a 10 percent increase in usage over the FY 2007 baseline and was surpassed by 18 percent during the first quarter of FY 2008. In FY 2007, the total actual usage of E-85 was 135,141 gallons. In FY 2008, the total actual usage of E-85 was 182,997 gallons. The 10 percent usage goal (148,658 gallons) was exceeded by 23 percent. Figure 5-1 represents the planned increase of E-85 fuel and the actual FY 2008 consumption.

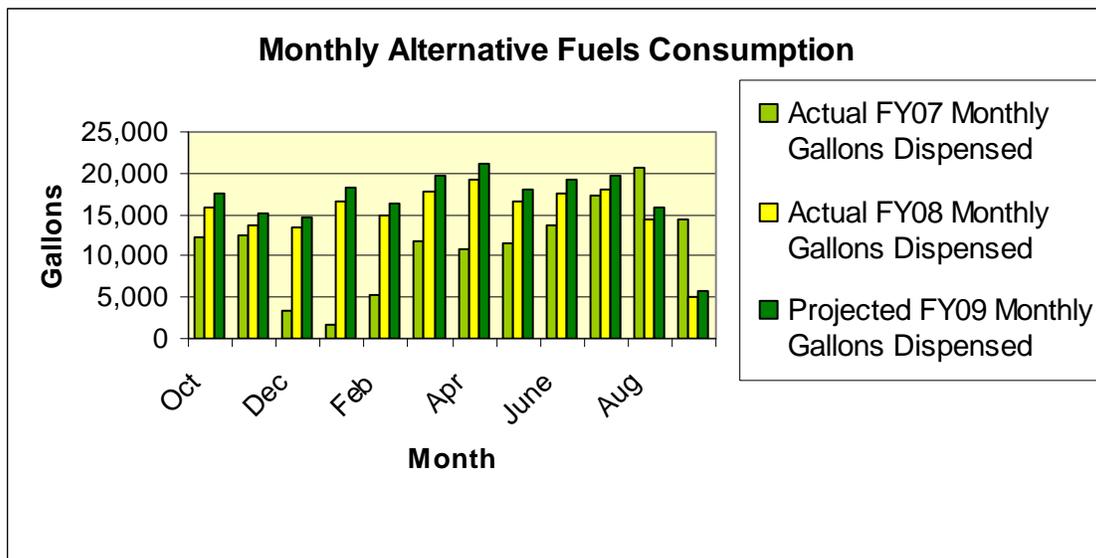


Figure 5-1 Planned Increase and Actual Consumption of E-85 Fuel

5.1.1 Implementing Plan

NSTec has continued to "right-size" its fleet by employing the most fuel-efficient vehicle for the required task and having the appropriate number of vehicles needed. The Nevada Test Site (NTS) has recently reduced the size of the fleet by 12 vehicles and maintains the minimum number of vehicles required to accomplish the mission. Work for Others' vehicle usage impacts this activity and challenges NSTec to have available vehicles.

Fleet implemented a fleet of pool vehicles located at the North Las Vegas Facility (NLVF) to reduce miles traveled. This reduces or eliminates the number of vehicles needed by each NLVF department. A mid-day shuttle service from the NTS was discontinued. In addition, several departments have recently added the videoconferencing capabilities. In March 2006, Fleet was recognized with "Best in Class Award" for petroleum reduction.

NSTec considers the use of plug-in hybrid electric vehicles and the use of electric drive vehicles to the extent feasible. Hybrid vehicles have been considered when ordering vehicles. The NNSA/NSO fleet has one hybrid in its fleet. The challenge with this vehicle is that the air conditioner does not operate on hybrid mode; this makes the vehicles less economical especially in the summer when temperatures can top 110 degrees. Also, the cost for these vehicles is higher than a regular vehicle.

NSTec employs efficiency strategies that reduce energy such as low rolling resistant tires, synthetic oil which allows for extended replacement frequencies, and other technologies. Fleet Services uses low rolling resistant tires and synthetic fluids on General Services Administration (GSA) vehicles when GSA approves and agrees to reimburse NSTec for the additional cost. GSA dictates what work or service and at what intervals it gets done on GSA vehicles. The use of these items on light duty agency owned vehicles (e-plated) is not recommended due to the low number of vehicles. These vehicles are special purpose and are driven very few miles.

The majority of the NTS Fleet operates on alternative fuels. The NTS uses E-85 fuel for AFVs and B-20 Bio-diesel for all diesel vehicles and equipment. The NTS has one E-85 station in place in NTS Area 23 and is pursuing adding an additional E-85 station in Area-6.

To achieve the goals of the Secretary's Transformational Energy Action Management Initiative and ensure that the Department remains a leader in sustainable transportation management, NSTec will ensure that alternative fuel and diesel vehicles will operate on alternative fuel to the maximum extent possible. Potential existing alternative fuel infrastructure must be investigated, using, among other tools, United States Department of Energy's (DOE's) Alternative Fueling Station Locator. Where no infrastructure currently exists within five miles, NSTec will investigate possible solutions through private sector alternative fuel distributors, including existing fuel vendors and stations. Where possible, NSTec will collaborate with nearby Federal, State, or local governments for alternative fuel. NSTec will work with DOE's Clean Cities program to coordinate these teaming arrangements. Currently, the only area of concern is an alternative fuel station within reasonable distance for the vehicles located in NLVF. There are several alternative fuel stations in North Las Vegas and Las Vegas that offer Alternative fuels (E-85); however, NSTec has yet to find an alternative fuel station that accepts the Voyager fuel credit card.

NSTec will arrange for the procurement of alternative-fuel vehicles to replace the existing conventional-fuel fleet to the extent practicable, with the goal of replacing the existing fleet with alternative fuel and/or hybrid technology vehicles by the end of FY 2010. This process is already in place to procure AFVs when available from GSA. The current Fleet has 540 AFVs this equates to 96 percent of the covered fleet.

NSTec uses petroleum-based fuels boilers to heat DOE-owned buildings and facilities. The oil fired boiler in Building 23-111 was replaced with an electric boiler in FY 2006. The oil fired boilers in Buildings 23-753 (Fleet Boiler House) and 23-754 (Cafeteria

Boiler Building) are going to be replaced with electric boilers in FY 2009. The oil fired boiler in Utility Building 23-536 will be replaced with an electrical boiler when funded.

5.1.2 Audits

The site performs utilization studies each year to provide feedback on rightsizing of the current fleet. Audits are not currently being performed on fuel beyond those performed by the NNSA Service Center.

5.1.3 Life-Cycle Costs

The fuel infrastructure is over 20 years old and is in need of recapitalization. The tank farm needs to be upgraded to meet new emission standards. There is no life-cycle data available in terms of E-85 fuel. Fuel is provided by the GSA to NSTec for dispensing.

5.1.4 Personnel Resources

There are four full-time equivalent ordering vehicles and reporting data in the Federal Automotive Statistical Tool (FAST). FAST is an online data reporting system for Federal fleet management personnel.

5.1.5 Emergency Conservation

The Fuels Logistic Department has two storage tanks for emergency situations. The bio-diesel tank has a 90 K gallon capacity and the gasoline tank has a 33 K gallon capacity. Both tanks are filled and maintained to 80 percent of their storage capacity. In the event of a fuel shortage these reserves would be utilized on a priority basis to keep the fleet running.

5.1.6 Data Collection

NSTec will provide annual compliance data to NNSA/NSO. NSTec will implement internal policies that will ensure accurate tracking of the vehicle acquisitions and inventory, mileage, fuel consumption by fuel type, and other relevant data. The annual report process is already in place. The annual data is reported in the FAST.

The fuel data for the GSA vehicles are maintained by GSA. GSA provides NSTec with a monthly report that NSTec reviews for accuracy for fuel use data (by fuel type for all petroleum and alternative fuels) for covered GSA-leased vehicles. The e-plated data is tracked by NSTec to ensure its accuracy and to compare data for all covered NNSA/NSO-owned and commercially leased vehicles.

AFV acquisition requirements are set forth in Section 303 of the U.S. Environmental Protection Agency (EPA) Act, 1992. In calculating AFV acquisition compliance, the NNSA/NSO will receive the following credits:

-
- One credit for each dual-fuel AFV (flexible fuel or bi-fuel), regardless of vehicle size class as long as the vehicle meets AFV definition of EPA Act 1992, as amended by EPA Act 2005.
 - Two credits for each dedicated light-duty AFV.
 - Three credits for each dedicated medium-duty AFV.
 - Four credits for each dedicated heavy-duty AFV.

5.2 Site-Specific Goals

For FY 2009, the goal is to increase the consumption of alternative fuels dispensed at the NTS. Currently, bio-diesel fuel is used in all equipment with the exception of emergency generators and boilers. In addition, alternative fuel usage will be promoted with awareness campaign, consisting of messages sent through the NSTec web page, Front Page, Spotlight, and other means. Fleet Services will monitor alternative fuel use by vehicle, and notify managers of those vehicles not using alternative fuels.

5.2.1 Petroleum Reduction (Goal: 2 percent annually)

NNSA/NSO has met/exceeded the 2 percent annual petroleum reduction requirement. The NTS has dispensed E-85 fuel since October 2006 and B-20 Biodiesel since 2001. According to Headquarters NNSA Fleet Representative, the NTS will be credited 10 percent for E-85 fuel additive that is required to be in the unleaded fuel. For every gallon of E-85 that is used, 85 percent of the petroleum base fuel is reduced; for every gallon of B-20 Biodiesel that is used, 20 percent of the petroleum base fuel is reduced; and another 10 percent fuel reduction is achieved for every gallon of unleaded that is used. The petroleum usage for vehicles and equipment and buildings and equipment are noted in Table 5-1.

Table 5-1 Petroleum Usage

In order to continue to meet/exceed the petroleum reduction goal, NSO will continue to have a pool vehicle fleet of 18 vehicles at the NLVF that is available to all departments at North Las Vegas; video conferencing established at several buildings at the NTS and in NLVF will continue to be utilized.

The overall fuel economy is increased by ordering the most fuel efficient vehicles that the manufactures offer through GSA at the time of the vehicle order (vehicle orders are placed in November and received around April/May). The NTS employs efficiency strategies to reduce energy by acquiring vehicles which come equipped with synthetic fluids and the low rolling resistance tires. The use of plug-in hybrids has been considered and one is in the fleet.

In order to increase the overall fleet fuel economy, the acquisition strategy will be to replace as many gasoline vehicles as possible with AFVs and diesel vehicles. The number of large vehicles such as Sport Utility Vehicles and ¾-ton trucks will be reduced and replaced with smaller vehicles for better fuel economy. (Smaller vehicles are identified as sedans, mini-vans or multi-task vehicles (1/2-ton crew cab pickup trucks).

5.2.2 Alternative Fuel Use Increase (Goal: 10 percent annually)

The B-20 Biodiesel infrastructure is already in place. The NTS has been dispensing biodiesel since 2001. The fuel is used on all diesel vehicles and off-road equipment.

The alternative fuel usage is projected to increase by 10 percent over FY 2008 as well as for FY 2009. Goals for fuel usage are presented in Table 5-2.

Table 5-2 Goals for Fuel Usage

Alternative Fuel Use (Gallons)		
	FY 2009	FY 2010
E-85 Fuel	210,000	231,000
Bio-Diesel	223,000	246,000

The trend over the last several years has been a decline in fuel usage by about 10 percent. Of that decline, unleaded usage is declining at a rate of about 20 percent and more vehicles are using E-85. NTS E-85 usage has continued to increase. Currently all but a few pieces of equipment use biodiesel. Currently, 83 percent is biodiesel. The largest use of non biodiesel is as heating fuel for older facilities. Most of that fuel is Red Dye diesel and the cost savings is significant to use over biodiesel. Overall usage of Red Dye is decreasing as newer heating systems are installed and some facilities are being deactivated.

In order to increase current alternative fuel usage, NNSA/NSO needs to identify a gas station in Las Vegas that provides E-85 fuel and that will also accept the GSA credit card. AFV waivers were requested for vehicles that did not have reasonable access to E-85 fuel, but the waivers were denied

Note: The installation of the second E-85 station that was planned to be installed by the end of calendar year 2008 for Area 6 has been put on hold.

5.2.3 Alternative Fuel Vehicles (Goal: 75 percent of acquisitions are AFV)

The AFVs goal of acquiring 75 percent of AFVs for the fleet has been met. Currently, the NTS has 540 AFVs. This equates to 96 percent of the covered fleet and 90 percent of the light duty fleet. AFV Acquisition Plan consists of acquiring vehicles to replace gasoline vehicles as listed in Table 5-3.

Table 5-3 AFV Acquisition Plan

AFV Acquisition Plan (Number of Vehicles)		
Vehicles	FY 2009	FY 2010
AFV	20	20
Diesel Power Vehicles	15	14

The fleet size is based on budget and mission requirements. The total NTS/NSO fleet size is currently 1,050 vehicles. Historically, the NTS has increased the number of AFVs by 20-30 vehicles per year. Current inventory of Light-Duty (LD) and Medium-Duty (MD) gasoline vehicles is LD: 62 and MD: 264. All of NSO vehicles are leased through GSA; very few, if any, are purchased. Obtaining these vehicles is determined by availability, lease, and mileage rates, and in some cases incremental cost and AFV vehicle surcharge.

5.3 Description of Projects and Activities

5.3.1 Alternative Fuel Vehicles Initiative (5c)

The fleet management program, to the greatest extent possible, ensures the achievement of the leadership goals established by the Secretary's Transformational Energy Action.

5.3.1.1 Funding Plan

Acquisition of AFVs is managed through the indirect pool.

5.3.1.2 Implementing Plan

AFV Acquisition Plan discusses acquiring AFVs to replace gasoline vehicles.

5.3.2 E-85 Availability Project (8b1a), (8b1b)

An activity for each facility/site to identify/arrange alternative fuel access for AFV users is by creating an AFV Station Locator and investigating possible solutions through private-sector alternative fuel distributors. (Facilities/sites will work with DOE's Clean Cities program to coordinate these teaming arrangements.)

5.3.2.1 Funding Plan

This project will be funded indirectly through the recharge pool.

5.3.2.2 Implementing Plan

- Identify local E85 Station
- Develop an area map with E85 stations identified
- Publish map and information for employee use
- Coordinate efforts with DOE Clean Cities Program

5.4 Milestone for Reaching the Goals

The AFVs goal of acquiring 75 percent of AFVs for the fleet has been met and exceeded. The current Fleet has 540 which equates to 96 percent of the covered fleet.

In FY 2007, the total actual usage of E-85 was increased by 35 percent; the FY 2007 goal called for a 10 percent increase. The NSO goal for FY 2009 is to increase usage by an additional 10 percent.

Development of the Executable Plan has identified a number of areas where NSO will focus on in FY 2009 that includes audits and assessments to determine baselines, development of a more robust energy management program, and development of specific execution plans for certain elements identified in DOE Order 430.2B Guidance. For transportation, this includes identifying local E-85 stations, developing and publishing E-85 area maps for non-NTS locations, and coordinating the clean cities program between NSO and NSTec.

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6.0 HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS

6.1 Current Status

This is a new initiative that will be included in projects costs for all new buildings. Currently, no line item projects have been submitted for Critical Decision (CD)-0. As of the Plan date, there are no new buildings and major buildings renovation projects at CD-1 or lower with a value exceeding \$5 million.

The National Nuclear Security Nevada Site Office (NNSA/NSO) will not meet the guiding principles for 15 percent of existing buildings. However, NNSA/NSO will incorporate sustainable practices in a variety of ways. Audits and assessments will be conducted to identify building areas that can potentially be upgraded using sustainable features. The Transformation Disposition Program will facilitate disposition of buildings not suitable for retrofitting with sustainable features. Consolidation, as part of the Integrated Resource Management Plan, will also reduce the square footage in use by NNSA/NSO.

New construction and major building renovations in excess of \$5 million will incorporate the Guiding Principles of Executive Order (EO) 13423, “Federal Leadership in High Performance and Sustainable Buildings,” to the extent practical and life cycle cost effective. All new construction or major renovation projects will incorporate renewable energy equipment into building design to the maximum extent feasible. No construction or renovation projects will proceed that do not meet or exceed statutory goals, including the achievement of credits to exceed the ASHRAE 90.1-2004 standard by at least 30 percent, and address each of the five elements of the Guiding Principles. To accomplish this, sustainable design principles and operations and design guidance through checklists and credit intent for new construction and major building renovations will be developed to attain Leadership in Energy and Environmental Design (LEED) Gold certification, comply with the requirements of 10 Code of Federal Regulations (CFR) Part 433, standardize cooling operations of data centers to maximize energy efficiency and incorporate the Guiding Principles of EO 13423 to the extent practical. Standards and criteria will incorporate energy efficiency/sustainable design.

As new requirements for new facilities come on line then line-item funding or third-party financing will be pursued. If the funding does not get approved, then a waiver will be pursued.

6.1.1 Implementing Plan

- Site Selection – Select building locations that minimize site disruption
- Brownfield Development - Rehabilitate existing and damaged sites reducing pressure on underdeveloped land
- Water use reduction and optimization of energy performance
- Selection of existing buildings for reuse of their walls, floors, and roofs
- Innovation in design – incorporate design teams to explore and implement up-to-date building design and innovative design features
- Investigate use of third-party financing for major reconfiguration projects

6.1.2 Audits

The NNSA/NSO currently has 449 real-property facilities (owned, leased, and/or permitted) listed in the Facilities Information Management System. The NNSA/NSO will exclude the following from the sustainability assessments:

- 151 facilities (including real-property trailers) that are 1,000 square feet or less.
- 28 facilities that are currently listed as non-operating.
- 88 facilities proposed for demolition as part of Transformation Disposition and NNSA/NSO's Integrated Resource Management Plan.
- Pre-engineered buildings that cannot meet the requirements for sustainability.
- Buildings that are critical for maintaining national security and whose inclusion in energy-savings initiatives would be damaging to the mission.
- Non-core mission facilities, e.g., Office of Secure Transportation.
- Other exemptions based on guidance from the Office of Energy Efficiency and Renewable Energy.
- Additional facilities identified during sustainability audits.

The specific buildings that will require sustainability assessments are not currently identified. A plan is in developmental stages and will be completed by March 2009. It is anticipated that all buildings recommended for assessment will be assessed in fiscal year (FY) 2009. Assessment results will provide initial data to determine path forward. It is anticipated that more facilities than those currently listed will require waivers or exemptions.

Personnel who will perform these audits will be trained staff members within the National Security Technologies, LLC (NSTec) Welding, Inspection, and Testing Department. The Facility and Infrastructure Planning staff will provide oversight of the audit process.

Three types of sustainability audits will be conducted in support of the United States Department of Energy (DOE) Order 430.2B: energy, high performance, and LEED/Energy Star. Checklists will be developed to assess High Performance Buildings, Energy, and LEED/Energy Star. A checklist for High Performance Buildings was developed from DOE High Performance Sustainable Building Assessment Tool and tailored for NSO facilities. The Energy Checklist was developed from the Energy Savings Expert Team. The High Performance and Sustainable Building Guiding Principles Checklist for Existing buildings will be tailored from the LEED checklist.

An enduring list of facilities will be developed. Some facilities will be audited for the purposes of elimination from the remaining audits to reduce time spent on the auditing process. The enduring list will take into account those facilities that are being proposed for disposition by the Ten-Year Site Plan, as part of the Integrated Resource Management Plan, or as part of Transformation Disposition. Once the enduring list of facilities has

been developed, mission critical facilities will be audited first. Of the remaining facilities a Pareto approach will be used, e.g., focus on which 20 percent of buildings are likely to yield 80 percent of the potential benefit. Facilities may also be audited in groups of similar buildings, e.g., structure type, age, etc. The schedule of facilities to be audited will be developed and distributed to auditors.

The energy, high performance, and LEED/Energy Star Audits will be conducted simultaneously to reduce the impact on Facility Managers and to take advantage of economies of scale. Each building will have a specific file developed. The LEED audit will continue even after “no” is reached to ensure all applicable points for that building are documented.

The audit data will be downloaded into a database developed specifically to retain audit data. The current plan is to find a way to link the results to each facility in the Facility Data Warehouse. The records will be maintained as audit records and will be managed under the RIIDS system. Once all building audits are completed, audit data will be analyzed and validated. Information will be compiled for reporting in accordance with the reporting requirements for each audit type. Required reports will be issued as required.

6.1.3 Life-Cycle Costs

Title 10 CFR Part 436, *Federal Energy Management and Planning Programs*, provides rules to reduce energy consumption and to promote life-cycle cost effective investments in building energy systems, building water systems, and water and energy conservation measures for federal buildings. In addition, General Services Administration LEED Cost Study that provides a detailed study of hard and soft costs. This will facilitate the development of cost benefit analyses as part of the decision-making process.

6.1.4 Metering

Each new building will be required to have metering for both power and water. Meters will be purchased with the intention of buying the most technologically advanced meters that can integrate with current metering systems.

6.1.5 Commissioning and Retro-Commissioning

Permanent federal government facilities and infrastructure are generally designed for a life expectancy of 50 years if they are properly maintained. Buildings that are allowed to run to fail will last 25 years as depicting in Figure 6-1. Keeping any building economically functional requires regular recapitalization planning and investment. This is especially true if the facilities and infrastructure are kept in operation beyond their design life.

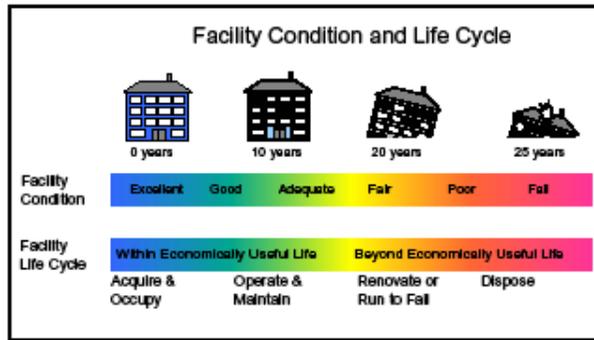


Figure 6-1 Building Condition and Life Cycle

Because of requirements to support leading-edge technology and to provide economically functioning buildings, the target life cycle for buildings requires updated technology systems every ten years and refurbishment of buildings at least once during their life cycle. This includes buildings targeted for retrocommissioning. It will include the optimization of deferred maintenance reduction, while maintaining basic services and needs. Facility Managers will focus limited resources to the facilities that require returning equipment that has fallen out of desired operating parameters back into appropriate tolerances. This will extend building life expectancy to 50 years as depicted in Figure 6-2.

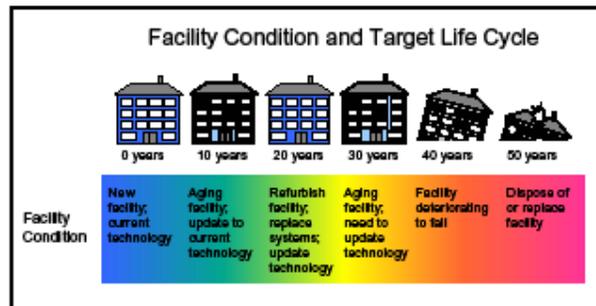


Figure 6-2 Building Condition and Target Life Cycle

NNSA/NSO will strive to achieve the U.S. Green Building Council’s LEED Gold certification for all new construction and major building renovations in excess of \$5 million. NSTec will follow a common set of sustainable guiding principles for integrated design, energy performance, water conservation, indoor environmental quality and materials for new construction and major building renovations to earn LEED Gold certification. Compliance with the requirements of Title 10 CFR Part 433, standardize cooling operations of data centers to maximize energy efficiency, and incorporate the Guiding Principles of EO 13423 to the extent practical.

The LEED Accredited Professionals will employ integrated design principles, develop technical standards, submit documentation, and perform design reviews for projects required to earn LEED Gold certification and the requirements of Title 10 CFR Part 433. The professionals will also implement common strategies for planning, acquiring,

siting, designing, building, operating and maintaining High Performance and Sustainable Buildings. Assumptions regarding the development of technical standards and design criteria for energy efficiency and sustainable design include:

- It is more efficient to develop the Design Criteria to earn LEED Gold Certification at the Nevada Test Site (NTS) a single time and include that those requirements into Engineering Division's, Engineering Division Design Manual (DM-ENGR.001), Facilities and Infrastructure Configuration Management Program Manual (DM-ENGR.002), and A/E Standards Manual (DM-ENGR.003).
- On-going revisions to LEED requirements will need to be incorporated into the three manuals on a periodic basis.
- Based upon Engineering Division's experience to develop and maintain the three manuals it will take approximately 100 hrs for each discipline to incorporate LEED Gold Design Criteria information into the three manuals (DM-ENGR.001, DM-ENGR.002, and DM-ENGR.003) and develop/modify Master Guide Specifications.
- The development of performance requirements, energy analyses, and design reviews for specific projects to meet the requirements of Title 10 CFR Part 433 will be variable and project specific. For each new project, there will be additional Engineering effort but that will need to be addressed in the project specific budgetary estimate.
- The energy consumption of data centers and server operations will be reduced by specifying the acquisition of energy efficient electronic equipment for data centers, operating the equipment to improve load management and server innovation, and configuring the cooling operations to maximize energy efficiency and sustainable design opportunities.

6.1.5.1 Mercury Reconfiguration

The Mercury Complex is the major NTS Administrative Center. Its permanent structures and services include office space, cafeteria, recreation facilities, a motor pool, laboratory facilities, administration offices, an emergency medical facility, a fire station, warehousing, craft shops and overnight living quarters for personnel. Most of these facilities and the supporting infrastructure are thirty to fifty years old and are rapidly deteriorating. As the center for administrative services and activities, the existing and next generation employees will expect contemporary office, light laboratory, housing areas with modern designs and communication systems. The requirements for this mission need are as follows:

- Demolish facilities and infrastructure that are no longer economically salvageable.
- Identify a land-use concept of Mercury that will create functional zones to facilitate groupings of similar activities. Replacement and new facilities should be relocated to the appropriately designated land-use group.
- Replace facilities that are obsolete, but functionally necessary.

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- Remodel selected facilities and infrastructure to extend useful life to accommodate existing and future support requirements.

Currently members of the same working group are housed in different buildings scattered around Area 23. The existing buildings have been surveyed as to the number of occupants, their function and existing work environment. Personnel have been assigned to whatever space is available. A new facility will combine similar functions. In addition to increasing efficiency, the buildings will improve the appearance of Mercury by create a campus like setting. Buildings not scheduled for demolition can be renovated. The new buildings can have modular office walls that can reconfigure floor layouts as tenants and functions change. Reconfiguration of Mercury would cost \$650 per sq ft for new construction. Remodeling would cost \$1,200 per sq ft. Costs for reconfiguration of Mercury would be pursued through third-party financing. Additional advantages for reconfiguration of Mercury include:

- Replace 40+ year old buildings. Buildings generally have a 50 year life expectancy.
- New buildings will utilize non-combustible construction combined with fire suppression.
- New construction will take advantage of new energy efficient building materials and latest construction techniques.
- Newly constructed buildings will be properly oriented to take advantage of solar energy.
- Newly constructed buildings will use natural light and ventilation to save energy and create a more productive work environment.
- Newly constructed buildings will use energy efficient light fixtures and water saving water fixtures.
- Retrofitting will include controlling individual office lighting with motion sensors when space is not occupied. This concept works well in space with intermittent use.
- Newly constructed buildings will be designed with shading, i.e., overhead shading elements (directional vanes) that diffuse light in the summer and allow the sun to penetrate the buildings in the winter.
- Newly constructed buildings and renovated buildings will utilize “green” products.
- Newly constructed buildings will achieve LEED certification.
- New buildings will meet all Americans with Disabilities Act requirements. Majority of buildings have washrooms that do not allow wheelchairs to maneuver.

Current building deficiencies that would be addressed through reconfiguration include:

General Building:

- Existing doors and windows are not energy efficient. Doors and windows have worn out seals. Single pane glass windows need to be replaced with dual pane glazing in energy efficient frames.

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- Buildings contain old insulation and possibly with minimal thermal value.
 - Older buildings are wood frame construction.

Plumbing:

- Existing buildings have water wasting water closets.
- Replace plumbing fixtures with energy saving features, i.e., efficient shower heads, faucets with motion operation.
- Possibility of existing copper water line joints soldered with lead.
- Need to verify that cast iron waste lines are in good condition and inspect for leaks.

Mechanical:

- Replacement parts may not be available for the older heating, ventilation, and air conditioning (HVAC) units.
- Existing buildings not weather sealed properly.
- Existing buildings have inefficient HVAC units and outdated thermostats. Replace HVAC units along with programmable “set-back” thermostats.
- Some buildings are using window air conditioners for cooling.
- Existing building insulation is “worn-out” due to age.

Electrical:

- Replace energy wasting light fixtures
- Existing wiring may not be rated to handle electrical demands of new computers and electronic equipment.
- Upgrade electrical service.

Security:

- Security can be better controlled by housing multiple operations “under one roof.”

The Energy Conservation Measures (ECMs) that are associated with facilities have been accounted for (seven buildings) and if all facilities listed are demolished, the impact to the total savings of ECM 3.1 and 5.1 (approximately \$120,000) will not be realized.

6.1.6 Personnel Resources

It will be necessary to obtain Engineering personnel capable of performing the energy analysis of applicable building and projects. Provide software and training to individuals expected to perform the energy analysis.

One goal is to obtain LEED Accredited Professionals in the Engineering Division. This will require providing training, registrations, and continuing education for personnel in the Engineering design disciplines. The LEED Accredited Professionals will develop performance requirements, develop technical standards, design criteria and perform

design reviews for projects required to earn LEED Gold certification and the requirements of Title 10 CFR Part 433. The professionals will also provide input and/or perform energy analysis for projects that are prepared by Engineering Division. LEED Accredited Professional training, examination, registration, and continuing education assumptions include:

- Engineering design staff will need to obtain and maintain LEED accreditation to develop the Design Criteria Documents needed to specify new building or major modification design requirements for LEED Gold Certification at the NTS.
- Engineering Division staff will participate in the design process, submit documentation, and perform design reviews of new buildings and major modifications at the NTS that will need to meet the requirements for LEED Gold Certification. Therefore, an understanding of LEED Rating System products, resources, and processes is needed to perform integrated designs and reviews.
- Engineering Division needs industry-accepted energy analysis software to prepare and review energy calculations for NTS. The Trane System Analyzer is an industry-accepted energy analysis software. To maintain expertise in developing and reviewing energy calculations, Engineering Division staff will need annual continuing education. To maintain software license and technical support, there will be an annual cost to own the software.
- Engineering Division's LEED Accredited Professional's will need to maintain familiarity of LEED credit intents, requirements, technologies, and strategies via annual continuing education.

6.1.7 Renewable Energy Application

In an effort to meet EO 13423, Energy Policy Act of 2005, and Performance Objectives between NNSA/NSO and NSTec, Operations and Infrastructure is mandated to implement a complex wide energy savings plan. Additional significant future savings can be accomplished. Current efforts include obtaining support for the renovation of Mercury Base Camp at the NTS, shown to achieve significant energy savings. Over 60 billion BTUs per year can be saved through new energy-efficient facilities fitted with energy saving and renewable energy features.

6.1.8 Emergency Conservation

All new buildings built in subsequent years will be evaluated for emergency conservation technologies and systems. In accordance with DOE guidelines issued under Section 103 of the Energy Policy Act of 2005, NSO will install building level utility meters in new major construction and renovation projects to track and continuously optimize performance.

6.1.9 Data Collection (Measurement and Verification)

NSTec is responsible for collecting data and providing the information for inputting into the web-based Departmental High Performance Federal Buildings Database, designed to document the planning, execution, and maintenance requirements.

6.2 Site-Specific Goals

NNSA/NSO does not anticipate meeting the requirement for 15 percent of existing federal capital building inventory incorporating sustainable practices. Audits and assessments will be conducted to identify building areas that can potentially be upgraded using sustainable features. The Transformation Disposition Program will facilitate disposition of buildings not suitable for retrofitting with sustainable features. Consolidation as part of the Integrated Resource management plan will also reduce the square footage in use by NNSA/NSO.

NNSA/NSO requires the U.S. Green Building Council's LEED Gold certification for all new construction and major building renovations in excess of \$5 million. To accomplish this, NSTec Engineers in the Engineering Division will obtain LEED Accreditation. The accreditation process requires training, registrations, and continuing education for integrated sustainable design and green building practices for personnel. The LEED Accredited Professionals will employ integrated design principles, develop technical standards, submit documentation, and perform design reviews for projects required to earn LEED Gold certification and the requirements of Title 10 CFR Part 433. The design disciplines will provide knowledge of LEED credit intents, requirements, submittals, technologies and strategies and/or perform energy analysis for projects that are prepared by Engineering Division

6.3 Description of Projects and Activities

6.3.1 Obtain LEED Accredited Professional in Engineering Division (5e)

Engineers will be provided training, registrations, and continuing education for design personnel. Accredited Professionals shall have in-depth familiarity with LEED Rating System. The candidates must demonstrate knowledge of LEED documentation and submittal requirements and processes. They must also demonstrate knowledge of design and construction industry standards and processes. Candidates must be experienced with key building and sustainable design resources and tools.

6.3.2 Sustainable Design and Green Building Practices (6f)

The LEED Accredited Professionals will use a collaborative, integrated planning and design process, develop technical standards, submit documentation, and perform design reviews for projects required to earn LEED Gold certification and meet the requirements of 10 CFR Part 433. Engineering personnel capable of performing the energy analysis of applicable building projects will be enlisted and will provide software and training to individuals expected to perform the energy analysis.

6.3.3 Compliance to Guiding “Principles for Federal Leadership in High Performance and Sustainable Buildings – Memorandum of Understanding” (7b)

NNSA/NSO will develop an Memorandum of Understanding that describes the extent to which NNSA/NSO contractors must develop and implement a plan to ensure that 15 percent of their enduring buildings are compliant with the guiding principles of EO 13423. Implementation of this plan must be documented within the programs’ Ten-Year Site Plan and through the appropriate LEED building credits. Progress within meeting this requirement will be tracked within the Department’s Facilities Information Management System.

6.3.4 LEED Standards, Sustainable Design Strategies and Practices (7a)

The LEED Green Building Rating System for New Construction and Major Renovation provides a set of performance standards for certifying the design and construction phases of buildings. The specific credits in the rating system provide guidelines for the design and construction of buildings of all sizes. NSTec Engineering includes the Sustainable Design Requirements specification section in their construction documents to enforce the design strategies and practices.

6.3.5 High Performance Building Plans (7c)

NSTec will submit a plan that addresses how the contractor will comply with (1) all new construction and renovation projects implement design, construction, and maintenance and operation practices in support of design/high performance buildings goals of EO 13423 and statutory requirements and (2) existing facilities’ maintenance and operation practices in support of goals of EO 13423. Plan will align with EO 13327 and the Department’s real property asset management plan.

Annually on August 1, NSTec will submit a High-Performance Building Plan to NNSA/NSO that addresses how NSTec will ensure that (1) all new construction and renovation projects implement design, construction, and maintenance and operation practices in support of design/high-performance buildings goals of EO 13423 and statutory requirements and (2) existing facilities' maintenance and operation practices in support of goals of EO 13423. The Plan will also align with EO 13327 and the Department's real property asset management plan. At a minimum, the plan will include:

- Employment of integrated design principles, optimization of energy efficiency and use of renewable energy, protection and conservation of water, enhancement of indoor environmental quality, and reduction of environmental impacts of materials in accordance with the Guiding Attachment 1 DOE O 430.2B Page 82-27-08 Principles and the other building and construction-related EO 13423 goals and instructions.

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- Procurement of ENERGY STAR®-qualified or FEMP-designated products when purchasing energy consuming products. This includes incorporation into the specifications for procurements involving energy consuming products and systems, including guide specifications, project specifications, and construction, renovation, and services contracts that include provision of energy consuming products and systems, and into the factors for the evaluation of proposals for the procurement criteria for energy efficiency that are consistent with the criteria used for rating ENERGY STAR®-qualified products and FEMP-designated products.
 - An assessment of policy, criteria, contracts, and other areas, identifying gaps in the sustainable building program.
 - Key action items, including major milestones and responsible parties.

6.3.6 Leasing Green/LEED Facilities Program (7e)

NSTec will develop a program for the selection criteria for acquiring new leased space, including build-to-suit lease solicitations to include a preference for buildings certified LEED Gold. NSTec must meet the requirements of 10 CFR Part 433 for all new buildings. Requirements of Title 10 CFR Part 433 indicate that federal commercial buildings must be designed to achieve energy savings of at least 30 percent below ANSI/ASHRAE and IESNA Standard 90.1-2004, if cost-effective. New buildings also must meet or exceed ENERGY STAR® Building criteria. When evaluating the ENERGY STAR® target for a new building, apply the more stringent standard set forth in the Table of Target Energy Performance Results and the values required under Title 10 CFR Part 433 or 435 (as applicable).

Starting in FY 2009, all procurement specifications and selection criteria for acquiring new leased space, including build-to-suit lease solicitations will include a preference for buildings certified LEED Gold. When entering into renegotiation or extension of existing leases, NSTec include lease provisions that support the Guiding Principles. A description of the process follows:

- Market survey preparation and completion
- Solicitation preparation to include the lease with LEED requirements/clauses
- Negotiation and resolution of any exceptions noted by proposers
- Preparation of final "successful" lease agreement

Assumptions for this activity are as follow:

- A waiver will be granted for leasing warehouses which typically do not and cannot meet LEED standards.
- Not considering retroactive actions for existing leased facilities.
- Procurement and Legal Department scope covered as part of indirect pool.
- Not considering rigor to determine LEED qualification or requirement needs, with due consideration given for maintenance and operational efficiency.

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- Amount of response and qualification of LEED facility selection will be dependent upon desired location supply and demand.
 - If sole source justification is required, it will be developed by relevant Program, describing mission and funding impacts if required to relocate.
 - Exceptions to the Order will be justified by means of mission and funding impacts, developed by relevant Programs.
 - Additional rigor in RFP/SFO, MOD and PREP Development - Ongoing 1/2 FTE, permanently.
 - The estimated hours reflect the procurement processing time only. This does not include the Subcontractors/Proposers time.
 - The necessary LEEDS requirements/specifications will be provided by others
 - Internal review process only includes the internal NSTec reviews; it does not include the NNSA or Service Center review associated with the lease.
 - This estimate does not include any time or costs associated with any Build-out modifications needed.
 - Time line assumes that lease facilities in the given area are available.
 - The solicitation preparation involves coordination between multiple groups over the course of time and rather than as all at one time.

6.4 Funding Plan

Appropriations will continue to be requested in annual budget requests and prioritized for application in projects for development of LEED certified facilities that cannot be funded through private sector financing. Recommendations will be made with the understanding that the use of all available private financing options will be maximized. A graded approach will be used to evaluate implementation. The level of funding received will drive the implementation schedule and approach used to meet requirements.

6.5 Milestone for Reaching the Goals

Development of the Executable Plan has identified a number of areas where NSO will focus on in FY 2009 that includes sustainability and energy audits, development of a more robust energy management program, and development of specific execution plans for certain elements identified in DOE Order 430.2B Guidance. For High Performance and Sustainable buildings, FY 2009 will be a year for establishing baselines and setting up a program based on audit and assessment results.

Appendix A

Energy Savings Performance Contract Projects

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Energy Savings Performance Contract Projects

ECM 3.1 - Building Controls Installation; NLV Electrical, Gas and Water Meter Installation; Electrical Subpanel Replacement

This Energy Conservation Measure (ECM) will install, replace, upgrade, or connect compatible control system components in 10 buildings at Mercury Complex, 4 buildings at Area 6, and the Underground Area to provide improved monitoring and control of heating, ventilating, and air-conditioning (HVAC) equipment. Many of the facilities included in this ECM will be upgraded to direct digital control (DDC) system using BACnet® protocol and LON-based controllers with a Web-based communication backbone. Other buildings will have programmable thermostats or time clock controllers installed.

The scope of this ECM also includes the replacement of multiple lighting electrical panels with smart electrical panels and the installation of electric, natural gas, and water meters at selected buildings at the NLV site.

Energy savings will be realized by optimizing the operation of the HVAC systems using control strategies via the DDC system and programmable controllers. Energy conservation strategies include the scheduling of HVAC equipment, implementing established space temperature setpoints during occupied and unoccupied periods, shutting down equipment during unoccupied periods, resetting cold and hot deck supply air temperatures, and resetting hot water temperatures with respect to outside air temperature. Programmable thermostats will control space temperature and runtime.

ECM Description – Existing Conditions

The existing controls for the buildings in this ECM scope of work fall into six different categories. The last two categories explain the electrical panel replacements at the test site and the meter installation at the NLV Campus. They are as follows.

There are several buildings throughout the Mercury site that use either old Energy Management Systems (EMS) or non-programmable thermostats for HVAC operation control. These include:

- Administrative/Engineering (23-117)
- Mercury Cafeteria (23-300)
- Joint Test Office (23-600)
- Print Plan/Radio Communications (23-726)
- Motor Pool Maintenance (23-750)
- Equipment Maintenance (23-751)

Air-Handling Units (AHUs) provide heating, cooling, and ventilation in all the buildings listed above. The AHUs operate continuously during the weekdays. Cooling is provided by chillers and heating by hot water boilers. There are 8 swamp coolers on both 750 and

751 and a few in some of the other buildings. All the buildings, with the exception of the buildings listed below, are heated by electric hot water boilers.

- Zone 1
Mercury Cafeteria (23-300)
Dorms (23-254, 23-536, and 23-753)
- Zone 2
Atlas
CP-1
CP-9

The buildings listed below are heated by an oil-fired boiler. In addition to the deficiency in controlling the zone temperatures properly, the systems are lacking many of the energy-efficient features which, if implemented, will considerably reduce the energy consumption.

- Oil fired units at 23-753; 23-754; 23-536
- The boiler in building 23-753 supplies heating to 23-751 and 23-750
- The boiler in building 23-754 supplies steam and hot water for heating to the cafeteria (23-300)
- The boiler in building 23-536 provides heating to the dorms across the street from the fire station in Mercury.

The installation of DDC System will limit the HVAC operation to occupied periods and provide several other energy efficiency features. Because these buildings follow a typical 4x10 weekly operation schedule (Monday through Thursday from 6:30 a.m. to 5:30 p.m.), there is a potential for significant energy savings by implementing this measure.

There are two buildings at the Mercury site that use non-programmable thermostats for HVAC operation. These include the following:

- Materials Test Lab (23-190)
- Craft Building (23-710)

The buildings are served by packaged or split type air conditioning or heat pump units. These HVAC units run 24 hours per day, 365 days per year. The installation of the programmable thermostats will limit the HVAC operation to occupied periods. Because these buildings follow a typical 4x10 weekly operation schedule (Monday through Thursday from 6:30 a.m. to 5:30 p.m.), there is a potential for significant energy savings by implementing this measure.

There are a several buildings at the Mercury site and Area 6 using electric radiant heaters. These include the following:

- Fire Department Warehouse (23-129)
- Main Warehouse (23-160)
- HD Repair Shop (06-800)

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- Carpenters Laborers (06-906)
 - Metal Workers Shop (06-908)
 - Wireman Shop (06-914)

The Fire Department Warehouse has 8 unit heaters. The Main Warehouse, Heavy Duty Repair Shop, Carpenter Shop, Metal Workers Shop, and Wireman Shop have 208, 44, 14, 43, and 60 radiant heaters, respectively. During winter season, these heaters are left on continuously. It is recommended that time clock controls be installed to turn these heaters off during unoccupied periods. These timers will have an override feature to turn the heaters on outside the normal hours of operation if the need arises.

The Underground Area (U1a) uses several fans for ventilation. There are three 100-HP fans and one 40-HP fan that run 24 hours per day, Monday through Thursday, year round. In addition, there is a 350-HP fan and several 50-HP fans that are used on an as needed basis. The underground area follows a typical 4x10 weekly operating schedule.

Many electrical panels located at the NTS, RSL, and NLV are old and pose a potential safety hazard. It appears the circuit breakers have not been tested for awhile and replacement parts for these panels are not available.

The buildings at NLV do not have separate electric, gas, and water meters. This makes it difficult to identify energy usage patterns in each building and to accurately provide usage billing to tenants in the buildings. This will be addressed in out-year projects.

Assumptions for current operating conditions are as follow:

- Nevada Power's LGS-3 rate schedule used for calculating electricity costs
- An average cost of \$3 per gallon for fuel (Diesel No. 2)
- Heating system efficiency for the fuel-fired steam and hot water boiler 78 percent
- Building occupied hours assumed to be Monday through Thursday from 6:30 a.m. to 5:30 p.m.
- Unoccupied period assumed for all other hours and holidays
- Operation for the HVAC equipment in all buildings 24 hours per day/365 days per year
- Setpoint temperatures 70° F for heating and 72° F for cooling during occupied and unoccupied hours

ECM Description – Proposed Conditions

The scope of work includes installing a new in ea86 occupied hours assu3d to acc004

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- programming capabilities, the facility will have both improved comfort and energy-efficient operation of the HVAC systems)
- Allow for night ventilation that uses outside air to pre-cool building spaces before the next day
 - Add “Optimum Start/Stop” capability to the operation of the HVAC system (With this capability, the actual load is calculated in various zones, and supply air temperature will be reset so that minimum cooling and reheating will occur. This action saves energy by matching the system to the actual building load during off-design conditions)
 - Allow for more precise control of static pressure, temperature, and economizer modulation for the AHUs
 - Allow for hot and cold deck air reset
 - Maximize cooling plant efficiency during all operating conditions to achieve minimum energy consumption and ensure unnecessary equipment runtime is eliminated. Another valuable benefit of installing a new digital control system is the improved troubleshooting capability. With the lack of a DDC system, any system failure might take extensive labor to identify the problem and make the necessary repairs. With a new control system, equipped with a Local Area Network interface that logs the points of control and alarm conditions on a regular basis, this procedure will be greatly simplified.

The scope of work includes installing 7-day programmable night setback thermostats in select buildings for the control of HVAC units. These thermostats will be connected to a Johnson Controls network in the building that will allow for front end access to setpoints and trends. The NTS will provide International Technology drop. The programming of these thermostats will include the following:

- Limit HVAC operation to building occupied hours
- Setpoints of 70° F for heating and 74° F for cooling
- Night setback temperatures of 55° F for heating and 85° F for cooling.
- Secure the thermostats with password protection to ensure that only authorized personnel can make system changes

The scope of work includes installing 7-day programmable thermostats in select buildings for the control of space heaters. These controllers will be connected to a Johnson Controls network in the building that will allow for front end access to setpoints and trends. The NTS will provide International Technology drop. These controllers will ensure that the heaters remain off during the unoccupied periods. The system will turn the heaters on approximately one hour before the start of work day so the space can reach the heating setpoint.

The scope of work includes installing 7-day programmable controllers to control the operation of the three 100-HP and one 40-HP ventilation fans serving the underground area. The air quality is being monitored in the area on a continuous basis by the Air Quality Monitoring System. The facility personnel have informed Johnson Controls that they found no substantial change in air quality between periods when fans were operating

and when they were off. It was determined that it is safe to shut these fans down at night when the space is unoccupied. The Air Quality Monitoring System will continue to monitor the air quality during these unoccupied times. If there becomes an air quality issue, the fans will be turned back on until that issue is resolved.

Electrical panels will be replaced with SMART electrical panels. These SMART panels are addressable and will have the capability to tie into the existing Building Management System so they can be used for energy savings and demand limiting strategies. This ECM includes the installation of the panels only. The control connections to these panels would be completed by the NTS on an as needed basis. The panel upgrades will also address a potential safety hazard associated with the extreme age and condition of the breakers.

One of the TEAM Initiative goals is to install advanced meters throughout the site, providing the capability to be connected to the existing site Building Management System, for the monitoring of electric, thermal, and water consumption. This ECM includes installation of the meters in the buildings proposed. NSTec is providing the electrical meters. The gas and water meters will be purchased as part of this project. The ECM will also allow the NTS to interface with the electric meters, gas meters and water meters to accurately monitor energy usage in each building and provide accurate tenant billing for energy usage.

Assumptions for proposed operating conditions are as follow:

- Energy costs the same as above
- Cooling system efficiency the same as above
- Heating system efficiency the same as above (except for new electric boilers)
- Existing fan and motor efficiency the same as above
- Supply fan static pressure the same as above
- Building occupied hours the same as above
- Setpoint temperatures 70° F for heating and 74° F for cooling during occupied hours
- Night setback temperatures are 55° F for heating and 85° F for cooling during unoccupied hours

Energy savings will result from implementing various control strategies. The control strategies include the following:

- Instituting NTS standard space temperatures for occupied and unoccupied periods
- Scheduling mechanical equipment based on occupancy to implement unoccupied space temperature reset and disabling of AHUs when conditions permit
- Reducing HVAC energy consumption when rooms are unoccupied through the use of equipment scheduling and occupancy sensors
- Disabling boilers and associated pumps in response to the outdoor air temperature
- Interlocking exhaust fans to the associated AHU or enable/disable control to meet environmental conditions as detailed in the Delivery Order Request for Proposal
- Installing timers on certain heaters and ventilation fans

- Resetting AHU hot deck, cold deck, and supply air discharge temperatures for buildings with new DDC systems

The majority of the energy savings results from scheduling HVAC operation and instituting the occupied and unoccupied space temperature setpoints as directed by the NTS. Cooling occupied temperature setpoints will be 74° F for dining facilities and 76° F for all other areas for storage and maintenance facilities and 70° F for all other areas. Unoccupied temperature setpoints will be 85° F for cooling and 55° F for heating. Outside air dampers will be closed and AHUs will be disabled during unoccupied periods as mechanical systems, outdoor conditions, and building conditions permit.

As part of this ECM, the DDC system buildings will be networked to the Johnson Controls Metasys® system Building Management System front-end. The Metasys system will be tasked with data acquisition to support the Measurement and Verification Reports as well as alarming, scheduling, trending, totalization, and system troubleshooting. The scope of work for this ECM includes management, materials, and labor for upgrades

The following work items are excluded from the proposed work scope:

- Interconnection of the meters to the NLV front end system
- Overtime work caused by unforeseen circumstances, beyond the control of Johnson
- Controls, such as scheduling changes by NTS (The cost difference between the cost of overtime work wages and normal time work [(overtime rate – normal rate) x hours] will be the responsibility of NTS.)
- Hazardous material abatement or removal, such as asbestos, lead paint mold/mildew, etc.
- Existing code violations (Existing code violations identified during ECM implementation will be brought to the attention of NTS.)
- Repair or replacement of defective mechanical and electrical equipment, except the equipment described in the ECM description (Defective equipment identified during ECM implementation will be brought to the attention of NTS)
- Upgrade or repair of electrical feeds and grounding systems
- Temporary cooling, heating, utilities, or plumbing to buildings

The following are the project milestones for this ECM:

<u>Task</u>	<u>Duration</u>
• Engineering/Design Acceptance	60 Days
• Equipment Procurement/Lead time	30 Days
• Installation and Commissioning	360 Days

ECM 5.1 - Lighting Retrofits and Lighting Controls

This ECM will upgrade the lighting systems in 23 buildings. Occupancy sensors will be installed in 17 of those 23 buildings. Existing standard-efficiency lighting fixtures will be upgraded to include energy-efficient components. In cases where lighting fixtures are damaged or it is more cost-effective to replace the fixtures than to retrofit existing equipment, the lighting fixtures will be replaced. Energy cost reduction is due to lowering the power requirement (kW) of the lighting fixtures through the use of more efficient lighting equipment and the reduction in lighting burn hours through the use of occupancy sensor-based controls and exterior lighting photocell controls. The reduction in interior lighting load will reduce energy used for space cooling and slightly increase energy used for space heating.

Replacing existing lamps and ballasts with new equipment will virtually eliminate the material cost of spot relamping for several years. Further, the use of long-life fluorescent lamps, the reduction in annual lighting burn hours, and the reduction in the number of lamps by installing reflectors and delamping will reduce lighting system maintenance costs. This ECM provides the additional benefit of increased productivity through improved lighting quality and improvements to the environment due to lower greenhouse gas emissions and lower mercury levels in the new fluorescent lamps.

ECM Description – Existing Conditions

The buildings at the NTS have a wide range of lighting technologies in use. Some T8 fluorescent lighting systems were installed during previous ESPC efforts; however, a significant number of standard efficiency T12 fluorescent lighting systems with both four and eight foot lamps and magnetic ballasts are still in use. The T12 lighting systems are not only inefficient but also have unfavorable characteristics, such as ballast hum and lamp flicker.

Many of the service bays and storage areas have High-Intensity Discharge lighting systems that feature metal halide and high-pressure sodium. Exterior lighting consists of a combination of high-pressure sodium, metal halide, high wattage incandescent, and C/F fluorescent fixtures. High-pressure sodium lighting systems are very energy-efficient but provide very poor color rendering index and usable light levels. Because high-pressure sodium lighting does not distinguish colors clearly, the work environment can be adversely affected. Lighting in many common areas and work areas remains on regardless of whether the spaces are unoccupied.

A comprehensive and detailed audit was performed for some buildings. The data collected during the site audit was used to evaluate potential lighting system improvements taking into account energy efficiency, light levels, and lighting system maintenance requirements. Lighting fixture power consumption (demand) was measured for a sample of fixtures during the detailed audit. Lighting burn hours were logged for a sample of spaces within each space type. Light level (lumen) measurements, where feasible, were taken near the center of spaces at approximately desk height. Additional

light level measurements will be performed in spaces following the lighting retrofit to ensure adequate Post-Installation light levels. Power readings were also taken using a Fluke 43B meter to establish the Baseline energy consumption for the various lighting types. The Baseline and Post-Installation Operations and Maintenance costs (material only) were estimated using typical material unit costs. Baseline and Post-Installation lighting burn hours were developed during the DES using light loggers and by interviewing building staff.

The proposed lighting system improvements are listed on the room-by-room survey and calculation Microsoft Excel® spreadsheet workbook in the ECM 5.1 Appendix. Standard efficiency T12 fluorescent lighting fixtures will be retrofitted or replaced with T8 fluorescent systems. The retrofit involves the removal and disposal of existing lamps and ballasts, fixture cleaning, replacement of yellowed or broken lenses, and the installation of new T8 fluorescent lamps and electronic ballasts. Where feasible, incandescent lamps will be replaced with compact fluorescent lamps, T8 fluorescent systems, or metal halide fixtures. Some High-Intensity Discharge lighting will be replaced with more efficient fluorescent systems, including induction lighting on the buildings exterior.

Wherever possible, four-lamp fixtures will be delampd to two-lamp operation using high efficiency reflectors. New lamps will have a high Color-Rendering Index rating for consistent high quality lighting. Electronic T8 ballasts start and regulate fluorescent lamps with electronic components rather than the traditional, inefficient, core-and-coil assembly. Electronic ballasts operate the lamp and ballast system to produce equivalent light levels while using significantly less power, reducing energy consumption. Lighting maintenance was considered when selecting lighting materials to minimize the lighting inventory variety. Ballast life and replacement costs have been considered as well. Benefits of the lighting upgrade include the following:

- Improved energy efficiency and lower energy costs
- Electrical energy savings
- Improved lighting quality and usable light levels
- Improvement in color rendering and the indoor visual environment
- Longer lamp and ballast life
- Electronic ballasts remove the visible 60 Hz flicker effect present with magnetic ballasts, which results in less eye strain and a better environment
- Electronic ballasts eliminate the humming sound present with some magnetic ballasts
- Reduced lighting inventory variety

The following paragraphs describe the types of retrofits to be implemented and the approach to be used regarding lighting levels:

Standard T12 fluorescent lamps and magnetic ballasts will be replaced with T8 fluorescent lamps and high-efficiency electronic ballasts. The proposed ballasts have a 20 percent maximum total harmonic distortion and a rated life expectancy of up to 100,000

hours. The proposed T8 lamps have a rated life of 30,000 hours. The T8 lamps also provide superior energy efficiency and better Color-Rendering Index when compared to conventional T12 lamps.

Incandescent bulbs are the least efficient, commonly used method of illumination. Many existing incandescent lamps will be replaced with compact fluorescent lamps, including the replacement of 60 to 1,000 watt incandescent lamps in recessed, surface mounted, and exterior shroud fixtures. With installed compact fluorescent style fluorescent lamps of 13-28 watts and new induction fixtures, lighting levels will be maintained above minimum requirements for the affected areas.

Tandem wiring is the connecting of two adjacent fixtures with one electrical ballast. Tandem wiring of a ballast presents unique first cost, energy, and maintenance savings opportunities. Tandem wiring will result in a total system draw reduction of approximately 10 percent when compared to a standard ballast configuration. Long-term maintenance costs are reduced based on having half the materials on the job site. A color-coded sticker will be applied on the fixture containing the ballast for tandem wired fixtures. Only end-to-end fixtures will be tandem wired.

The accumulation of dust on fluorescent fixtures and lenses contributes to diminished lighting levels in buildings. Installation, where feasible, of a high-efficiency reflector in existing fixtures normally results in an increase of light output of approximately 15 percent.

Optimizing the lamp/ballast/reflector combination with the specific photometric characteristics of the existing light fixtures will boost light output by as much as 40 percent over the normal delamping processes. This increased efficiency allows for reconfiguration of the fixtures to use fewer lamps. Where reflectors are used in a 2' x 4' fixture, 1 or 2 lamps will be removed. The two remaining lamps in the fixture will be relocated to positions centered on either side of the fixture for maximum use of the reflector. New lamp sockets will be installed to enhance light output and create a more acceptable luminaire appearance. All new and existing reflectors will be cleaned when fixtures are opened for the lamp and ballast replacements.

Delamping is the removal of one or more lamps from a fixture. When delamping, the ballast for the removed lamps is also disconnected and removed. Delamping will be combined with the use of higher output lamps and/or tandem wiring. Where dual switching exists, the general approach will be to provide a "checkerboard" approach and layout for large open and private office spaces to eliminate the dual inboard/outboard option.

The proposed exit signs feature long-life, high efficiency Light-Emitting Diodes, have a rated life expectancy of over 10 years, and provide superior energy efficiency by consuming only 2 to 4 watts of electricity. They also provide improved visibility and luminescence when compared to the existing incandescent and fluorescent signs.

In contrast with all other electrical lamps that use electrical connections through the lamp envelope to transfer power to the lamp, in lamps without electrodes, the power needed to generate light is transferred from the outside of the lamp envelope by means of electromagnetic fields. Induction lamps offer unparalleled lamp life of up to 100,000 hours, as well as, outstanding energy savings. Induction fixtures also provide high Color-Rendering Index white light and excellent energy savings.

This ECM includes the installation of occupancy sensors in 248 spaces at NTS. Use of occupancy sensor controls will reduce lighting runtime by turning lights off in areas during unoccupied times. The majority of these installed sensors will be dual technology, which means the sensor will use both infrared and ultrasonic technology. Photo sensors will also be installed on exterior fixtures where fixtures were noted as operating continuously during the detailed audit.

Baseline light level (lumen) readings were measured in a sample of spaces during the DES. Post-Installation light level readings will be measured in spaces affected by this ECM, where feasible. The intention of this ECM is to save energy, improve lighting quality, and achieve acceptable light levels in spaces. The proposed lighting design for each facility has been chosen to help alleviate the poor light quality, while maximizing energy savings. The design will achieve a higher quality of light by installing lamps with a 5,000 Kelvin color temperature and a color rendering index of 85. This scotopically enhanced design will stimulate the eyes' photoreceptors, called rods, making the pupils contract thereby increasing visual acuity. Well designed scotopic lighting provides greater energy efficiency, diminished glare, and increased user comfort. The scotopic lighting approach uses the Correlated Color Temperature that closely replicates natural daylight. High Correlated Color Temperature lamps give the clearest vision, which allows for a reduction in the number of lamps in a given area while maintaining comparable visual acuity. IESNA measures light output through lumens and foot-candles, which is based on photopic light sensed by the cones only. The scotopic approach to lighting measures the actual perceived light of both cones and rods. Using the 5,000 Kelvin lamps will stimulate the rods in addition to the cones, increasing the perceived light output.

Overall, the scotopic approach with the use of 5,000 Kelvin lamps throughout may not increase footcandles in all areas but will increase the perceived light throughout the facility and the visual effective lumens, or usable light levels that the eye can process more efficiently. This chosen design will result in a better quality of light, improved visual acuity, and a reduction in eye strain.

This approach is recognized by the Environmental Protection Agency and the DOE as a way to reduce energy consumption for lighting while improving the quality of light produced and has been successfully used in many applications nationally. Lighting opportunities that have been identified include, but are not limited to, the following:

- Replacing T12 lamps and ballasts with T8 lamps and electronic ballasts using low power T8 ballasts where lighting levels allow

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- Replacing T12 fixtures with new fixtures where fixtures are damaged or replacement is more cost-effective than retrofitting
 - Removing unnecessary fixtures
 - Delamping T12 fixtures and replacing lamps and ballasts with T8 lamps and electronic ballasts
 - Delamping T12 fixtures, installing reflectors, and replacing lamps and ballasts with T8 lamps and electronic ballasts
 - Wiring fixtures in tandem to allow multiple-lamp ballast use
 - Replacing U-tube T12 lamps and ballasts with 2-foot T8 lighting systems, where feasible
 - Replacing incandescent lamps with compact fluorescent lamps
 - Replacing incandescent fixtures with fixtures containing T8 lighting systems or compact fluorescent systems
 - Replacing 8-foot high output lamps and ballasts with T8 lighting systems and new fixtures
 - Replacing various metal halide and high pressure sodium fixtures with new fixtures containing high-lumen, extended-life T8 lamps and ballasts
 - Replacing incandescent exit fixtures with new fixtures Light-Emitting Diodes exit fixtures
 - Replacing specified exterior fixtures with new induction lighting fixtures
 - Installing occupancy sensors, where cost-effective, to reduce fixture burn-hours

The scope of work for this ECM includes management, materials, and labor for the following:

- Implementation of the lighting system improvements detailed in the ECM 5.1 Appendix
- Maintenance stock “leave behind” of 2 percent of the total material value in replaceable components (majority lamps and ballasts)
- Full manufacturer material warranty of three years on lamps and five years on ballasts
- Disposal of non-Polychlorinated Biphenyl ballasts in a contractor-supplied drum container
- Disposal of Polychlorinated Biphenyl ballasts in accordance with state and Federal laws with NTS listed as the generator and owner of the waste
- Boxing and shipment of removed fluorescent lamps to a Johnson Controls authorized hazardous waste processing company in accordance with Department of Transportation requirements and state and Federal laws
- ECM Commissioning limited to updating equipment counts to reflect actual equipment installed, light level measurement results, lighting panel, or fixture power measurement for a sample of fixtures and applicable lighting control operational measurements
- Operations and Maintenance manual and applicable ECM training

The following work items are excluded from the proposed work scope:

- Work in buildings that are not included in initial audits
- Situations that could not be documented during the detailed audit, such as concealed conditions past the fixture junction
- Overtime work caused by unforeseen circumstances, beyond the control of Johnson
- Controls, such as scheduling changes by NTS (The cost difference between the cost of overtime work wages and normal time work [overtime rate – normal rate x hours].)
- Hazardous material abatement beyond the scope defined in the Management Approach section of this Proposal
- Code violations (Code violations identified during ECM implementation will be brought to the attention of NTS.)
- Repair or replacement of defective electrical equipment, such as switches, breakers, and wiring
- Upgrade or repair of electrical feeds and grounding systems
- Batteries for emergency lighting beyond those listed in the room-by-room scope of work
- Escorts

The following are the project milestones for this ECM:

- | | |
|-----------------------------------|----------|
| • Task | Duration |
| • Engineering/Design Acceptance | 30 Days |
| • Equipment Procurement/Lead Time | 60 Days |
| • Installation and Commissioning | 210 Days |

ECM 11.3 - Solar Lighting Installation

This ECM proposes nine solar electric lights at seven locations to replace three diesel-powered mobile light towers at the Wackenhut Services, Incorporated (WSI) range. Without electrical grid access, some portions of the shooting range are over lighted with mobile light towers when less light would satisfy the lighting requirement. Solar electric lighting assemblies are self-contained structures which capture energy with solar modules during the day, store the energy in batteries, and energize outdoor lighting when needed. The solution is environmentally benign and will eliminate unnecessary diesel fuel consumption, maintenance costs, rental charges, and generator emissions as well as generate .04% of renewable energy of the total site electricity requirements.

ECM Description – Existing Conditions

The WSI range currently utilizes three mobile light towers for illumination during night operations. The primary function of the lighting is to maintain safety and to illuminate small, specific briefing areas. The level of lighting provided by the light towers exceeds the relatively small amount of lighting that is actually needed for the mission. The mobile

light towers each possess four, 1000-watt metal halide lamps on a telescoping tower. WSI personnel operate the light towers for 8 hours per day, 5 days per week, and 22 weeks per year for a total of 880 hours per year.

Solar electric lighting assemblies combine efficient fluorescent lamps with solar panels and battery storage all mounted on a single pole in order to avoid grid connection and the continued use of diesel-powered mobile light towers. Each of the nine light poles will be equipped with a “dusk-to-dawn” charge controller that allows the lamp to automatically turn on at night and remain on until dawn. Each assembly will also contain an actuated switch at the base of the pole that will allow WSI personnel to manually shut off the light when necessary. The pole will be a 25’ tapered, concrete composite pole with lamp height of 18’. The solar electric lighting will provide adequate lighting for the relatively small locations identified by WSI personnel but will not provide similar output as the existing light towers.

Eight of the nine installations will consist of Solution “A” while one installation will consist of Solution “B.” Both solutions are outlined below:

Solution “A”

- 170 Watt Solar Electric Power Assembly
- 164 Amp Hour Battery Assembly
- Power Flood Fixture with 42 Watt Lamp
- Dusk to Dawn Charge Controller
- Remote Actuated Switch
- Side of Pole Horn Bracket
- Concrete Composite Tapered Pole 25'
- Dark Bronze, Direct Burial

Solution “B”

- 170 Watt Solar Electric Power Assembly
- 164 Amp Hour Battery Assembly
- Street Light Refractor Fixture with 42 Watt Lamp
- Dusk to Dawn Charge Controller
- Remote Actuated Switch
- Side of Pole Bracket 4'
- Concrete Composite Tapered Pole 25'
- Dark Bronze, Direct Burial

The following items are included in the proposed work scope:

- Labor and materials to perform the solar lighting system upgrades.
- Work completed following a Monday through Friday, eight-hour shift schedule (JCI will provide one week notice to NTS prior to starting work and will coordinate with WSI personnel. The NTS will provide escorts as necessary. Any

issues with timeliness or quantity of NTS provided escorts will result in schedule delays or possible monetary adjustments. NTS will provide Final Inspections within 10 days of completion of the building).

- Full manufacturer's warranty (material only).

The following work items are excluded from the proposed work scope:

- Overtime work caused by unforeseen circumstances, such as an act of God or scheduling changes by NTS (The cost difference between the cost of overtime work wages and normal time work [(overtime rate – normal rate) x hours] will be the responsibility of NTS.)
- Hazardous material identification and abatement or removal.
- Cost of NTS escorts as needed.
- Costs associated with delays due to work performed by NTS to facilitate ECM implementation, including, but not limited to, hazardous material surveys, hazardous material abatement or removal, and repair or replacement of existing equipment outside the scope of this ECM that would negatively impact ECM performance.

Locations to receive solar lighting are outlined below:

- Area 1 – Vehicle Assault Area:
The vehicle assault area requires lighting for a 100' x 50' area. Two poles will be positioned on the south side of the area with lighting to the north in order to avoid operational impacts.
- Area 2 – D Range:
D Range requires lighting for a quarter-circle with 30' radius (700 square feet) by a single pole facing northwest.
- Areas 3 And 4 – E Range:
Areas 3 and 4 are adjacent. Two wooden platforms on the north side of a large earth berm will be illuminated by two fixtures located just behind the platforms facing north. This total area is 60' x 20'. A third fixture will be located on the south side of the large earth berm and will face south. This area is 700 square feet.
- Area 5 – E Range Tactical E Range:
Tactical requires lighting for a quarter-circle with 30' radius (700 square feet) by a single pole facing southwest onto a section of existing corrugated drain pipe.
- Area 6 – Shoot Tower:
Area 6 requires lighting for a 20' x 20' area due south of the Shoot Tower. A single fixture will be positioned near a corner of the Shoot Tower to adequately light the whole area.

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- Area 7 – E Range Intersection:

Area 7 requires lighting for a small 3-way intersection of 300 square feet. A single street light fixture will be positioned on the northeast side of the intersection.

The following are the project milestones for this ECM. The schedule for the entire project is presented at the beginning of the ECM Description section.

• Task	Duration
• Engineering/Design Acceptance	60 Days
• Equipment Procurement/Lead time	60 Days
• Installation and Commissioning	30 Days

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