

SANDIA REPORT

SAND2013-1762

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Printed February 2013

Environmental Management System (EMS) Objectives & Targets Annual Results Summary – FY2012

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Environmental Management System
Sandia National Laboratories
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Abstract

Sandia National Laboratories/New Mexico's (SNL/NM) Environmental Management System is the integrated approach for members of the workforce to identify and manage environmental risks. Each Fiscal Year (FY) SNL/NM 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/NM's operations on the environment. An annual summary of the results achieved towards meeting established objectives and targets provides a connection to, and rationale for, annually revised environmental aspects. The purpose of this document is to summarize the results achieved and documented in FY2012.

ACKNOWLEDGMENTS

We would like to thank all the members of the Corporate EMS Team and Points-of-Contact who contributed to the monitoring and measuring of Corporate EMS Objectives and Targets during FY2012:

Stephanie A. Salinas
Morgan E. Gerard
Pascale S. Waffelaert
Katrina M. Wagner
Michael D. Nagy
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Jeffrey T. Young
Robert D. Statler
Chris A. Evans
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Marti K. Adams
Ralph J. Wrons
Samuel A. McCord
Rosemary P. Avery
David H. Castillo
Mark E. Brynildson
Linda M. Gonzales

TABLE OF CONTENTS

ACRONYMS & ABBREVIATIONS	7
1.0 INTRODUCTION	9
1.1 Description of the Activity.....	9
1.2 Purpose & Scope.....	9
2.0 OBJECTIVES AND TARGETS SUMMARY	10
2.1 Environmental Aspect: Air Emissions – Greenhouse Gas (GHG).....	10
2.2 Environmental Aspect: Personnel Transportation.....	11
2.3 Significant Aspect: Hazardous Materials/Waste.....	14
2.4 Significant Aspect: Hazardous Materials (Use and Storage).....	15
2.5 Environmental Aspect: Solid Waste.....	16
2.6 Environmental Aspect: Resource Use -- Energy.....	18
2.7 Environmental Aspect: Resource Use -- Water.....	19
3.0 DOCUMENTATION AND RECORDKEEPING	21
4.0 REFERENCES	21
4.1 Reference Documents.....	21
5.0 ATTACHMENTS	21
6.0 DEFINITIONS	21

LIST OF FIGURES

Figure 1. GHG Emission Reduction Trend.....	11
Figure 2. SNL Fleet Petroleum Use Reduction Trend.....	13
Figure 3. SNL Fleet Alternative Fuel Use Increase Trend.....	13
Figure 4. SNL/NM Explosive/Energetic Material Waste Reduction Results.....	15
Figure 5. SNL/NM Solid Waste Diversion Results (excluding C&D waste).....	17
Figure 6. Annual Energy Use Intensity Reduction Trend.....	19
Figure 7. Annual Water Use Intensity Reduction Trend.....	20

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ACRONYMS & ABBREVIATIONS

AOP	Administrative Operating Procedure
BTU	British Thermal Unit
C&D	Construction & Demolition
CIS	Chemical Information System
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
ES&H	Environment, Safety and Health
FY	Fiscal Year
gal	gallon(s)
GHG	Greenhouse Gas
gsf	gross square foot
HVAC	Heating, Ventilation, and Air Conditioning
MOW	Member of the Workforce
P2	Pollution Prevention
Sandia	Sandia Corporation
SF ₆	Sulfur Hexafluoride
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico
SSP	Site Sustainability Plan
Yr	year

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1.0 INTRODUCTION

1.1 *Description of the Activity*

Sandia National Laboratories/New Mexico's (SNL/NM) 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/NM's operations on the environment.

Monitoring and measurement information supports SNL/NM's EMS program compliance requirements and provides a status of overall progress in meeting site environmental objectives. Based on the annual evaluation and prioritization of environmental aspects, procedures for monitoring and measurement are revised to reflect objectives and targets performance metrics, associated operational controls, and documentation requirements. An annual summary of the results achieved towards meeting established objectives and targets provides a yearly overview of environmental performance and a connection to, and rationale for, 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 objectives and targets established to progress SNL/NM 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/NM EMS Team. This provides consistency, continuity, and connectivity between objectives and targets for the previous, current, and upcoming years.

In FY2011, 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 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 sustainability goals. Although this order is not within Sandia Corporation's (Sandia's) Management and Operating Contract, the intent of the DOE Order is implemented through Sandia's requirement for an International Organization for Standardization 14001 certified EMS. SNL/NM'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 FY2011 to include all Sandia National Laboratory (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 Environmental Aspect: Air Emissions – Greenhouse Gas (GHG)

Objective: Reduce GHG Footprint

Target: By FY2020, reduce Scope 1 & 2 GHG emissions by 28 percent relative to a FY2008 baseline.

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*. EO 13514 requires DOE to reduce its GHG Scope 1 & 2 emissions by 28 percent by FY2020 from a FY2008 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, Sandia 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 FY2010 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.

FY2012 Results:

As of year-end FY2012, SNL has reduced Scope 1 and 2 GHG emissions by 46 percent from a FY2008 baseline. The major source of SNL's Scope 1 GHG emissions is fugitive emissions. Sulfur Hexafluoride (SF₆) is the primary contributor to SNL fugitive GHG emissions, accounting for approximately 77 percent of Scope 1 emissions in FY2012. Due to the extensive use of SF₆ 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 SF₆ emissions, including retrofit/replace switchgear equipment, improve storage equipment, deploy reclaimers, and enhance tracking methods. Previously reported SF₆ data used in calculating Scope 1 GHG emissions from the baseline year through FY2011 was determined to be misrepresentative of continuous usage (although accurate over long time periods). The corrected data is reported herein, and additional information regarding this change is contained in Appendix D of the SNL FY2013 SSP.

The only component of SNL Scope 2 GHG emissions is grid electricity use, because the majority of SNL's grid electricity generation is coal-fired. 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

heating, ventilation, and air conditioning (HVAC) techniques, occupancy-based lighting controls, automated building control systems, etc. See Section 2.6 for additional information on SNL energy-use reduction results and the SNL FY2013 SSP for additional information regarding GHG emissions reduction status, plans, and projected performance.

Figure 1 shows SNL’s FY2012 status towards meeting the GHG reduction objective and target, in terms of tonnes carbon dioxide equivalents (CO₂e). Since this objective and target has a FY2020 timeline, monitoring and measurement progress will be ongoing.

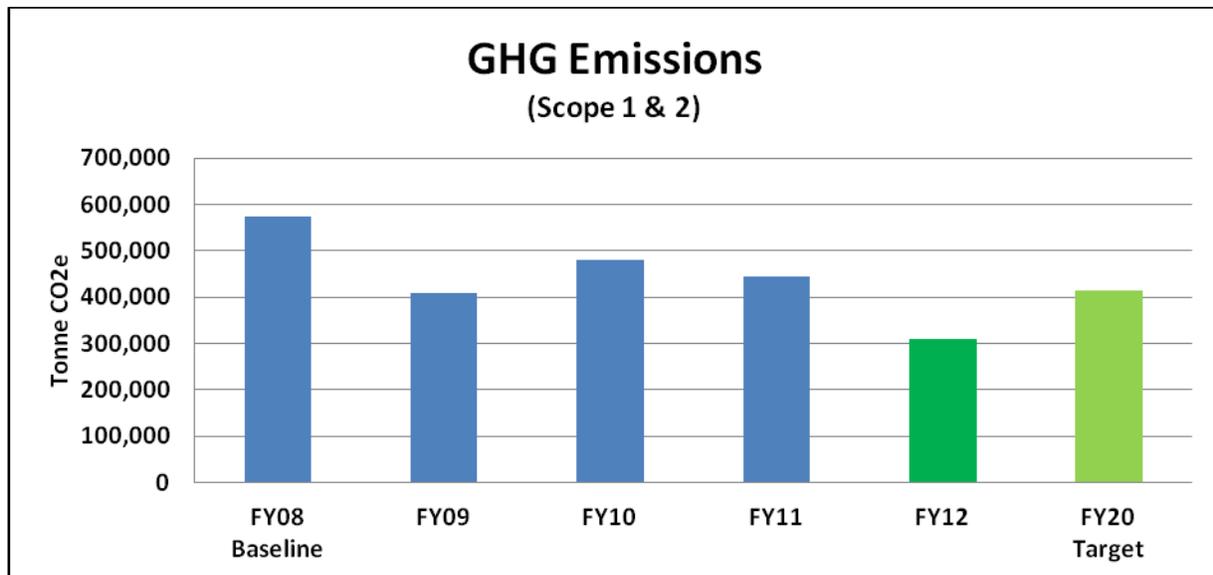


Figure 1. GHG Emission Reduction Trend.

2.2 Environmental Aspect: Personnel Transportation

Objective: Reduce Use of Fleet Petroleum

Target: By FY2020, reduce fleet petroleum consumption by 2 percent per year relative to a FY2005 baseline.

Scope: Corporate SSP Goal for all SNL Sites

Objective: Increase the Use of Fleet Alternative Fuel

Target: By FY2015, increase fleet alternative fuel consumption by 10 percent per year relative to a FY2005 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 the *Energy Independence and Security Act of 2007* (EISA 2007). EO 13423 requires Federal

agencies to reduce “subject” fleet petroleum use by 2 percent per year through FY2015 (from a FY2005 baseline), for an overall reduction of 20 percent. EO 13514 incorporates this requirement and extends it to FY2020, 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 FY2015 (from a FY2005 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, Sandia 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 FY2010 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.

FY2012 Results:

SNL achieved an 8 percent reduction in fleet petroleum use relative to FY2011, far exceeding the annual 2 percent target reduction. This resulted in an overall cumulative reduction in fleet petroleum use of 34 percent from the baseline year FY2005, which is above the overall FY2020 target of a 30 percent reduction. SNL achieved a 9 percent decrease in fleet alternative fuel use relative to FY2011. Although this result is significantly below the annual 10 percent target increase, the overall cumulative increase in fleet alternative fuel use is 124 percent compared to the baseline year FY2005. Thus, the overall cumulative alternative fuel use increase is exceeding the overall increase trend necessary to meet the FY2015 objective and target, 159 percent increase. Figures 2 and 3 depict the Fleet petroleum reduction and alternative fuel increase objective and target status, respectively, based on FY2011 results. Since these objectives and targets have FY2015 and FY2020 timelines, monitoring and measurement progress will be ongoing.

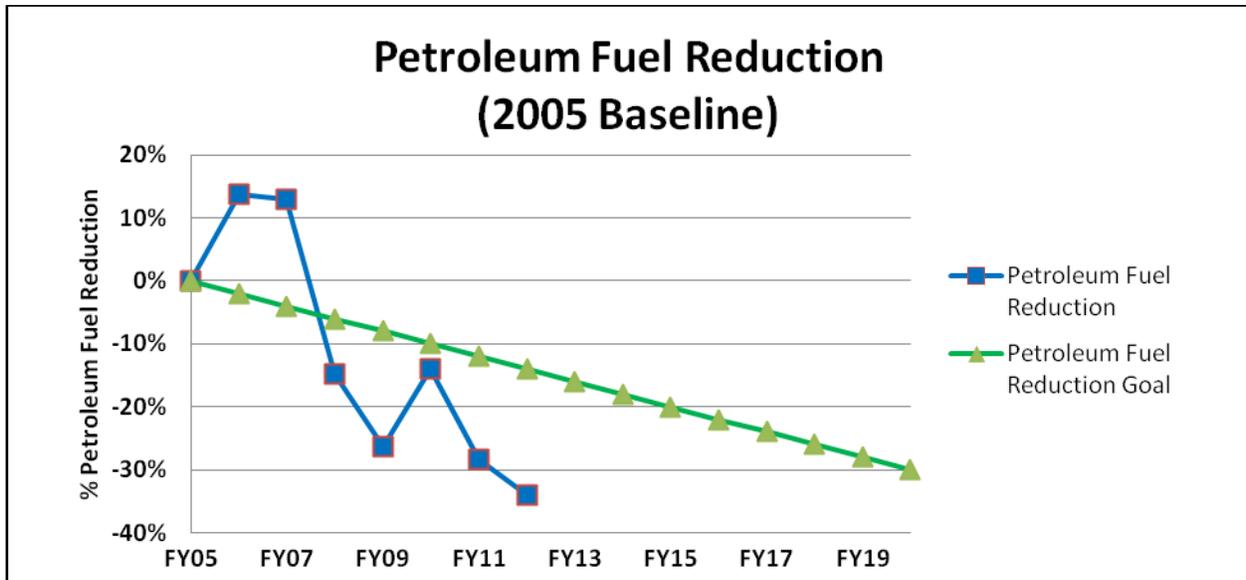


Figure 2. SNL Fleet Petroleum Use Reduction Trend

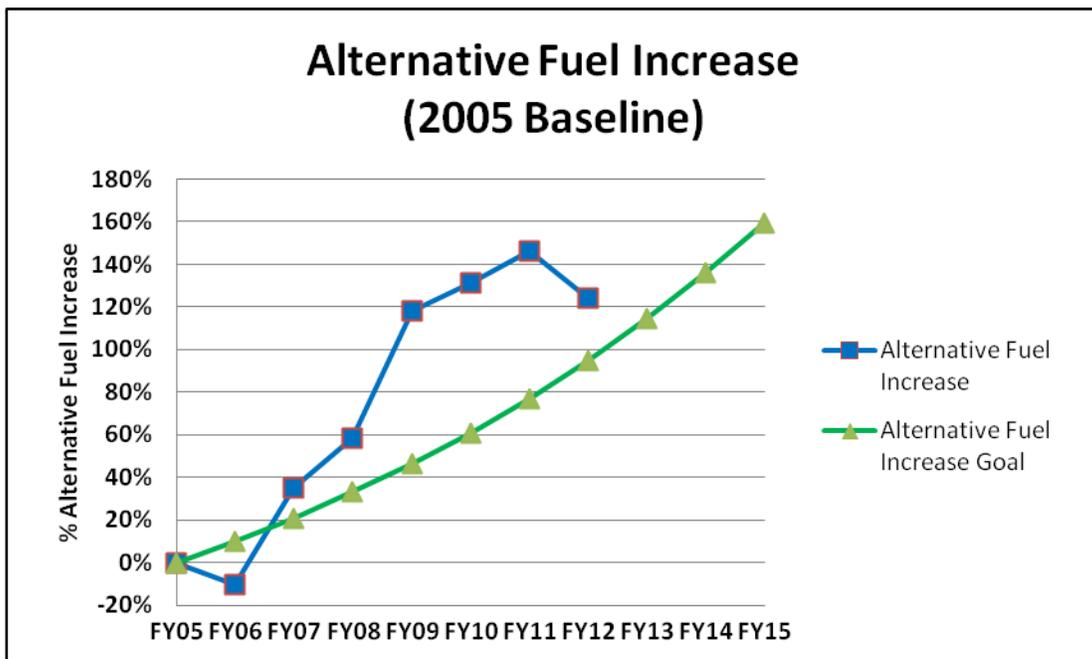


Figure 3. SNL Fleet Alternative Fuel Use Increase Trend

2.3 Significant Aspect: Hazardous Materials/Waste

Objective: Reduce Inventory of Explosive/Energetic Materials/Waste

Target: Remove at least 40,000 pounds gross weight of explosives or energetic materials before the end of FY2012.

Scope: Site-Specific for SNL/NM

This one-year duration objective and target was established in FY2012 within the scope of the SNL/NM site only and is based on continual improvement of hazardous materials/waste reduction efforts. This objective and target spans the significant environmental aspects of both hazardous materials and hazardous waste. Explosive and energetic materials (including waste) are both considered “hazardous” in nature and the term “explosive” is intended to be inclusive of “energetic.”

All explosive materials (including waste) owned by SNL are tracked in the Explosives Inventory System (EIS). The EIS is the only approved explosive inventory system at SNL. Minimizing the quantities of SNL-owned explosive materials (including waste) minimizes Sandia’s safety and environmental risks associated with such materials.

Reductions in the onsite inventory of explosive materials (including waste) at SNL are achieved through three primary practices. First, explosive material can be consumed by use in the activities SNL carries out to perform its mission, such as through experiments involving detonation of explosive material or firing / launching (and thereby expending) a rocket motor. Second, explosive material can be transferred in ownership to another entity, such as the transfer of ownership of unused and un-needed rocket motors to the U.S. Air Force. Finally, explosive material that has been designated as waste can be sent offsite to an approved treatment, storage, and disposal facility through SNL’s Waste Management operations. Regardless of the ultimate disposition path for explosive materials owned by SNL, tracking the cradle-to-grave disposition occurs using the EIS.

FY2012 Results:

SNL achieved a 45,479 pound gross weight reduction in explosive/energetic material inventory in FY2012, exceeding the 40,000 pound reduction target. The largest inventory reduction occurred in the first quarter of FY2012, based on consumption of rocket motors used in testing. Ownership of approximately 4,000 pounds of unused and unneeded rocket motors was transferred to the U.S. Air Force during FY2012. Over 2,000 pounds of explosive waste were transported offsite for disposal.

Explosive waste disposal was a significant issue in FY2012. Following termination of the Kirtland Air Force Base onsite Explosive Ordnance Disposal program in FY2011, SNL/NM had no disposal pathway for explosive waste. As a result, explosive waste accumulation was approaching U.S. Resource Conservation and Recovery Act permit limits pending development of an alternative disposal path. In the beginning of FY2012, an offsite disposal pathway was identified and SNL/NM began reducing the inventory of onsite stored explosive waste.

Figure 4 depicts the explosive/energetic material reduction objective and target results for FY2012 on a quarterly basis.

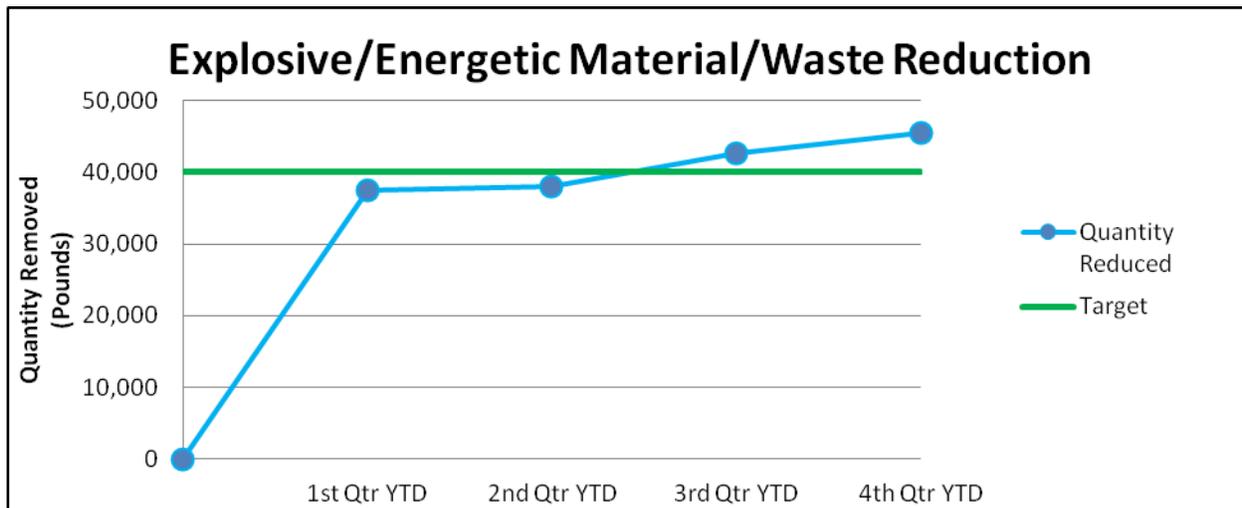


Figure 4. SNL/NM Explosive/Energetic Material/Waste Reduction Results

2.4 Significant Aspect: Hazardous Materials (Use and Storage)

Objective: Improve Chemical Management

Target: Part 1. By FY2013, incorporate Life-Cycle Methodologies into Chemical Management.

Part 2. By FY2013, reduce the Number of Containers of Chemicals that have been On-Site over 10 Years by 1,650.

Scope: Site-Specific for SNL/NM

This one-year duration objective and two-part target was established for FY2012 within the scope of the SNL/NM site only and is based on continual improvement of hazardous materials life-cycle management efforts.

In FY2012, the Environmental Life-cycle Management Program began developing and implementing a Chemical Life-Cycle Management Implementation Plan and reducing the number of chemical containers existing on-site for more than 10 years. The Chemical Life-Cycle Management Implementation Plan involves development and implementation of a pre-procurement process and procedure to ensure proper management of chemicals that will be brought on site to SNL in order to meet corporate and federal requirements, reduce excess chemical inventories, and account for environmental liabilities (disposal) of those chemicals. The milestones established to achieve part one of this target include:

- Determine requirements that improve chemical life-cycle management prior to procurement.
- Brief Organization 4100 senior management and obtain approval to proceed to develop plan.

- Brief Organizations 4100 and 10200 to determine a “champion” to lead the effort.
- Establish a working group to develop the plan.
- Present the implementation plan to Environment, Safety and Health (ES&H) Corporate Clearinghouse.
- Revise process/proposal and receive Clearinghouse approval to implement.

The reduction in chemical containers that have been on-site over 10 years involves reconciliation of Chemical Information System (CIS) inventories attributed to specific chemical owners (or locations) as well as disposition of aging chemicals determined by owners to be no longer needed. Chemical containers are tracked at all SNL sites through CIS, which is an integrated chemical inventory and Material Safety Data Sheet document management system.

FY2012 Results:

Part 1 of this objective and target was accomplished based on completing each of the milestones listed above. In the first quarter of FY2012, chemical lifecycle management requirements were identified, initial briefings were held, and a plan development working group established. In the second quarter of FY2012, the lifecycle management requirements were further refined and developed into pre-procurement requirements flowcharts for the Chemical Exchange Program, Industrial Hygiene, Fire Protection, and the Air Quality Program. Additional briefings were held to update 4100 senior management on issues and concerns identified during the flow chart development process. The working group also received approval to proceed with development of the chemical life-cycle management implementation plan during this time period. In the third quarter of FY2012, the working group completed the Draft Life Cycle Management of Materials Property Purchasing Implementation Plan. The Programs Leaders Council (formerly ES&H Corporate Clearinghouse) was briefed, and approval for implementation was received, in the fourth quarter FY2012.

Part 2 of this objective and target was significantly exceeded with the number of chemical containers existing onsite for 10 years or more being reduced by 9,453 containers. CIS personnel estimate that approximately 25 percent of those containers reduced resulted from inventory reconciliation efforts, while approximately 75 percent of those containers were actual chemical containers submitted to the Hazardous Waste Management Facility for disposal.

2.5 Environmental Aspect: Solid Waste

Objective: Reduce Waste

Target: By end of year FY2012, divert 65 percent of non-hazardous solid waste, (excluding construction and demolition debris).

Scope: Site-Specific for SNL/NM

This two-year duration objective and target was established in FY2011 within the scope of the SNL/NM site only and is considered a “stretch” goal for continually improving solid waste reduction. The objective and target is based on reducing (or diverting) solid waste sent to the landfill through measures incorporating the Pollution Prevention (P2) hierarchy of reduce, reuse, and recycle. Construction and demolition (C&D) waste is specifically excluded from this objective and target, as this portion of the solid waste stream is highly variable at SNL/NM.

The P2 Program coordinates, tracks, and improves the recycling processes for SNL/NM and the nearby offsite Sandia Science & Technology Park, working with both line organizations and the Waste Management Service Center. Coordinating and improving the recycling processes are daily activities. Diversion of solid waste in FY2011 and FY2012 was increased through a number of measures, including:

- Awareness and outreach to MOWs encouraging participation in available recycling opportunities.
- Expansion of existing recycling programs to improve access to MOWs.
- Implementation of new recycling programs.
- Improvements to the existing recycling infrastructure.

FY2012 Results:

SNL/NM achieved a final diversion rate of 67 percent for year ending FY2012, exceeding the 65 percent diversion rate target. Figure 5 shows the quarterly solid waste diversion rate results over the two-year target duration. An increasing trend in the diversion rate occurred over the first three quarters of FY2012 reaching nearly 70 percent, but then decreased slightly in the fourth and final quarter of the FY.

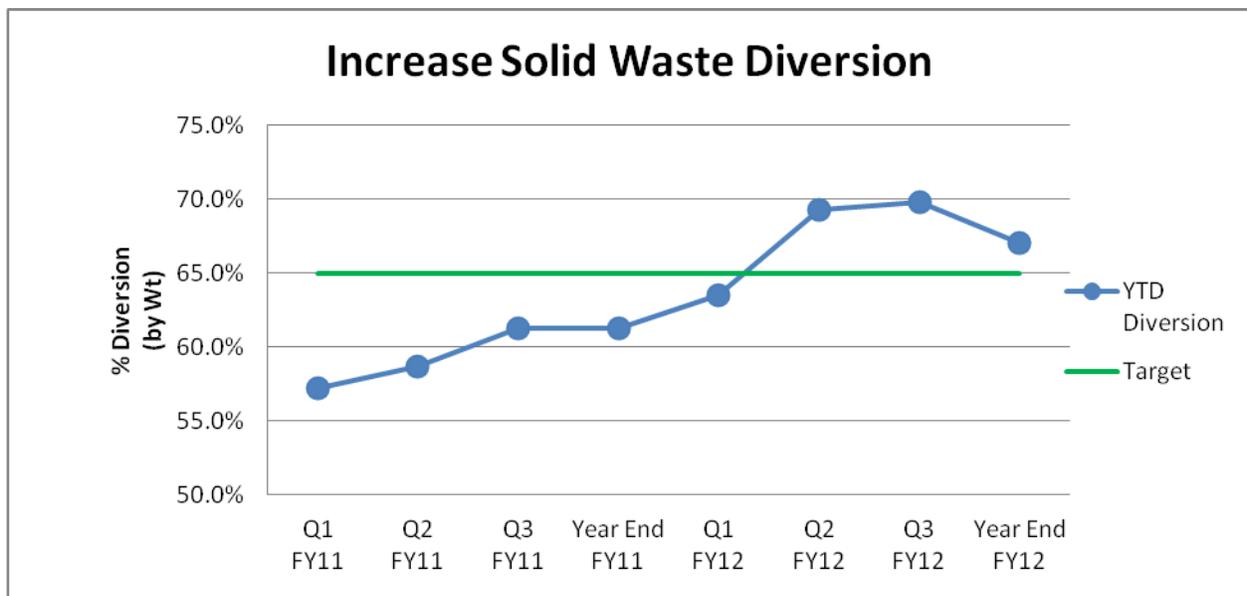


Figure 5. SNL/NM Solid Waste Diversion Results (excluding C&D waste).

2.6 Environmental Aspect: Resource Use – Energy

Objective: Reduce Annual Energy Use

Target: By FY2015, reduce energy intensity by 30 percent relative to FY2003 (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 EISA 2007, which requires DOE to reduce its energy intensity by 30 percent by FY2015 from a FY2003 baseline. This objective and target has been revised from FY2010 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 gross square foot 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, ES&H 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.

FY2012 Results:

SNL is on track to meet the objective and target for energy intensity reduction. In FY2012, energy use intensity was decreased by over 4 percent relative to FY2011, from 149,001 BTU/gsf/yr to 142,646 BTU/gsf/yr. This corresponds to an overall 26.7 percent reduction relative to the FY2003 baseline of 194,533 BTU/gsf/yr. Figure 6 displays SNL's annual energy intensity trend from the FY2003 baseline.

Previous energy intensity data reported for the baseline year through FY2007 was discovered to be incorrectly reported during compilation of the FY2013 SSP. The corrected data is reported herein, and additional information regarding this change is contained in Appendix D of the SNL FY2013 SSP.

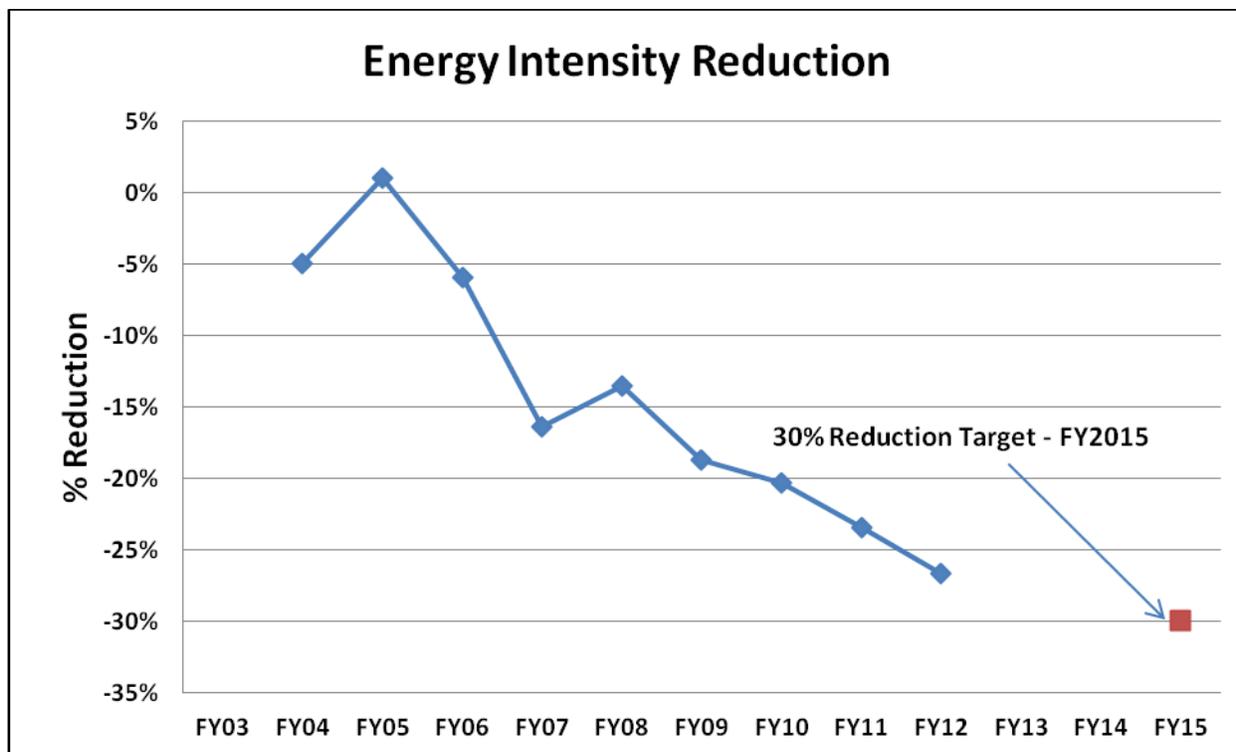


Figure 6. Annual Energy Use Intensity Reduction Trend.

The energy intensity reduction goal has a FY2020 timeline to completion. As a result, monitoring and measurement of this objective and target will be ongoing through FY2020.

2.7 Environmental Aspect: Resource Use – Water

Objective: Reduce Water Use

Target: By FY2020, reduce potable water use intensity by 26 percent relative to FY2007.

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*, which requires DOE to reduce potable water consumption intensity 26 percent by FY2020 relative to a FY2007 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 gross square foot (gal/gsf), and when measured on an annual basis becomes water use per gross square foot of building space per year (or gal/gsf/yr).

This objective and target has been revised from FY2010 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 FY2015, relative to a FY2007 baseline.

Sandia 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.

FY2012 Results:

In FY2012, water use intensity increased by 5.1 percent relative to FY2011, from 50.1 gal/gsf/yr to 52.6 gal/gsf/yr. This corresponds to an overall cumulative reduction of 30.3 percent reduction relative to the FY2007 baseline of 75.4 gal/gsf/yr. Although the current reduction status exceeds the 26 percent target, the water use intensity increase in FY2012 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 HVAC operations as well as landscape irrigation. Figure 7 displays SNL’s annual water consumption trend since FY2007.

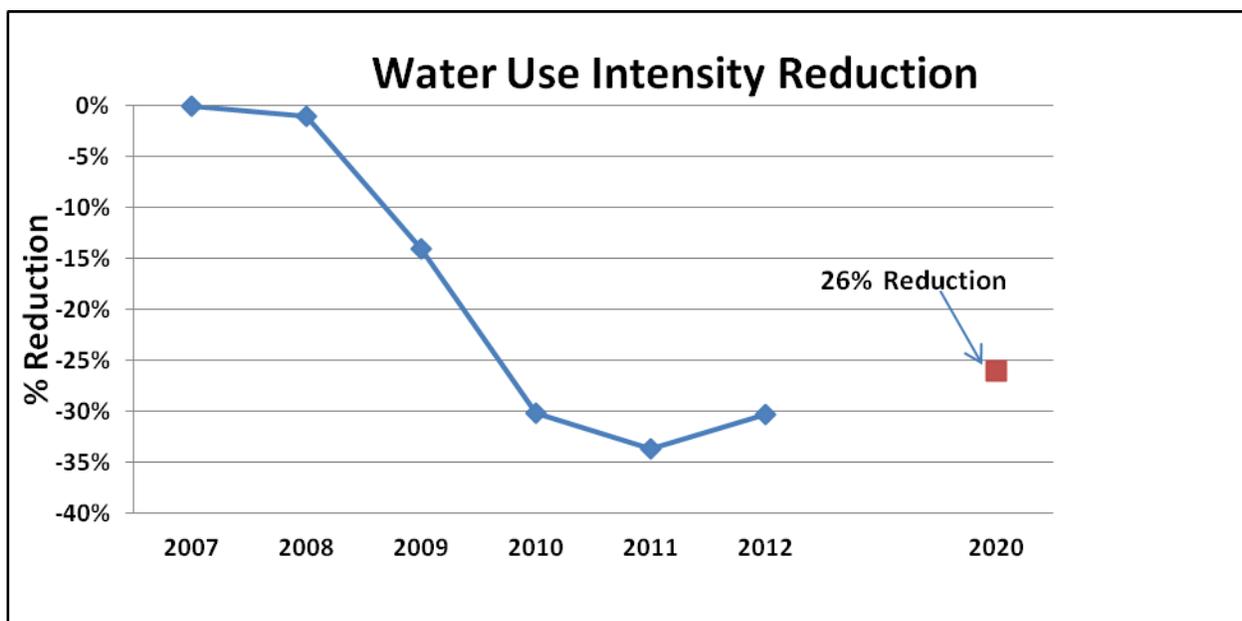


Figure 7. Annual Water Use Intensity Reduction Trend.

The water use intensity reduction goal has a FY2020 timeline to completion. As a result, monitoring and measurement of this objective and target will be ongoing through FY2020.

3.0 DOCUMENTATION AND RECORDKEEPING

The data (status of Objectives and Targets) that is collected in accordance with the Monitoring and Measurement Procedure (AOP 09-06, EMS Monitoring & Measurement Procedures) is maintained and tracked on the EMS Implementation SharePoint Site. The data is provided for management review.

4.0 REFERENCES

4.1 Reference Documents

Sandia National Laboratories/New Mexico, Environmental Management System Manual, PG470222.

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

Sandia National Laboratories, FY2013 Site Sustainability Plan, December 2012, SAND2012-10383P.

5.0 ATTACHMENTS

Not Applicable

6.0 DEFINITIONS

EMS – The Environmental Management System is a part of an organizations management system used to develop and implement its environmental policy and manage its environmental aspects.

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