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Environmental Management System Objectives & Targets Results Summary – FY 2015

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Environmental Management System (EMS) Objectives & Targets Annual Results Summary – FY 2015

Environmental Management System
Sandia National Laboratories
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Abstract

Sandia National Laboratories (SNL) Environmental Management System is the integrated approach for members of the workforce to identify and manage environmental risks. Each Fiscal Year (FY) SNL performs an analysis to identify environmental aspects, and the environmental programs associated with them are charged with the task of routinely monitoring and measuring the objectives and targets that are established to mitigate potential impacts of SNL's operations on the environment. An annual summary of the results achieved towards meeting established Sandia Corporation and SNL Site-specific objectives and targets provides a connection to, and rational for, annually revised environmental aspects. The purpose of this document is to summarize the results achieved and documented in FY 2015.

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ACRONYMS & ABBREVIATIONS

AOP	Administrative Operating Procedure
BTU	British Thermal Unit
C&D	Construction & Demolition
CIS	Chemical Information System
CO2e	Carbon Dioxide Equivalents
Corporate	Sandia Corporation
DOE	U.S. Department of Energy
EISA	Energy Independence and Security Act (of 2007)
EIS	Explosive Inventory System
EMS	Environmental Management System
EO	Executive Order
EOD	Explosive Ordinance Disposal
FOP	Field Operating Procedure
FY	Fiscal Year
gal	gallon(s)
GHG	Greenhouse Gas
gsf	gross square foot
HVAC	Heating, Ventilation, and Air Conditioning
HWMF	Hazardous Waste Management Facility
KAFB	Kirtland Air Force Base
MOW	Member of the Workforce
MSP2	Material Sustainability and Pollution Prevention
NFPA	National Fire Protection Agency
NNSA	National Nuclear Security Administration
SF_6	Sulfur Hexafluoride
SFO	Sandia Field Office
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico

ACRONYMS & ABBREVIATIONS (continued)

SSP	Site Sustainability Plan
TU	Trackable Unit
yr	year

1.0 INTRODUCTION

1.1 Description of the Activity

Sandia National Laboratories (SNL) Environmental Management System (EMS) is the integrated approach for members of the workforce (MOW) to identify and manage environmental risks. Each Fiscal Year (FY), environmental aspects are evaluated and prioritized, and the environmental programs associated with them are charged with the task of routinely monitoring and measuring the objectives and targets that are designed to mitigate the impact of SNL's operations on the environment.

Monitoring and measurement information supports SNL EMS program compliance requirements and provides a status of overall progress in meeting environmental objectives. Based on the annual evaluation and prioritization of environmental aspects, procedures for monitoring and measurement are revised to reflect Sandia Corporation (Corporate) and SNL/New Mexico (NM) site-specific objectives and targets performance metrics, associated operational controls, and documentation requirements. An annual summary of the results achieved towards meeting established Corporate and Site-specific objectives and targets provides a yearly overview of environmental performance and a connection to the annual evaluation and prioritization of environmental aspects.

1.2 Purpose & Scope

The purpose of this document is to annually summarize results achieved and documented through monitoring and measurement of Corporate and SNL/NM Site-specific objectives and targets established to progress SNL towards mitigating its significant environmental aspects. In addition, this annual summary provides a roadmap for year to year changes in the significant aspects and objectives and targets tracked by the SNL EMS Team. This provides consistency, continuity, and connectivity between objectives and targets for the previous, current, and upcoming years.

In FY 2011, an important scope change occurred when the U.S. Department of Energy (DOE) issued DOE Order 436.1, *Department Sustainability*, which superseded DOE Orders 450.1 and 430.2A. This new DOE Order requires DOE sites to use EMS as a platform for Site Sustainability Plan (SSP) implementation and for programs with objectives and measurable targets that contribute to the DOE meeting its Agency sustainability goals. Although this order is not within Sandia Corporation's Management and Operating Contract, the intent of the DOE Order is implemented through the contract's requirement for an International Organization for Standardization 14001 certified EMS. SNL's EMS had previously included several SSP sustainability goals as objectives and targets, but were measured and monitored on the basis of SNL/NM activities only. The scope of measuring and monitoring SSP-specific sustainability goals was expanded in FY 2011 to include all Sandia National Laboratories (SNL) sites (e.g., New Mexico, California, Nevada, and Hawaii). Therefore, each EMS objective and target described in this document differentiates the applicable scope as either "Site-Specific for SNL/NM" or "Corporate SSP Goal for all SNL Sites."

Processes and procedures associated with measuring and monitoring of EMS objectives and targets are described in administrative operating procedure (AOP), EMS *Monitoring & Measuring Procedures*, AOP 09-06.

2.0 OBJECTIVES AND TARGETS SUMMARY

2.1 Significant Environmental Aspect: Hazardous Materials - Use and Storage

Objective: **Reduce the Quantity of Legacy Chemicals**

Target: **By end-of-year FY 2015, reduce the inventory of chemicals 10 – 15 years old to no more than 15 percent of the total inventory; reduce the inventory of chemicals 15 years and older to no more than 10 percent of the total inventory; and reduce the inventory of expired chemicals to less than 2 percent of the total inventory.**

Scope: **Corporate Goal for all SNL Sites**

This one-year duration, Corporation-based objective and target was established to reduce the inventory aging and expired chemicals. Although all divisions were included in the scope of this objective and target, only Divisions 1000, 2000, 4000, 5000, 6000, 8000, and 10000 actually maintain chemical inventories. Chemical use and storage at SNL is a significant component of the hazardous materials managed at SNL. Since hazardous material was identified as a significant environmental aspect for SNL's EMS in FY 2015, this objective and target supports continual improvement of hazardous materials management activities.

Chemical containers are tracked at all SNL sites through the Chemical Information System (CIS), which is an integrated chemical inventory and Safety Data Sheet document management system. The CIS tracks chemical containers through SNL barcodes. Information such as the chemical or product name, location, container size, and information about who is responsible for the chemical is managed in the CIS database.

Chemical containers are removed from the CIS inventory by either disposition through the Hazardous Waste Management Facility (HWMF) at the New Mexico site, other approved processes and vendors at other SNL sites, or through a reconciliation process verifying the inventory attributed to specific chemical owners or locations. Measuring and monitoring the status of the chemical inventory for each division was based on CIS data, as reported in the Corporate Scorecard reporting tool.

FY 2015 Results:
SNL exceeded the objective and target for aging and expired chemical inventory reduction. SNL maintained the inventory of chemical containers 10 to 15 years old, as well as those over 15 years old, below the 15 percent target during FY 2015. In addition, SNL reduced the inventory of expired chemicals from approximately 2.1 percent to approximately 1.6 percent during FY 2015.

Figure 1 depicts the Corporate FY 2015 chemical inventory results on a quarterly basis for chemical containers 10 to 15 years old and chemical containers over 15 years old.

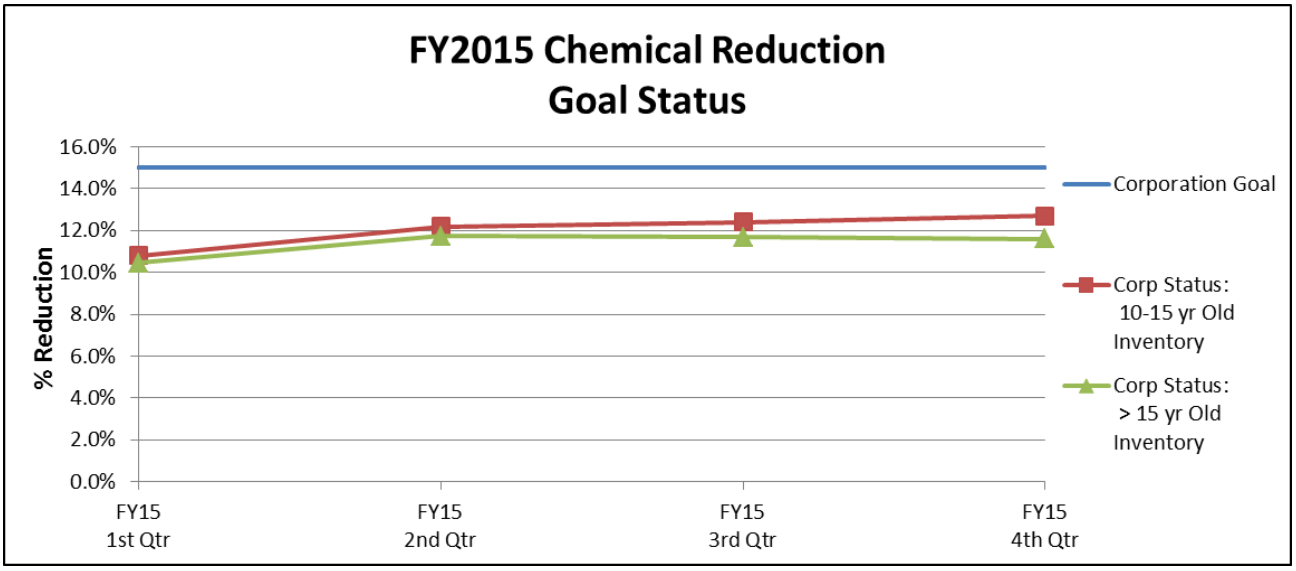

Figure 1. SNL Aging Chemical Inventory Reduction Results

Figure 2 depicts the Corporate FY 2015 chemical inventory results on a quarterly basis for expired chemical containers.

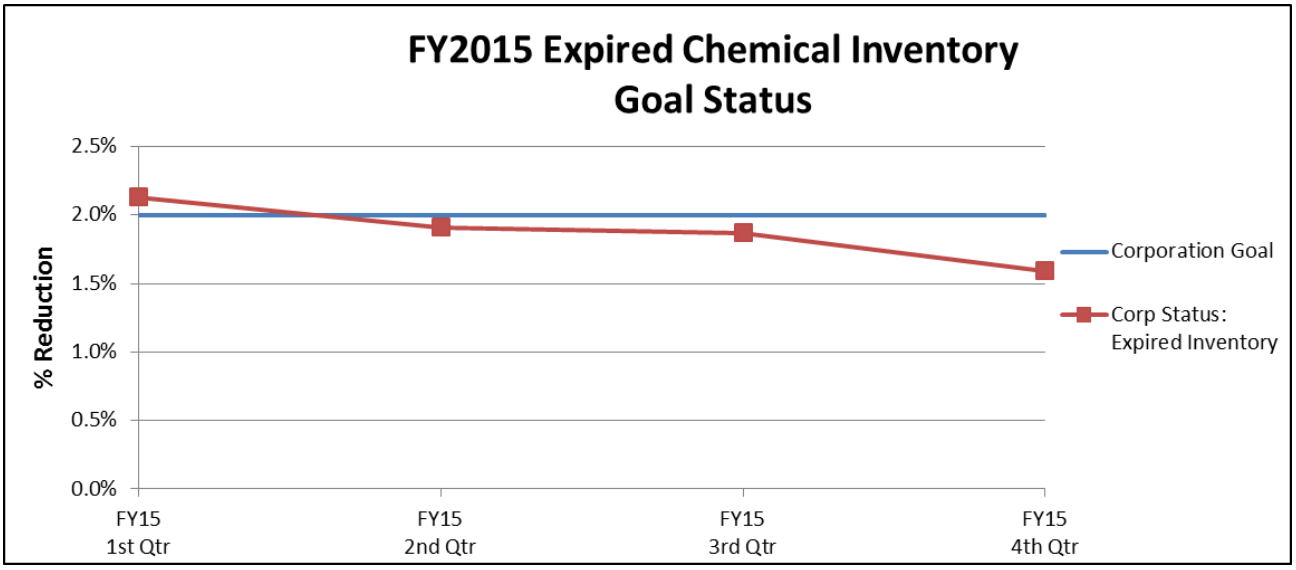

Figure 2. SNL Expired Chemical Inventory Reduction Results

The aging chemical inventory and expired chemical reduction goal has a one-year duration (FY 2015). As a result, monitoring and measurement of this objective and target is considered complete.

2.2 Significant Environmental Aspect: Hazardous Waste – Legacy Explosives

Objective: **Reduce the Inventory of Legacy Explosives (Trackable Units (TUs) declared waste before August 22, 2011).**

Target: **By end-of-year FY 2017, reduce 80% (20% annually) of legacy TUs.**

Scope: **Corporate Goal for all SNL Sites**

This four-year duration, Corporation-based objective and target is specifically intended to address the explosives waste inventory that resulted when the Kirtland Air Force Base (KAFB) Explosive Ordinance Disposal (EOD) operations were abruptly terminated, resulting in the sudden and unplanned elimination of the disposal pathway SNL had been using for such explosive wastes. Following the elimination of the KAFB EOD operations, SNL began the process of identifying and establishing a new disposition pathway for explosive wastes. Due to the timeframe involved with developing the new explosive waste disposal pathway, a backlog inventory of explosive waste resulted. This "legacy" explosive waste is defined as those TUs declared waste before August 22, 2011 (the date of termination for KAFB EOD operations).

All explosive materials, including waste, owned by SNL are tracked in the Explosives Inventory System (EIS). The EIS, the only approved explosive inventory system at SNL, is used to implement a cradle-to-grave philosophy through defined roles and responsibilities, requirements, and guidelines for acquisition, receiving, storing, inventorying, modifying, transporting, managing, and final disposition of all explosive materials owned or controlled by SNL. TU numbers are generated by the EIS and are used for the unique identification of any explosive owned by Sandia regardless of physical location. TU numbers are used for storage, tracking, control and EIS safety validations. Tracking the cradle-to-grave disposition of legacy explosives material occurs using the EIS, and on a quarterly basis, Organization 4144, Waste Management & Pollution Prevention, queries the EIS to determine the number of legacy TUs disposed.

FY 2015 Results:
SNL is on track to meet the objective and target for legacy explosive waste reduction. A total of 430 TUs were identified as comprising the inventory, or baseline, of legacy explosives declared waste before August 22, 2011. During FY 2015 SNL reduced the legacy explosives inventory by 125 TUs, resulting in a one-year reduction of 29.1 percent. Combined with the reduction results from FY 2014 (47.9 percent), the cumulative reduction in legacy explosive waste is 77.0 percent as of end-of-year FY 2015. Figure 3 depicts the quarterly reduction results for the first two years of the four year legacy explosives reduction objective and target.

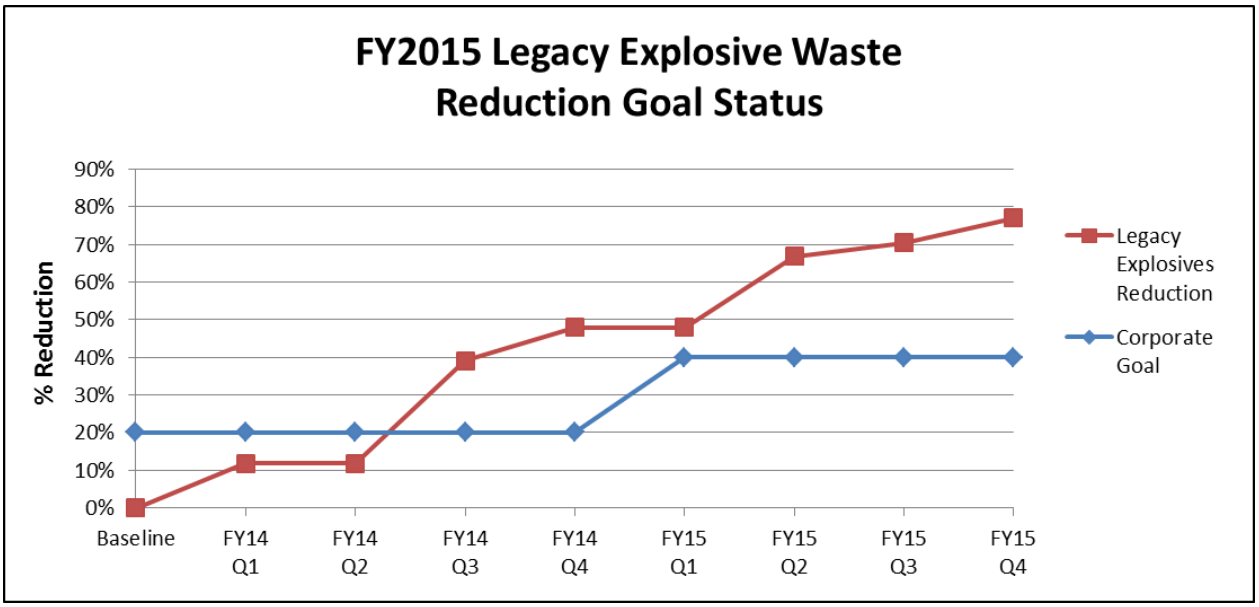

Figure 3. SNL Legacy Explosive Waste Inventory Reduction Results

The legacy explosive waste reduction goal has a four-year duration (FY 2014 – FY 2017). As a result, monitoring and measurement of this objective and target will be ongoing through FY 2017.

2.3 Significant Environmental Aspect: Resource Use – Energy

Objective: **Reduce Annual Energy Use**

Target: **By FY 2015, reduce energy intensity by 30 percent relative to FY 2003 (excluding buildings that meet the guidelines for Federal Energy Management Program excluded buildings).**

Scope: **Corporate SSP Goal for all SNL Sites**

This corporation-based goal is identified in the SSP and originates from *Energy Independence and Security Act of 2007* (EISA 2007), which requires DOE to reduce its energy intensity by 30 percent by FY 2015 from a FY 2003 baseline. This objective and target has been revised from FY 2010 with respect to scope. Adoption of the Corporate SSP goal for energy intensity reduction changed the scope from SNL/NM-specific to include all SNL sites.

Energy intensity, as opposed to overall energy use, is a measure that normalizes energy use by allowing for increases or decreases in the size of SNL due to changes in mission and work scope. Energy intensity is measured in terms of energy use per square foot of building space, or British Thermal Units per gross square foot (BTU/gsf), and when measured on an annual basis, intensity becomes energy use per gsf of building space per year (or BTU/gsf/yr).

SNL has an Energy and Water Resource Management program that is assigned the responsibility of ensuring energy efficiency is integrated and institutionalized into SNL sites planning, design, construction, operations, and infrastructure including, Environment, Safety and Health policies, processes, and procedures. Significant opportunity for energy demand reduction exists at SNL, because 60 to 70 percent of the peak energy intensity occurs at night and on weekends. In other words, significant energy demand occurs even during non-working hours. As a result, SNL continually strives to reduce energy consumption through a variety of means, including improved facility control measures, implementation of new and more efficient equipment, razing of outdated, inefficient buildings, etc.

FY 2015 Results:
SNL exceeded the objective and target for energy intensity reduction. In FY 2015, energy use intensity was decreased by 1.3 percent relative to FY 2014, from 136,881 BTU/gsf/yr to 134,484 BTU/gsf/yr. This corresponds to an overall 30.9 percent reduction relative to the FY 2003 baseline of 194,533 BTU/gsf/yr. Figure 4 displays SNL's annual energy intensity trend from the FY 2003 baseline.

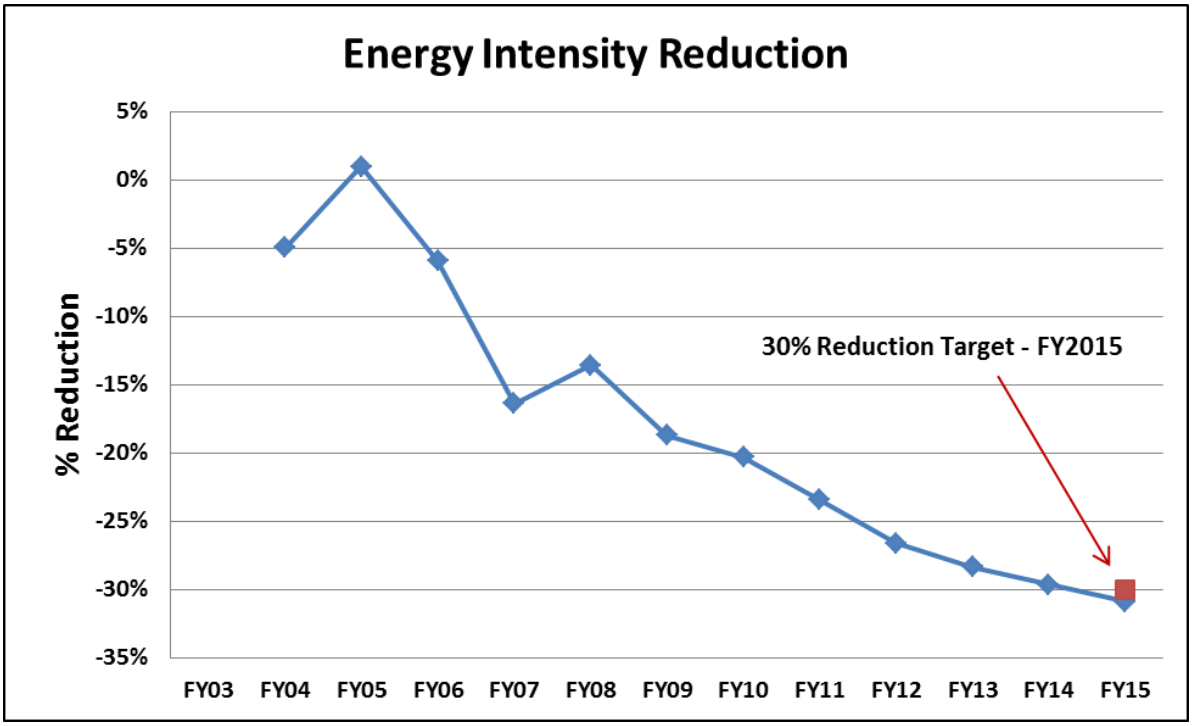

Figure 4. Annual Energy Use Intensity Reduction Trend

The energy intensity reduction goal has a FY 2015 timeline to completion. As a result, monitoring and measurement of this objective and target is considered complete.

2.4 Significant Environmental Aspect: Resource Use – Water

Objective: Reduce Water Use

Target: By FY 2020, reduce potable water use intensity by 26 percent relative to FY 2007.

Scope: Corporate SSP Goal for all SNL Sites

This corporation-based goal is identified in the SSP and originates from Executive Order (EO) 13514; *Federal Leadership in Environmental, Energy, and Economic Performance*, which requires DOE to reduce potable water consumption intensity 26 percent by FY 2020 relative to a FY 2007 baseline. Water use intensity, as opposed to overall water use, is a measure that normalizes water use by allowing for increases or decreases in the size of SNL due to changes in mission and work scope. Water use intensity is measured in terms of water use per square foot of building space, or gallons per gsf (gal/gsf), and when measured on an annual basis becomes water use per gsf of building space per year (or gal/gsf/yr).

This objective and target has been revised from FY 2010 with respect to description and scope. Adoption of the Corporate SSP goal for water use intensity reduction changed the scope from SNL/NM-specific to include all SNL sites. In addition, the previous goal and driver for water reduction, DOE Order 430.2B, has been cancelled and replaced with the more aggressive EO 13514 goal. DOE Order 430.2B, *Departmental Energy, Renewable Energy and Transportation Management*, had required DOE to reduce water intensity by no less than 16 percent by FY 2015, relative to a FY 2007 baseline.

SNL continually strives to reduce overall water consumption through a variety of means, including implementation of low-flow plumbing fixtures, improved cooling tower operating practices, efficient landscape irrigation technology, etc. SNL has determined that ultra-pure water process systems are one of the largest sources of water use, while cooling is the next-largest water-using process. Although irrigation does not account for a significant amount of the water consumed, an area that is difficult to quantify is construction and the recent reduction in construction activities helped reduce water consumption. Increased cooling tower cycles, condition assessments, and leak repairs on the water-distribution system have contributed to water savings.

FY 2015 Results:
SNL is on track to meet the objective and target for water use intensity reduction. In FY 2015, water use intensity significantly decreased from FY 2014, decreasing by approximately 12.5 percent from 53.2 gal/gsf/yr to 46.5 gal/gsf/yr. This corresponds to an overall cumulative reduction of 38.3 percent relative to the FY 2007 baseline of 75.4 gal/gsf/yr. Although the current reduction status exceeds the 26 percent target, water use intensity has been on an increasing trend since FY 2011. This increasing trend is attributed to the ongoing drought conditions and increased temperatures experienced in both the New Mexico and California regions. These conditions result in increased water use associated with building Heating, Ventilation, and Air Conditioning (HVAC) operations as well as landscape irrigation. Figure 5 displays SNL's annual water consumption trend since the FY 2007 baseline.

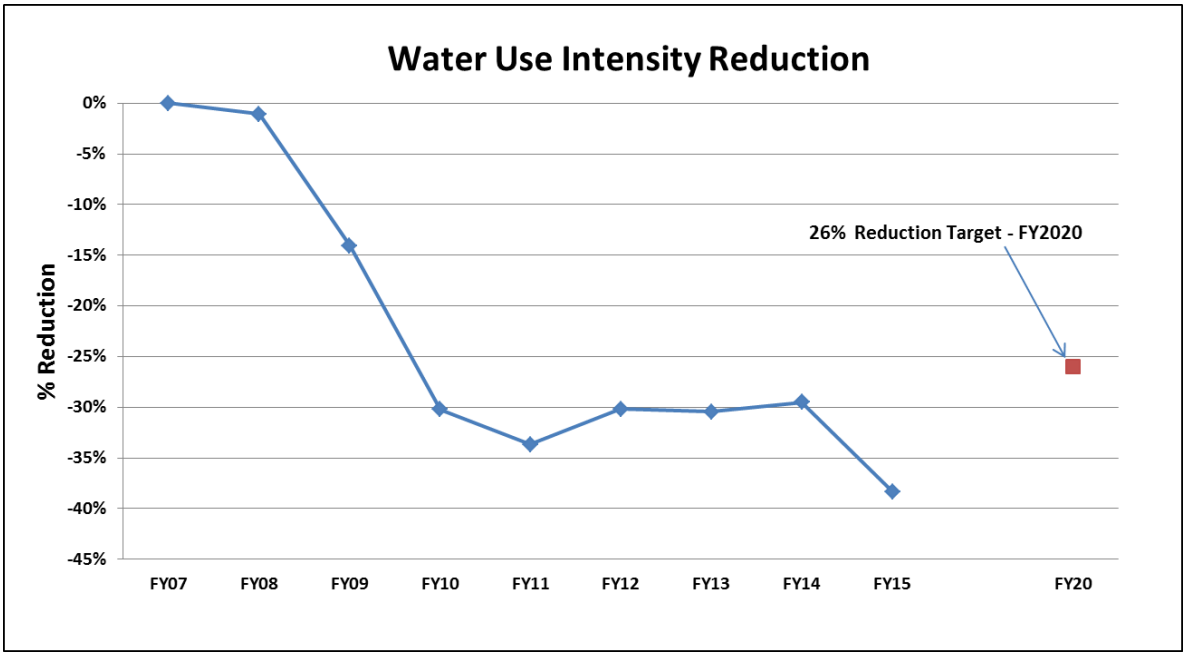

Figure 5. Annual Water Use Intensity Reduction Trend

The water use intensity reduction goal has a FY 2020 timeline to completion. As a result, monitoring and measurement of this objective and target will be ongoing through FY 2020.

2.5 Environmental Aspect: Air Emissions – Greenhouse Gas (GHG)

Objective: **Reduce GHG Footprint**

Target: **By FY 2020, reduce Scope 1 & 2 GHG emissions by 28 percent relative to a FY 2008 baseline.**

Scope: **Corporate SSP Goal for all SNL Sites**

This corporation-based goal is identified in the SSP and originates from EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. EO 13514 requires DOE to reduce its GHG Scope 1 & 2 emissions by 28 percent by FY 2020 from a FY 2008 baseline. Scope 1 consists of direct emissions such as on-site combustion of fossil fuels or fugitive GHG emissions, whereas Scope 2 consists of indirect emissions associated with the consumption of electricity, heat, or steam. Sites are expected to aggressively strive towards the overall DOE goal of a 28 percent reduction, but will not necessarily be held to it, as actual targets will be defined at the DOE Under Secretary level.

While individual DOE sites are not required specifically to meet the 28 percent target that the agency as a whole is committed to meeting, SNL as a corporation has adopted an equivalent GHG reduction in the SSP and as an EMS Objective and Target. As a result, this objective and target have been revised from FY 2010 with respect to scope. Adoption of the Corporate SSP goals for GHG reduction changed the scope from SNL/NM-specific to include all SNL sites.

FY 2015 Results:
SNL is on track to meet the objective and target for GHG reduction. As of year-end FY 2015, SNL has reduced Scope 1 and 2 GHG emissions by 52.5 percent from the FY 2008 baseline. The major source of SNL's Scope 1 GHG emissions is fugitive emissions. Sulfur Hexafluoride (SF_6) is the primary contributor to SNL fugitive GHG emissions, accounting for approximately 77.9 percent of Scope 1 emissions in FY 2015. Due to the extensive use of SF_6 in SNL pulse power and high voltage research and development applications, Scope 1 emissions are expected to vary widely from year to year depending on the extent and scope of activities conducted. SNL continues to investigate and implement measures to reduce SF_6 emissions, including retrofit/replace switchgear equipment, improve storage equipment, deploy new and more efficient reclaim units, and improve measuring and tracking methods. Section 2.1.1 of the SNL FY 2016 SSP contains additional information regarding SF_6 emission reduction activities.

The only component of SNL's Scope 2 GHG emissions is grid-based electricity use, because the majority of SNL's grid-provided electricity is generated from coal-fired power plants. There is a direct link between projects supporting electricity-use reduction and Scope 2 GHG emissions reduction. The SNL Energy Management Program implements electricity-use reduction measures, including free-cooling HVAC techniques, occupancy sensor-based lighting and HVAC controls, building temperature set-back points for non-occupied hours, implementing automated building control systems, etc. Section 2.1.1 of the SNL FY 2016 SSP contains additional information regarding Scope 2 GHG emission reduction activities.
Figure 6 shows SNL's FY 2015 status towards meeting the GHG reduction objective and target, in terms of tonnes carbon dioxide equivalents (CO2e). Since this objective and target has a FY 2020 timeline, monitoring and measurement progress will be ongoing.

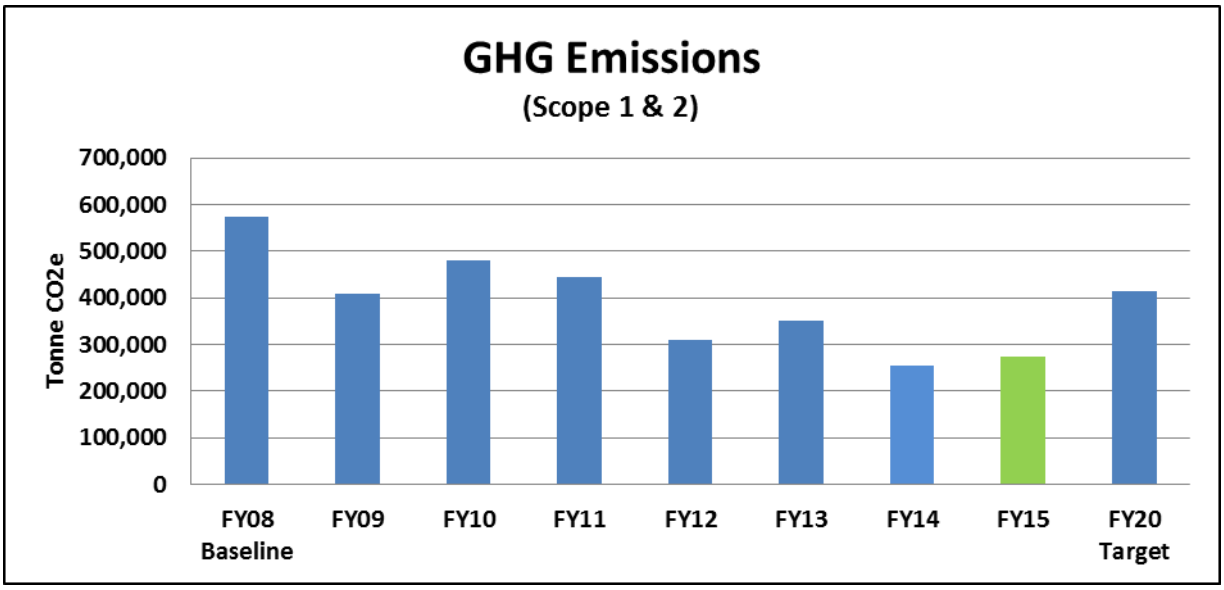

Figure 6. GHG Emission Reduction Trend

The GHG emissions reduction goal has a FY 2020 timeline to completion. As a result, monitoring and measurement of this objective and target will be ongoing through FY 2020.

2.6 Environmental Aspect: Personnel Transportation

Objective: **Reduce Use of Fleet Petroleum**

Target: **By FY 2020, reduce fleet petroleum consumption by 2 percent per year relative to a FY 2005 baseline.**

Scope: **Corporate SSP Goal for all SNL Sites**

Objective: **Increase the Use of Fleet Alternative Fuel**

Target: **By FY 2015, increase fleet alternative fuel consumption by 10 percent per year relative to a FY 2005 baseline.**

Scope: **Corporate SSP Goal for all SNL Sites**

These two corporation-based goals are identified in the SSP and originate from EO 13514 *Federal Leadership in Environmental, Energy, and Economic Performance* (2009); EO 13423 *Strengthening Federal Environmental, Energy, and Transportation Management* (2007); and EISA 2007. EO 13423 requires Federal agencies to reduce "subject" fleet petroleum use by 2 percent per year through FY 2015 (from a FY 2005 baseline), for an overall reduction of 20 percent. EO 13514 incorporates this requirement and extends it to FY 2020, for an overall reduction of 30 percent. In addition, EISA 2007 requires federal agencies to increase the use of "subject" non-petroleum fuels, or alternative fuels, by 10 percent annually through FY 2015 (from a FY 2005 baseline), for an overall increase of 159.4 percent. "Subject" fuel includes the fuel used in all light-duty, medium-duty, and heavy-duty vehicles, unless such vehicles are exempted from EO 13423 (e.g., law enforcement, emergency, and military tactical vehicles, and vehicles operated outside of the United States).

While individual DOE sites are not specifically required to meet the petroleum fuel use reduction and alternative fuel use increase that the agency as a whole is committed to meeting, SNL as a corporation has adopted both these fuel use goals in the SSP and as EMS Objectives and Targets. As a result, these two objectives and targets have been revised from FY 2010 with respect to scope. Adoption of the Corporate SSP goals for petroleum fuel use reduction and alternative fuel use increase changed the scope from SNL/NM-specific to include all SNL sites.

FY 2015 Results:
In FY 2014, SNL experienced a problem with availability of the alternative fuel E-85 at the SNL/NM site. SNL/NM fleet vehicles access E-85 fuel through the KAFB. The KAFB E-85 fuel dispensing system went out of service in January 2014 and as of the end of year FY 2015 the E-85 dispensing system remained out of service. SNL is currently working with KAFB to re-establish access to the onsite E-85 fueling station as well as evaluating other potential opportunities for accessing E-85 fuel.

E-85 is the primary alternative fuel type consumed by SNL fleet vehicles, and constituted over 90 percent of the alternative fuel consumed by SNL/NM fleet vehicles in FY 2013. The inability to access E-85 alternative fuel at KAFB caused SNL/NM flex fuel vehicles to use regular gasoline instead of the E-85 fuel. As a result, SNL increased petroleum fuel consumption by 22.2 percent in FY 2015 compared to FY 2014, and decreased alternative fuel consumption by 56.0 percent in FY 2015 compared to FY 2014. Relative to the petroleum fuel use reduction objective and target, SNL's cumulative petroleum fuel use is 47.5 percent higher than the FY 2005 baseline (see Figure 7). Relative to the alternative fuel use increase objective and target, SNL's cumulative alternative fuel use is only 0.2 percent higher than the FY 2005 baseline (see Figure 8). Although the decrease petroleum fuel use objective and target has an FY 2020 timeline, the increase alternative fuel use objective and target timeline is FY 2015. As a result, the increase alternative fuel use objective and target was not met.

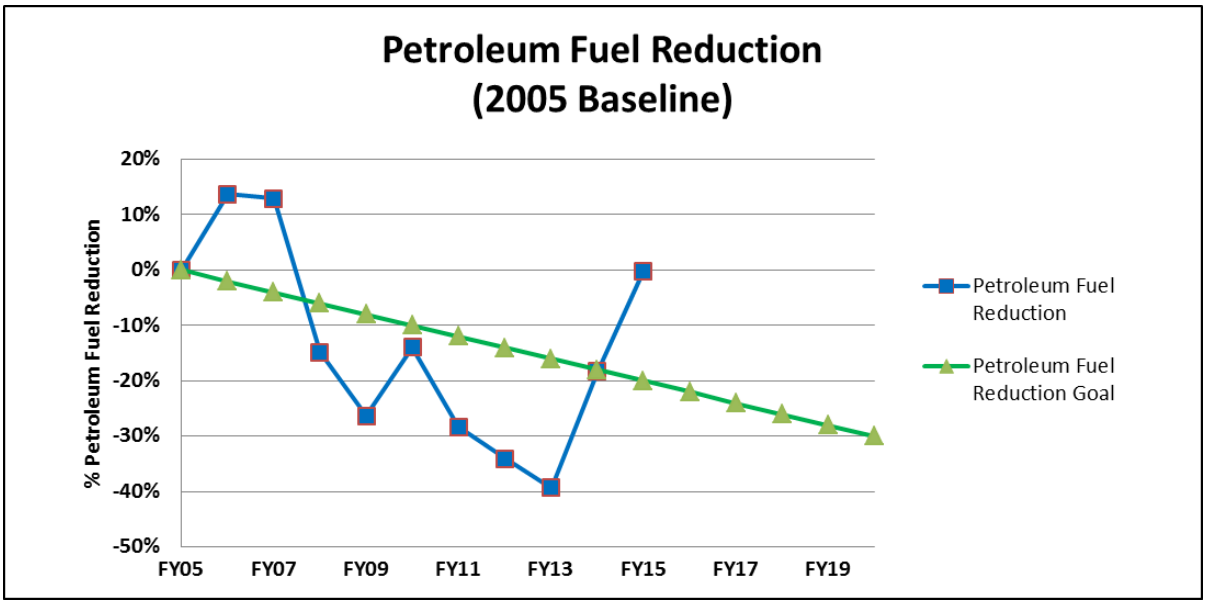

Figure 7. SNL Fleet Petroleum Use Reduction Trend

The Fleet petroleum fuel use reduction goal has a FY 2020 timeline to completion. As a result, monitoring and measurement of this objective and target will be ongoing through FY 2020.

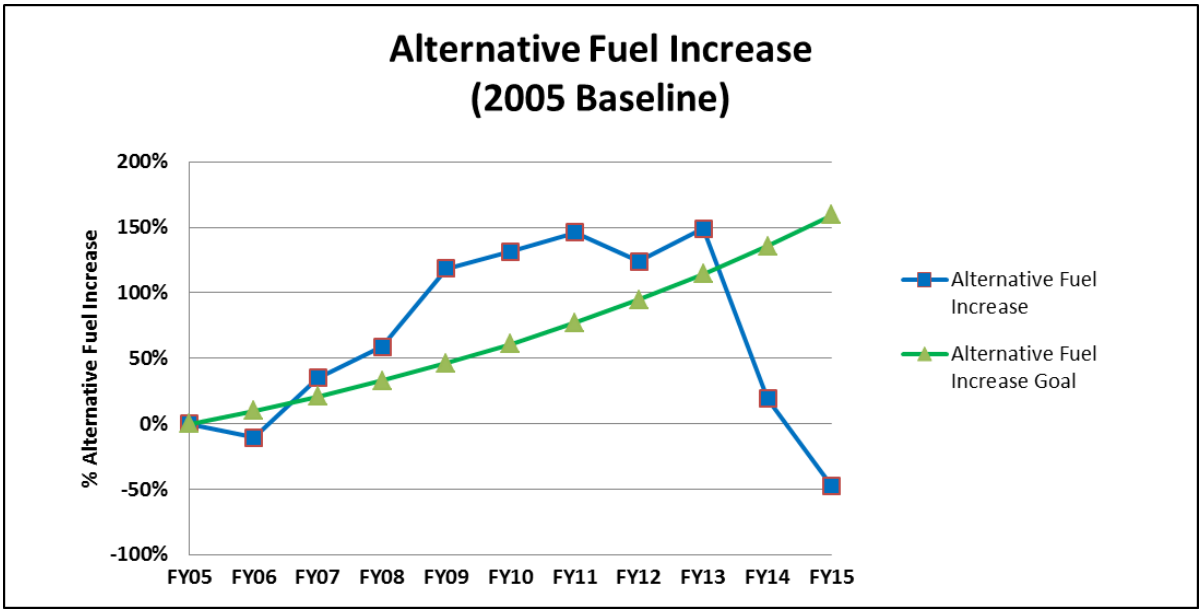

Figure 8. SNL Fleet Alternative Fuel Use Increase Trend

The Fleet alternative fuel use increase goal has a FY 2015 timeline to completion. As a result, monitoring and measurement of this objective and target is considered complete FY 2015.

2.7 Environmental Aspect: Solid Waste

Objective: **Reduce Waste**

Target: **By end-of-year FY 2015, each Division at SNL/NM will support a minimum of one Zero Waste Event.**

Scope: **Site-Specific for SNL/NM**

This one-year, SNL/NM site-specific objective and target was established to promote the *Zero Waste* concept to the SNL/NM workforce by conducting zero waste events within each division. Zero waste events are essentially an education and outreach measure to introduce SNL/NM personnel to the concept of zero waste as well as provide a demonstration of how zero waste can be achieved. SNL/NM is seeking to achieve *Zero Waste by 2025*, which is defined as diverting more than 90% of solid waste generated (excluding construction and demolition waste) from being landfilled or incinerated.

The Material Sustainability and Pollution Prevention (MSP2) program coordinates and tracks all zero waste events conducted at SNL/NM and records each event on the zero waste webpage (http://info.sandia.gov/esh/p2/ZeroWaste.htm). A zero waste event is basically a food centered event (e.g., a team celebration) designed and managed to generate only recyclable or compostable byproducts, eliminating the need for a trash can. The MSP2 program provides planning, logistical, material, and labor support for conducting zero waste events.

FY 2015 Results:
SNL/NM met the objective and target for each division to host at least one zero waste event in FY 2015. Several divisions exceeded the target, hosting numerous zero waste events throughout the year. Table 1 below presents the number of zero waste events supported by each division at the SNL/NM site during FY 2015.

Table 1. SNL/NM FY 2015 Zero Waste Events by Division

FY 2015 Results	
Division	**Zero Waste Events**
1000	2
2000	1
3000	1
4000	2
5000	1
6000	1
9000	4
10000	7
Total	**19**

The zero waste event education and outreach goal has a FY 2015 timeline to completion. As a result, monitoring and measurement of this objective and target is complete.

3.0 DOCUMENTATION AND RECORDKEEPING

The EMS Objectives and Targets tracking data is collected in accordance with the monitoring and measuring procedure (AOP 09-06) and is maintained on the EMS Implementation SharePoint Site. Periodic status updates and results are provided for management review.

4.0 REFERENCES

Energy Independence and Security Act of 2007

Executive Order 13423 *Strengthening Federal Environmental, Energy, and Transportation Management.*

Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*.

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Sandia National Laboratories/New Mexico, EMS Monitoring & Measuring Procedures, AOP 09-06.

Sandia National Laboratories, *FY 2016 Site Sustainability Plan*, December 2015, SAND2015-10488 O.

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