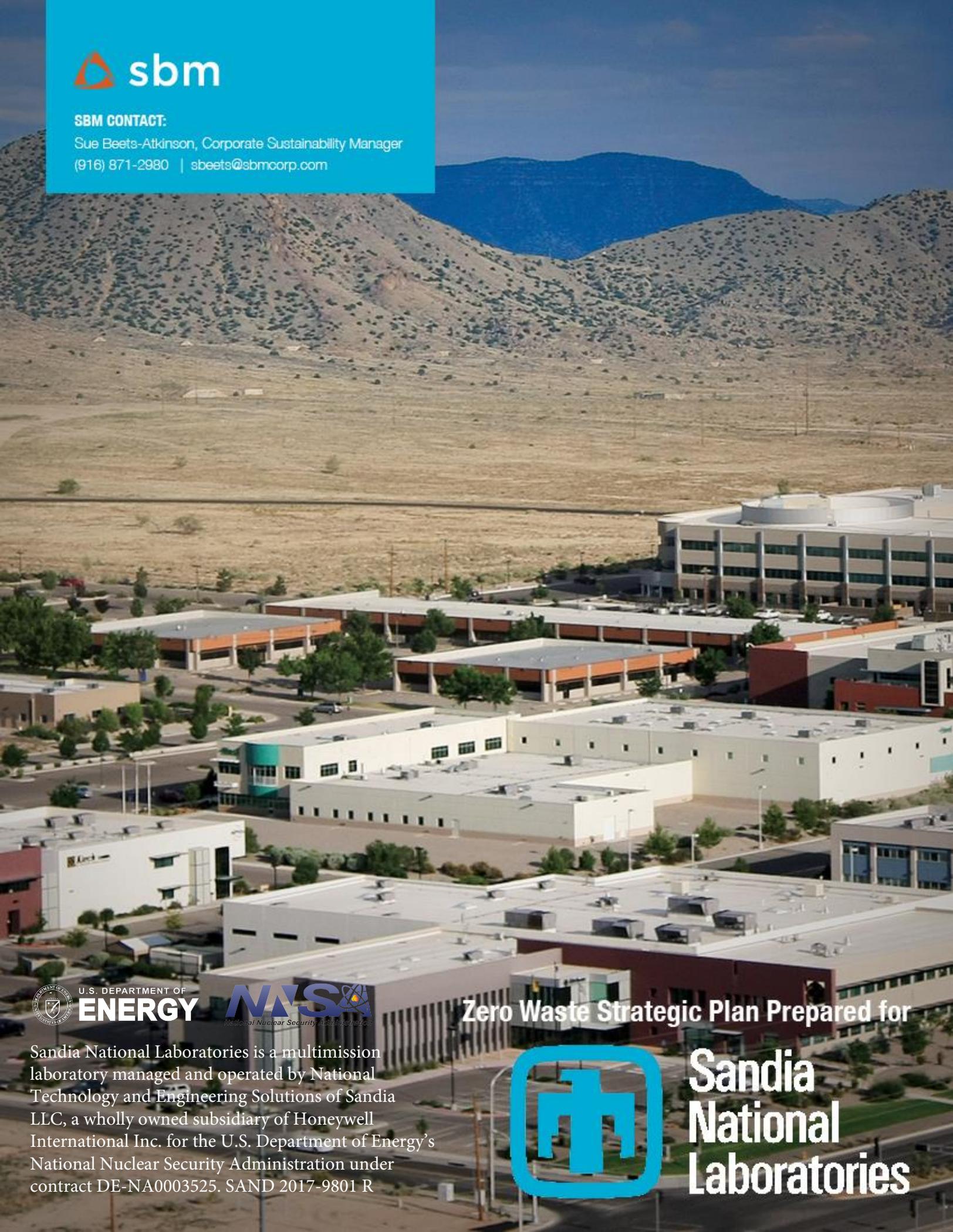




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Zero Waste Strategic Plan Prepared for



**Sandia  
National  
Laboratories**

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# Executive Summary

## **BACKGROUND**

Sandia National Laboratories/New Mexico is located in Albuquerque, New Mexico, primarily on Department of Energy (DOE) permitted land on approximately 2,800 acres of Kirtland Air Force Base. There are approximately 5.5 million square feet of buildings, with a workforce of approximately 9200 personnel.

Sandia National Laboratories Materials Sustainability and Pollution Prevention (MSP2) program adopted in 2008 an internal team goal for New Mexico site operations for Zero Waste to Landfill by 2025. Sandia solicited a consultant to assist in the development of a Zero Waste Strategic Plan. The Zero Waste Consultant Team selected is a partnership of SBM Management Services and Gary Liss & Associates.

The scope of this Plan is non-hazardous solid waste and covers the life cycle of material purchases to the use and final disposal of the items at the end of their life cycle. The Zero Waste Consultant Team performed the following tasks:

- Reviewed recent trends of and current infrastructure for waste disposal and diversion.
- Reviewed recent waste diversion opportunity analyses and reports.
- Interviewed current potential partners and stakeholders, including the following groups over a 3-day period in Albuquerque:

## **SNL STAKEHOLDER MEETINGS**

- MSP2 staff and Manager
- Facilities (Offices/Construction/Grounds & Roads/Structural Services/Warehouse/EMS)
- Vehicles Management
- Food Services & Retail
- Procurement (Offices/Construction/Manufacturing/Logistics/Policy/Infrastructure/JIT)
- Recycling & Waste staff (Custodial/ Solid Waste Collection & Recycling Center/Recycling Field Techs/Environmental Compliance)
- Line Operations and procurement (Manufacturing/Computer Support)
- Logistics (Warehousing and Distribution/ Shipping and Receiving/ Property Management & Reapplication Services)
- Senior Management (David Gibson, Fran Nimick, and Jeff Jarry)

## **TOUR OF FACILITIES**

- Office/Cube and common areas
- Conference Rooms
- Copy/Print
- Cafeteria/Break Areas
- Laboratories
- Shipping/Receiving and Warehouse

- Exterior
- Reuse, Recycling, Composting & Waste Infrastructure

#### TOUR OF PARTNERS

- Friedman Recycling
- Bio-Pappel
- Soilutions
- Albuquerque Bernalillo County Water Utilities Authority
- ABQ Metals

#### ADDITIONAL ANALYSIS

- Evaluated the existing system, what's in the MSP2 program elements, what's being accomplished and what needs enhancement and/or modification to make considerable improvements in Materials Sustainability.
- Included a marketing plan for upper management and the workforce as part of the Zero Waste Strategic Plan.
- Developed this Zero Waste Strategic Plan with interim milestones.

#### KEY FINDINGS

- **Sandia achieved a diversion rate of 65.3% by weight in 2013** (Routine Commercial Solid Waste).
- The MSP2 team has done a great job of setting up reuse, recycling, composting and other waste diversion programs.
- Procurement and logistics offices are providing real leadership to eliminate wasteful practices.
- Reuse, recycling and composting infrastructure and processes are advanced. The current program covers all the major material categories and appears to be implemented well throughout the facilities.
- Sandia employees and contractors embrace the goal of Zero Waste and want to help get there.
- Sandia Zero Waste program supports multiple internal and external Sandia and DOE policies, including:
  - Executive Order 13514 Sustainability goals for Federal agencies
  - U.S. Department of Energy Strategic Sustainability Performance Plan (SSPP)
  - Sandia/New Mexico Site Sustainability Plan
  - City of Albuquerque Climate Action Plan
  - Sandia FY11-15 strategic objectives:
    - Lead the complex as a model 21st century Government owned Contractor operated national laboratory
    - Commit to a learning, inclusive and engaging environment for our people

#### KEY RECOMMENDATIONS

Focus on employee and contractor education, more emphasis on reduce and reuse and buying Green policies and programs, and successful implementation of new simplified recycling and composting programs to get to 90% and be recognized as a Zero Waste Business. Our recommendations are laid out

in six categories in order of importance and are explored in detail in the “Policy, Program and Facility Recommendations” section starting on page 22:

**1. Simplify the Process**

- Modified Single Stream Recycling
- Capitalize on Public's recognition of new CABQ recycling program
- Desk Collection or Central Trash/Recycle
- Ensure Bin availability and co-location
- Clear and Concise labeling
- Re-address Sensitive Paper Process

**2. Strategic Communications**

- Green Teams
- Awareness
- Education
- Training
- Reinforcement, Incentives

**3. Expand reduction, reuse, recycling and composting programs**

- Compost Expansion
- Lean Path or Trim Trax for Cafeteria Operation
- Electronics and Peripherals collection system
- C&D collection expansion
- Lab Recycling Optimization
- Junk Mail Reduction
- Glass Recycling

**4. Develop and Adopt new Policies, Procedures, Rules and Incentives**

- Data Tracking, Accountability and Periodic Review of Progress/Status
- Align with Corporate Lean Six Sigma
- Compliance as a performance measure
- Develop guidelines and policies for selection of scrap sale to vendors
- Include Zero Waste Requirements in Contracts

**5. Support use of materials locally in Closed Loops for Highest and Best Use**

- Food Donation
- Compost
- Sustainable Development and increasing Green Industry
- Federal and/or Regional Cooperation

**6. Product Stewardship and Extended Producer Responsibility**

- Extended Producer Responsibility (EPR)
- EPEAT

- Redesign of Products and processes
- Bans of Problem Materials

### TOOLS FOR ENSURING PROGRESS

- Monthly Data Tracking
- Recycling Opportunity Assessment every 4 years
- Waste Characterization Study every 2-3 years
- Internal Waste Analyses annually
- Tactical Road Map – list steps required to complete the strategy each year
- Annual Budget - Develop forecast of requirements and targets for upcoming year
- Semi-annual Business Review to leadership

### TIMELINE

- Much of the impactful programmatic change is compressed into the first 3 years
- Zero Waste performance of 90% or better *could* be reached by 2018

### NEXT STEPS

#### Immediate:

- Gain High Level Support for Zero Waste Initiative, including briefing Senior Managers that Zero Waste Plan has been developed, and seeking highest level adoption of Zero Waste goal
- Develop Tactical Plan for 2015 (including how to simplify recycling and expand composting)
- Include Zero Waste in D4000 Strategic Communications Plan
- Develop corporate and/or division level objectives and targets to include in Environmental Management Systems (EMS) reports by late Q1

#### Short-term:

- Develop Marketing Plan with assistance from Strategic Communications staff, including: developing branding; determining team for awareness, education, training and incentives; and developing strategy to solicit and engage Green Teams
- Pilot expanded composting of food scraps particularly for paper towels and food scraps and containers from food eaten at desks
- Design simplified recycling system and re-negotiate contracts to implement
- Initiate new reporting systems, including those recommended in Zero Waste Plan and proposed for quarterly EMS reports

# Introduction to Zero Waste

## WHAT IS ZERO WASTE

Zero Waste refers to taking a systems approach to eliminating wasteful practices, setting up reuse systems, recycling and composting to reinvest discarded resources into the local economy to create more income, wealth and jobs. Zero Waste focuses on reducing and designing wastes out of the system, reusing discarded materials and products for their highest and best use for their original form and function for as long as possible, then recycling, composting and redesigning the rest.

The Zero Waste International Alliance (ZWIA) defines Zero Waste as follows:<sup>1</sup>

*“Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where **all discarded materials are designed to become resources for others to use**. Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and **not burn or bury them**. Implementing Zero Waste will **eliminate all discharges to land, water or air** that are a threat to planetary, human, animal or plant health.”*

This is the only peer-reviewed definition of Zero Waste that is internationally accepted by the worldwide Zero Waste, recycling and environmental movements. **ZWIA defines the measure of success in meeting that goal to be diverting 90 percent of the waste generated** from landfills and incinerators (anything over 100°C).

## SANDIA VISION AND MISSION

The Materials Sustainability and Pollution Prevention Program (MSP2) promotes, investigates, facilitates, and implements resource conservation, waste minimization, recycling, and green purchasing to achieve materials sustainability for operations and supply chain management at SNL/NM. In its FY13 Program Plan, the MSP2 Program adopted the following statements:

**Vision** - The MSP2 Program promotes and integrates materials sustainability into all SNL/NM operations.

**Mission** - The MSP2 Program provides technical support to line customers to meet their mission needs with the goals of optimizing resource efficiency and minimizing waste. This is accomplished by developing, maintaining, and enhancing the corporate infrastructure to integrate MSP2 into daily work activities. Progress and achievements are reported regularly to the government, to SNL/NM internally, and to the community.<sup>2</sup>

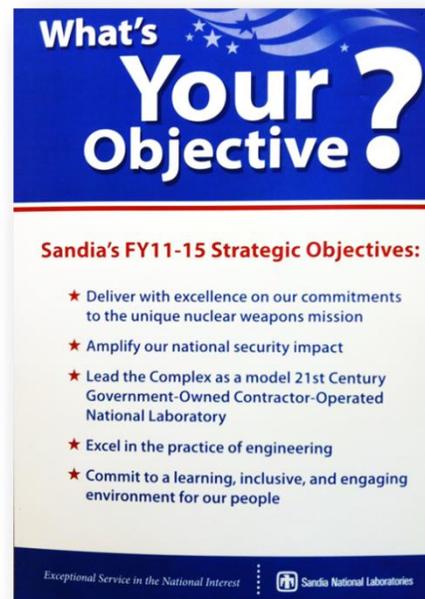
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<sup>1</sup> Source: <http://zwia.org/standards/zw-definition/>

<sup>2</sup> Excerpted from FY13 Program Plan

Sandia National Laboratories is driven to reduce waste and increase waste diversion by both external and internal goals, including:

- Executive Order 13514 in 2009 set sustainability goals for Federal agencies and required improvements in environmental, energy and economic performance. The Executive Order requires Federal agencies to reduce waste generation rates by 50% by 2015; support sustainable communities; and leverage Federal purchasing power by requiring that 95% of federal contracts promote environmentally-responsible products and technologies.<sup>3</sup>
- The U.S. Department of Energy (DOE) Site Sustainability Performance Plan established a goal to divert 50% by FY15.<sup>4</sup>
- The Sandia/New Mexico Site Sustainability Plan established a goal to divert 70% of routine waste by the end of FY14
- Mayor Chavez of Albuquerque proposed in 2007 a goal of Zero Waste to Landfill by 2030, which was incorporated into the City of Albuquerque’s Climate Action Plan in 2008.<sup>5</sup>
- In 2008, the MSP2 Program adopted the goal of Zero Waste to Landfill by 2025 for the New Mexico site operations as an internal Program goal and in support of the City’s effort.
- FY11-15 strategic objectives related to pursuing and achieving Zero Waste
  - Lead the complex as a model 21st century Government owned Contractor operated (GOCO) national laboratory.
  - Commit to a learning, inclusive and engaging environment for our people.



## FOCUS ON NON-HAZARDOUS WASTE

The focus of this Zero Waste Strategic Plan for Sandia National Laboratories is on non-hazardous solid waste, which is the scope of Zero Waste defined by the Zero Waste International Alliance. These materials are either routine or non-routine. Routine discards result from ongoing activities, whereas non-routine discards result from finite activities such as construction and demolition (C&D). The MSP2

<sup>3</sup> [http://www.defensecommunities.org/wp-content/uploads/2012/08/ADC-2012-Zero-Waste-Presentation\\_Draft-080712.pptx](http://www.defensecommunities.org/wp-content/uploads/2012/08/ADC-2012-Zero-Waste-Presentation_Draft-080712.pptx)

<sup>4</sup> SANDIA REPORT: SAND2013-7578, September 2013, FY13 Recycling Opportunity Assessment for Sandia National Laboratories/New Mexico, Samuel A. McCord, Page 7...

<sup>5</sup> <http://www.cabq.gov/cap/strategies/recycling-and-zero-waste/recycling-and-zero-waste>

categorizes waste in this way for reporting and to better understand how materials are discarded at Sandia for planning purposes.<sup>6</sup>

C&D concrete and asphalt (which is most of the non-routine materials) can achieve high levels of reuse, recycling and composting. C&D debris is stockpiled and processed once every two years. Both materials impact the life of landfills used by Sandia. As a result, this Plan recommends including both routine and non-routine non-hazardous discarded materials to achieve Zero Waste. The success in meeting the Zero Waste goal should be reported every two years, after C&D materials have been processed.

## **ZERO WASTE BUSINESS SUCCESS STORIES**

Businesses are leading the way to Zero Waste, particularly in the economic climate of the past five years. Those that already embrace Zero Waste have discovered the money it saves, the increased operational efficiency it brings, and the decrease in liabilities it offers, as well as a significant reduction of their carbon footprint and greenhouse gases.

There are thousands of examples of businesses that have already achieved Zero Waste, including some comparable organizations to Sandia as highlighted below. Some of the most applicable examples of Zero Waste are military bases, NNSA laboratories and other DOE sponsored facilities.

### **Vandenberg Air Force Base**

Vandenberg Air Force Base lies approximately 150 miles north of Los Angeles. The base covers 99,100 acres and approximately 42 miles of coastline. Vandenberg mission is to launch scientific and commercial space satellites into polar orbits and testing Intercontinental Ballistic Missiles for the Department of Defense. Vandenberg is like a small city, and provides recycling services to facilities, residents, and tenant organizations.

Vandenberg has successfully implemented reuse, recycling, and diversion programs for materials such as paper, cardboard, plastic, concrete, asphalt, and metals that are typical of any federal facility.

Vandenberg has diverted over 90% of its discarded materials since the late 1990s. For the past 6 years, Vandenberg has achieved a 92 percent waste diversion rate—the highest in the Air Force. Vandenberg continues to pursue diversion of more complex and challenging materials, making it a model for the Department of Defense. These more challenging waste streams include: expanded polystyrene, cooking oil and greases, plastic bags, electrical transformer carcasses, wooden pallets, consumer batteries, treated wood, used oil, and toner cartridges. The goal of the Vandenberg Recycling Team is to create a zero waste environment.

Recycling efforts at Vandenberg resulted in reducing transportation, manufacturing, raw material acquisition and waste disposal. These all contributed to decreasing greenhouse gases, reduced air emissions by 4, 611 tons and saved 1,638 per household equivalent units of energy.<sup>7</sup>

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<sup>6</sup> Ibid, Sandia Recycling Opportunity Assessment 2013, page 7.

<sup>7</sup> [http://yosemite.epa.gov/r10/ECOCOMM.NSF/Federal+Green+Challenge/FedGreenWebinar2-11/\\$FILE/5-CTC-Nom-Zero-Waste-09.pdf](http://yosemite.epa.gov/r10/ECOCOMM.NSF/Federal+Green+Challenge/FedGreenWebinar2-11/$FILE/5-CTC-Nom-Zero-Waste-09.pdf)

## US Military Net Zero Waste

The U.S. military overall adopted Net Zero Energy, Water and Waste programs that will ultimately affect Kirtland Air Force Base. The US military has been working to implement a variety of federal executive orders to expand their recycling programs. The Army has adopted a goal of Net Zero for energy, water, and waste. Their Net Zero programs have a hierarchy that starts with reduction, and then progresses through repurposing, recycling, energy recovery, and disposal being the last. <sup>8</sup>



The military established 5 Net Zero Energy, 5 Net Zero Waste, and 5 Net Zero Water Installations as pilot programs in 2011. Net Zero Waste Sites include: Fort Hood, TX; Fort Hunter Liggett, CA; Fort Polk, LA; Joint Base Lewis-McChord, WA and U.S. Army Garrison Grafenwoehr Germany. Overall Net Zero Installations include: Fort Bliss, TX and Fort Carson, CO.

### Pilots selected in 2011:

5 Net Zero Energy + 5 Net Zero Waste + 5 Net Zero Water Installations

One that is all three by 2020

### Net Zero Waste Sites:

Fort Hood, TX; Fort Hunter Liggett, CA; Fort Polk, LA; Joint Base Lewis-McChord, WA and U.S. Army Garrison, Germany

### Net Zero Installations

Fort Bliss, TX

Fort Carson, CO<sup>9</sup>

Fort Bliss was selected as a pilot installation to reach Net Zero Waste by 2020 as the Fort Bliss landfill is expected to close soon. The Net Zero Waste goal requires considering the waste stream when purchasing items, reducing the volume of packaging, reusing as much as possible, and recycling the rest. Fort Bliss' diversion rate as of FY11 was 25%.<sup>10</sup>

## NNSA Laboratories

MSP2 staff contacted other NNSA Laboratories to benchmark SNL relative to other comparable facilities and asked them if they are pursuing Zero Waste, have a target year, and/or have a Plan in place. Those that were furthest along down this path were:

- **Los Alamos NL** – They indicated that they have a long term plan that contains a grand challenge but did not formally adopt a target. They are very interested in formulating a Zero Waste Plan

<sup>8</sup> Oceanside Zero Waste Plan, 2012, page 15.

<sup>9</sup> [http://www.defensecommunities.org/wp-content/uploads/2012/08/ADC-2012-Zero-Waste-Presentation\\_Draft-080712.pptx](http://www.defensecommunities.org/wp-content/uploads/2012/08/ADC-2012-Zero-Waste-Presentation_Draft-080712.pptx)

<sup>10</sup> <https://www.bliss.army.mil/dpw/environmental/index.html>

- **Y-12 (Tennessee)** – They indicated that they have been going down this path, but that there was no formal plan or target year in place.

### Other DOE Sponsored Facilities

MSP2 staff contacted other DOE sponsored facilities similarly. Those that were furthest along down this path were:

- **Lawrence Berkeley NL** – They indicated that they have no plan in place, but should be at 75% waste diversion right now and that they have a zero waste target for 2020.
- **Stanford Linear Accelerator Program (SLAC)** – They indicated that they began a Zero Waste program in 2008, and in 2011 more rigorously pursued the implementation of that Zero Waste program. Their next goal is to get to 75% waste diversion by 2020.
- **Bonneville Power Administration (BPA) in Portland** – They have been active in the last 3 years. Portland State University does waste audits. Central Hub collects waste & recyclables. They are at about 75% waste diversion now.

In California, the State Legislature adopted AB341 in 2012, which included a 75% waste diversion goal to be achieved statewide by 2020. AB341 also required that all businesses that generate more than 4 cubic yards of waste per week must participate in recycling programs, as 75% of all materials still being discarded were being wasted by businesses.

### Zero Waste Businesses

There are several examples of Zero Waste Businesses that have already diverted over 90% of their wastes from landfills and incineration in the region, including:

- Intel, Rio Rancho, NM
- New Belgium Brewery, Fort Collins, CO
- Toyota, San Antonio, TX

Other notable examples of those working towards Zero Waste in the region are:

- Walmart corporate-wide
- Albertson’s supermarkets
- Albuquerque Academy
- Santa Fe Community College
- New Mexico PIRG<sup>11</sup>
- Sierra Club Rio Grande Chapter<sup>12</sup>
- Home Grown New Mexico<sup>13</sup>

<sup>11</sup> <http://nmpirgstudents.org/campaigns/nm/zero-waste>

<sup>12</sup> <http://nmsierraclub.org/zero-waste>

<sup>13</sup> <http://homegrownnewmexico.wordpress.com/2013/03/07/our-zero-waste-goal/>

- Reunity Resources<sup>14</sup>
- Ingredients, zero-waste grocery store, Austin<sup>15</sup>

Some of these are highlighted below.

**WalMart** - In the U.S., more than 81% of the materials that flow through their stores, clubs, and distribution centers is being diverted from landfills. Operations in Japan and the U.K. lead the way with a diversion rate of more than 90%, while Walmart Canada and Walmart Mexico divert more than 70%. Walmart reduced plastic bag waste by more than 38% by the end of 2013, compared to a 2007 baseline. That represents a reduction of 10 billion bags annually. By working with suppliers, WalMart is also developing product packaging solutions that cut unnecessary waste and save customers money. These are a few recent examples:



- **U.K.:** In 2013, operations in the United Kingdom introduced a lighter version of its private-label Eden Falls water bottles. The new 500-milliliter and 2-liter water bottles are 6% and 13% lighter, respectively.
- **Japan:** By developing non-tray packaging for meats and seafood, and introducing a corn-based bio-plastic wrap for 37% of its packaged produce, Walmart Japan has reduced the total weight of trays by 25.5% since 2007.<sup>16</sup>

**Toyota** has 10 “Zero Waste” Plants in the U.S. that achieved 95% reduction of waste to landfill since 1999 (including one in San Antonio). Toyota also reports that one headquarters building and 3 Distribution Centers are “Zero Waste to Landfill”, and eight Distribution Centers achieved a greater than 90% Recycling Rate. Toyota reported that their **returnable shipping modules saved them \$1 billion from 2002-2012.**

In 2013, the **New Mexico Recycling Coalition** developed a Recycling Plan to Create 5000 Jobs in New Mexico. In that Plan, NMRC highlighted the following examples of how major corporations are looking at Zero Waste.<sup>17</sup>

“In 2007, at the 26th annual National Recycling Coalition Exhibition, the two opening speakers—Dave Steiner, CEO of Waste Management, and Scott Vitters, Sustainable Packaging Director, Coca Cola—stressed the importance of changing the way Americans value waste in an effort to achieve Zero Waste. Steiner defined Zero Waste as collecting and processing waste materials for reutilization. His focus was to make recycling simpler for the consumer, thereby increasing the volume of materials in the recycling stream. Vitters defined Zero Waste more narrowly, arguing that the material packaging of products

<sup>14</sup> Nonprofit in Santa Fe with a Zero Waste mission, composting food scraps and making bio-diesel fuel from used cooking oil: <http://www.reunityresources.com/>

<sup>15</sup> <http://www.archinia.com/index.php/more/easyblog/entry/zero-waste-grocery-store>

<sup>16</sup> <http://corporate.walmart.com/global-responsibility/environment-sustainability/waste>

<sup>17</sup> [http://www.recyclenewmexico.com/pdf/Recycling\\_Plan\\_to\\_Create\\_5000\\_Jobs\\_in\\_NM.pdf](http://www.recyclenewmexico.com/pdf/Recycling_Plan_to_Create_5000_Jobs_in_NM.pdf), page 4

should be considered valuable raw material for reuse. He defined the current state of sending packaging materials to landfills as a core inefficiency, adding avoidable costs to companies.<sup>18</sup>

Both men have since led rapid industry change and developed “out of the box,” cutting-edge solutions:

- At The Wall Street Journal’s September 2012 ECO:nomics conference, Steiner is quoted as saying, “We faced that existential question about five or six years ago. We looked at all the stuff that we take and we put into landfills across the United States. And we said, ‘What would that be worth if we were able to separate it out and sell it for its constituent price?’ Our total revenue right now is about \$13 billion, \$14 billion. If we could take all that garbage you’re giving us—in fact, we’re charging you to pick it up—and separate it and sell it into the commodity markets, it would be worth about \$10 billion to \$12 billion. We could double our revenue if we sold it for its commodity value.”<sup>19</sup>
- In September 2012, Vitters discussed Coca-Cola’s plant-based materials and commitment to recycling: “But the journey needs to have a destination. Our destination is Zero Waste.” Coca-Cola’s published goals are to recover 50% of its bottles and cans by 2015 and 100% by 2020. “Lots of people are on sustainability journeys,” says Vitters. In 2009 the company opened the world’s largest plastic bottle-to-bottle recycling plant in Spartanburg, SC. The plant will produce approximately 100 million pounds of recycled Polyethylene terephthalate [PET] plastic for reuse each year—the equivalent of nearly 2 billion 20-ounce Coca-Cola bottles. These efforts are all focused on helping “close the loop” on packaging use and producing truly sustainable packages for consumers.”<sup>20</sup>

## **BENEFITS OF ZERO WASTE**

All businesses that have adopted Zero Waste as a goal have saved money, reduced their liability, increased their efficiency and reduced their greenhouse gases. They save the most money by reducing wasting, next most by setting up reuse systems like returnable shipping containers, and they also save with recycling and composting, if the trash fees provide incentives for waste reduction. Zero Waste businesses also contribute to reinvesting resources in local businesses and nonprofits.

Zero Waste aligns with USDOE sustainability goals to reduce waste by 50% by 2020, and supports the DOE Net Zero Energy goal by conserving significant amounts of energy, particularly through upstream initiatives.

Additional benefits are detailed below in the Impact Analysis section of this Plan.

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<sup>18</sup> <http://nasarecycles.nasa.gov/assets/documents/NationalRecyclingCoalition.pdf>

<sup>19</sup> <http://online.wsj.com/article/SB10001424052702304636404577299693244220740.html>

<sup>20</sup> [http://www.greenerpackage.com/bioplastics/destination\\_zero\\_waste](http://www.greenerpackage.com/bioplastics/destination_zero_waste)

# Goals and Objectives

## ZERO WASTE BY 2025

Sandia achieved a diversion rate of 83%<sup>21</sup> in 2013. Once this Plan is fully implemented, **Sandia should be able to readily achieve the international standard of 90% waste diversion to be a successful Zero Waste Business.** The timeline on page 44 highlights that it is possible that this could be achieved by 2020 or sooner. It is definitely possible to achieve this goal by the target year of 2025.

One of the keys to getting to Zero Waste is engaging the whole organization in achieving the goal, much like Sandia's safety program. Until now, the Zero Waste goal was set informally by the MSP2 Program. To get everyone to participate and buy in to this goal, it's now time for Sandia to formally adopt the Zero Waste goal at the highest level of the organization. The most successful Zero Waste businesses have had the strong support of their Chief Executive Officers who also have asked all employees to actively participate. The Zero Waste Consultant Team recommends that Kim Sawyer, Executive VP for Mission Support and Deputy Labs Director Sandia Corporation, adopt the Zero Waste goal as defined in this Plan, and urge all employees to participate. A sample resolution is included in the appendix "Zero Waste Resolution" that could be approved by Kim Sawyer, or a letter could be sent to all staff incorporating the points of the sample resolution.

## Valuing waste as a resource

There are many other benefits that come from valuing waste as a resource and Sandia pursuing higher waste diversion goals, including:

- Local jobs and economic development from conserving and using resources locally rather than landfilling them
- Promoting the donation of food to those who most need it in the Albuquerque area
- Getting nutrients back to the soil to enhance local agriculture and horticulture and save water by using compost
- Helping business partners of Sandia and stakeholders be more sustainable and efficient
- Protecting health of residents by reducing emissions from landfilling
- Saving energy and producing clean energy – reducing, reusing and recycling materials and products conserves 3-5 times the amount of energy that could be produced by burning those materials. Once all materials are reduced or recovered, there are different technologies that could produce energy from remaining materials using biological processes that comply with international standards for Zero Waste.
- Improving local air quality and reducing mobile emissions through more local use of resources
- Reducing the use of toxic products through use of cleaner and safer alternatives
- Protecting and restoring habitat, biodiversity and open space through increased use of compost products and reducing the need for mining

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<sup>21</sup> Based on data from "Zero Waste Strategic Plan Data - Recycled and Landfilled - Last 6 Quarters"

- Providing “green” marketing edge for local businesses

## IMPROVED PRODUCT STEWARDSHIP

Product stewardship refers to voluntary policies and programs established by producers, retailers, distributors and other suppliers to take-back products and/or packaging for reuse, recycling, composting or proper disposal at no cost to Sandia. Sandia has already adopted a number of policies and practices to incorporate paper free operations.

The Sandia Procurement team has enacted a policy to eliminate paper proposals and contracts from being sent to Sandia. This has eliminated a great deal of paper and copies that are unnecessary. This has also eliminated two people managing the paper process who could be reassigned to higher priorities.

A number of additional strategies can be employed for improved product stewardship and Zero Waste Purchasing, including: Adopt Precautionary Principle (The Precautionary Principle is like the Hippocratic oath – “Do no harm.” Adopting the Precautionary Principle to guide purchasing decisions would result in each Department assessing whether any of the products they purchase are toxic to humans, animals or the environment, and if so, are there alternatives that are less toxic, could less of the product be used, or whether a process that uses that product could be changed to eliminate its use. MSP2 staff could work with each Department to evaluate their needs and opportunities in complying with a policy such as this if it were adopted.); Purchase Zero Waste products and services; Avoid single use products and packaging; Return to vendors wasteful packaging; Reduce packaging and buy in larger units; Use reusable shipping containers; Purchase reused, recycled and compost products; Buy remanufactured equipment; Lease, rent and share equipment; Buy durables (using life-cycle cost analyses).<sup>22</sup> Policies may be included as part of Sustainable, Green, Corporate Responsibility, Social Responsibility, and/or Climate Change Purchasing Policies or Plans. Additionally: Sandia can highlight how many disposable goods were replaced by durable goods and what were the costs or savings. Many businesses (large and small) have saved significant amounts of money by switching to reusable shipping containers. Another example would be the use of reusable plates, bowls, cups, and utensils for cafeterias, break and conference rooms, and special events. Additional support could be provided for the latter to be successful by company provided dishwashers, durable goods and deposits for those used at special events.

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**"We don't need to buy something that we already have, but we do need to improve knowledge of what we have"**

**- Executive VP Kim Sawyer**

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<sup>22</sup> Source: Alicia Culver, [www.ResponsiblePurchasing.org](http://www.ResponsiblePurchasing.org)

Through the centralized purchasing system, a guideline or policy could be adopted to identify environmentally preferred products, packaging and services that address Zero Waste. Those could be highlighted in purchasing catalogs used by purchasing agents and other Sandia staff. For decentralized purchasing activities, Sandia could implement a system that communicates that it is the company's policy to purchase environmentally preferred products and provide an easy to access directory of such products. Executive Order 13514 has already required that 95% of federal contracts promote environmentally-responsible products and technologies.

Sandia should also create a system to track environmentally preferred products that includes Zero Waste products, packaging and services. This should be highlighted in purchasing guidelines used by purchasing agents and/or any departments authorized to make purchases. Zero Waste is about only buying what is needed and not stockpiling different products that can become outdated and get recycled instead of having a useful life.

### **Cradle to cradle and Zero Waste**

Cradle to cradle refers to the design of products and systems based on natural processes. All materials are either "technical" or "biological" nutrients in cradle to cradle designs. Technical nutrients are designed to be non-toxic with no negative effects on the environment and used over and over again in continuous cycles. Biological nutrients are designed to be discarded after use into nature and providing food for soil and microbiological life within the soil. A basic equation often cited regarding biological nutrients is that Waste = Food. This refers to discarded organic materials becoming food for bugs and insects, who feed on it, decompose it and enrich the soil for growing food for humans.<sup>23</sup>

Initially defined by William McDonough and Michael Braungart, the Cradle to Cradle Products Innovation Institute was established to certify products meeting criteria addressing:

- **Material Health** (made with materials that are safe and healthy for humans and environment)
- **Material Reutilization** (all parts can be reused or recycled safely by nature or industry)
- **Renewable Energy** (products assembled and manufactured with renewable energy)
- **Water Stewardship** (to protect quality of water used and discharged)
- **Social Fairness** (including fair labor practices and social and environmental justice)

Cradle to cradle supports the concepts that are embodied in the concept of Zero Waste.

## **REDUCED GHG (IN CONTEXT OF DOE STRATEGIC SUSTAINABILITY PERFORMANCE PLAN)**

Greenhouse Gas (GHG) protocols categorize direct and indirect emissions into three broad scopes:

- **Scope 1:** All direct GHG emissions.
- **Scope 2:** Indirect GHG emissions from consumption of purchased electricity, heat or steam.

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<sup>23</sup> [http://en.wikipedia.org/wiki/Cradle-to-cradle\\_design](http://en.wikipedia.org/wiki/Cradle-to-cradle_design)

- **Scope 3:** Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities... not covered in Scope 2, such as outsourced activities and waste disposal.”<sup>24</sup>

Executive Order 13514 requires each agency to establish a scope 1 & 2 GHG reduction target for

FY2020. The target for USDOE is a 28% reduction compared to FY2008. The actual status in 2011 was a 12.6% reduction compared to the FY2008 baseline. Each agency was also to establish a scope 3 GHG reduction target for FY2020. The FY2020 target for USDOE is 13% lower than the FY2008 baseline. The actual status in 2011 was a 12.2% reduction from the FY2008 baseline, very close to the 2020 target.<sup>25</sup>

Zero Waste can contribute significantly to the reduction of GHG, primarily through the “upstream” benefits of reducing impacts of wasting from mining, manufacturing and distribution of products. The average municipal climate change plan finds that 10-20% of GHG reduction can come from Zero Waste initiatives. In Fort Collins, CO, the largest percentage decrease of all actual climate change emissions between 2005 and 2012 occurred in the waste sector, which reported a 66.7% drop.<sup>26</sup> Most of these GHG reductions are Scope 3 reductions, so will contribute primarily to exceeding the USDOE goal for Scope 3. However, following the Zero Waste definition of the Zero Waste International Alliance will ensure that no direct emissions are produced from the burning of discarded materials, so that the waste sector will not contribute to increasing Scope 1 and 2 GHG emissions.

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<sup>24</sup> <http://www.ghgprotocol.org/calculation-tools/faq>

<sup>25</sup> [http://www1.eere.energy.gov/sustainability/pdfs/doe\\_sspp\\_2012.pdf](http://www1.eere.energy.gov/sustainability/pdfs/doe_sspp_2012.pdf)

<sup>26</sup> 2012 Fort Collins Climate Status Report, page 8. [http://www.fcgov.com/common/images/spotlight\\_image.php?id=1609&type=3](http://www.fcgov.com/common/images/spotlight_image.php?id=1609&type=3)

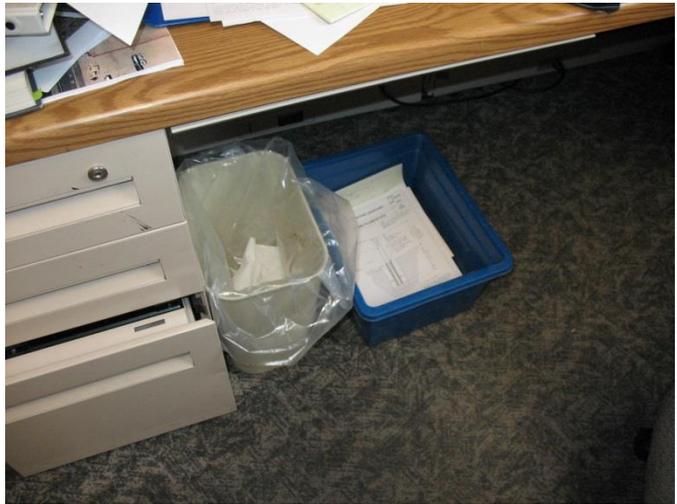
# Analysis of Existing System

## SITE PRACTICES

The project team conducted a walkthrough of the facility with a focus on reviewing representative samples of all the different space types (Office, Conference, Copy/Print, Cafeteria, Break Area, Labs, Warehouse and Common Space) and found the following:

### Office/Cube and common areas

- Desk Side Recycling is currently available for white paper only. Staff members are supplied with a blue under desk bin upon request only and are expected to move the bin to a centralized collection bin.
- All desks are outfitted with a trash bin which is emptied 2X/week as a service of the janitorial staff
- Visual inspection of contents of desk trash bins showed significant amounts of paper and beverage containers
- Recycling centers are generally available throughout the facilities. Some areas could benefit from more conveniently located recycling stations.
- Common area recycling bins observed in Tech area 1 have outdated labeling that states only #1 and 2 plastics accepted (current program accepts 1-7)



### Conference Rooms

- Conference rooms that were viewed on the tour did not contain recycling options.

### Copy/Print

- Copy areas that were observed had opportunity for white paper, mixed paper and confidential paper recovery.
- Many of these areas also had battery collection

### Cafeteria/Break Area

- Back of house operations is capturing cardboard, steel, aluminum and plastic containers, pre-consumer food scraps, post-consumer food scraps
- Toters staged outside building collect food scraps that are picked up by Soilutions for composting
- Interior dining area is outfitted with collection for bottles and cans as well as chip bag collection. Recycling collection bins have adequate signage with pictures and text
- Interior coffee area is outfitted with a compost bin for coffee grounds collection. Bin is not adequately labeled and a poster above the bin shows composting but does not appear connected with the actual bin. Café staff noted that the bin gets contaminated 2-3 times per week and is consequently dumped as trash
- Break areas were generally outfitted with collection for bottles and cans recycling
- Break areas that were observed did not have collection for white or mixed paper



### Laboratories

- Office areas attached to labs were outfitted with white paper recycling similar to other office areas
- Lab areas observed did not have recycling opportunities for mixed paper, plastic, glass or other recyclables
- Staff interviewed on the tour noted that there is no training, guidance or procedures for recycling of non-hazardous material. Examples were given of common materials (#1 and #2 plastic gallon containers)

### Shipping/Receiving and Warehouse

- Shipping and Receiving area recycling opportunities included: Shrink wrap, cardboard and pallets
- Warehouse Building 954 area recycling opportunities included: Shrink wrap, cardboard, light bulbs, carpet tiles, mix metals and pallets
- Noted some volume of plastic strapping in the trash at the Shipping and Receiving dock area.

## Exterior

- Several gate areas viewed on the tour had adequate collection for bottles and cans in console type bins
- Standard collection dumpsters outside buildings consists of trash, cardboard, mixed paper/foam
  - Staff noted that some buildings have space constraints that prohibit placement of all three
- Dumpsters have prominent signage and are color coded to assist in proper segregation



## Recycle and Waste Infrastructure

- Solid Waste Collection and Recycling Center (SWCRC) – The project team was invited to watch the process at the SWCRC with a load of material being dumped on the floor and processed. Materials are pushed onto the conveyor and staff is positioned with rake like tools to positively sort the recyclables. Recyclables are placed in designated piles either in tilt hoppers or on the floor and are then moved into storage for later baling or packaging. The screening of material as it goes up the conveyor seems to work well especially with two staff monitoring the material. Trash is then baled and shipped via walking floor trailer to the local landfill
  - Staff noted that one improvement would be to identify and position collection containers for all positive sort recyclables. Currently the materials pulled out are sometimes staged on the floor of the SWCRC and can create a tripping hazard.
  - Screening of materials by staff is limited to loose items in the waste.
  - Waste sorting staff was asked to break open some of the bags. Significant amounts of recyclable material were noted inside trash bags including:
    - Paper and cardboard
    - Beverage containers
    - Organics (food waste and non-recyclable paper)
    - Miscellaneous electronics peripherals and wiring
    - Porcelain and other construction and demolition materials



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- Drive Through -- Drop off available

to SNL staff with multiple segregations of materials in tilt hoppers and open top containers.

- MSP2 Tents – The available space for storage and protection from the weather provided in these two tents is a huge asset to the program. The tents appear to be well organized and staff noted future upgrades to include an inventory tracking system and addition of two open top containers within the protection of STENT11.
- Current Storage in the two tents includes: Extra bins, ceiling tile, excess dispensers, shrink wrap, Tyvek, foam logs, promotional items, toner, binders and e-scrap
- Reapplication (ReApp) – site tour did not include a full review of the area. However, description of the program by the MSP2 team confirms a well-developed process for disposition of unwanted items. Process encourages on-site re-deployment of items, then online auction and lastly scrap value for unwanted items.



- There may be an opportunity to capture additional weights for re-use materials if they are not all currently accounted for.

## COMMODITIES ANALYSIS

SNL has identified and is utilizing a wide variety of vendors to dispose of their recyclable and reusable commodities. In many cases the materials are baled, staged and shipped in truckload or mixed truckload quantities. This practice is in most cases favorable and should be expanded wherever possible. Economics of sorting and processing labor should be considered for each material recovery effort.



SNL currently utilizes their own trucking and contracted labor to collect trash throughout the site and delivers it to the tipping floor of the SWCRC where it is manually screened for common recyclables. The remaining trash material is then baled and trucked to the local landfill on a tractor trailer with walking floor and disposed at the standard rate of \$30/ton paid to the City and a \$300.30/haul rate charged by ACT. This practice ensures that SNL is only paying for the cubic yards and tonnage that are actually generated and maximizes the tons per haul by increasing the density of the material

In 2013 Friedman Recycling opened a \$22 million state of the art Material Recovery Facility (MRF) in the city of Albuquerque. This MRF is currently handling all of the recycling for municipal pickup in the city and surrounding municipalities and has the capacity to handle all of the recyclables in the state of New Mexico. The MRF is designed to handle Single Stream Recycling (SSR) which is a mix of all paper, cardboard, aluminum and #1-7 plastics. The current Sandia practice of source segregating, baling and shipping materials directly is beneficial from a revenue standpoint and maintaining the highest and best use of materials. However, the ease of use realized by participants that is gained in the collection of mixed materials that can then be separated at a MRF can result in reduced recyclable materials reaching the landfill. This could result in an overall net benefit by increasing participation and diversion rate, and reducing the amount of materials sent to landfill and resulting tip fees.

## SERVICE OPPORTUNITIES ANALYSIS

Service opportunity analyses identify existing services available and highlight where new services are needed to help reach Zero Waste. In a Zero Waste systems approach, one of the first steps to be completed is an inventory of the materials generated in the service area and identification of the facilities that reuse, repair, recycle and/or compost the materials. This analysis incorporates all material generated and all facilities processing the materials. The inventory does not include landfills or incinerators. A complete analysis of the inventory not only identified existing programs and facilities

available to SNL in the area that currently reuse, recycle or compost discarded materials, but also revealed voids or gaps in material markets and services available.

Discards are identified by standard classifications and sorted into twelve market categories. For each classification, productive uses and market options are identified within SNL, locally and regionally. This step also allowed identification of products or packages that have unacceptable disposal options and/or need opportunities for new services.

Issues of access, opportunity, availability and knowledge are addressed. In some cases, the inventory showed that there is no reuse, recycle or compost option. In such instances, these items should be addressed as producer responsibility issues.

**“If it can't be reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, then it should be restricted, redesigned, or removed from production.”**

**Martin Bourque,  
Berkeley Ecology Center**



The main objective of this exercise was to ascertain availability of recycle, reuse and composting services that would meet the need of SNL for current and future programs supporting a Zero Waste outcome.

In general the availability of recycling and reuse options in the Albuquerque area is abundant and has capacity for growth. In many cases with the highest value and volume materials there are multiple options. SNL has done a good job of identifying and utilizing a wide variety of material outlets.

MATERIAL BY TYPE	PROGRAMS/FACILITIES/OPTIONS
<b>Reuse</b>	Re-App program on-site receives, catalogues, and markets items that have reuse value
<b>Textiles</b>	No significant volume of textiles generated at the site. Local clothing reuse/thrift outlets could be an option when materials are generated
<b>Polymers (Plastic)</b>	Several options are available to SNL for a wide variety of plastics. Local infrastructure at the Friedman MRF accepts #1-7 plastic containers as well as mixed rigid plastics. SNL is currently shipping a number of plastics streams to Berg Mill Supply Co in California.
<b>Metals</b>	Local infrastructure available for most common metals types. Acme Iron and Metals operates under several business names in ABQ each with different capabilities servicing ferrous and non-ferrous streams in any size and quantity

<b>Glass</b>	Growstone Glass operated out of the Cerro Colorado landfill accepts container glass at the same rate as the landfill tip fee
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<b>MATERIAL BY TYPE</b>	<b>PROGRAMS/FACILITIES/OPTIONS</b>
<b>Paper</b>	Several local options are available for paper and cardboard recycling including Friedman and Bio-Pappel. Bio-Pappel has been used for source segregated and baled materials in truckload quantity. Non-recyclable paper including waxed cardboard, food soiled paper and cardboard, paper towels and napkins are accepted at both Soilutions and ABCWUA as compostable organics as long as the streams are clean
<b>Putrescibles (Food Scraps)</b>	Soilutions – provides pick up service for totes, accepts all forms of organics including compostable service ware. Site tour identified opportunity to divert dead animals found by the site grounds crew. ABCWUA – No hauling service, also no tip fees. Strict government testing of materials requires strict control and forbids any contamination.
<b>Plant Debris (Yard Trimmings)</b>	Soilutions – Accepts all forms of organics, tip fee collected for green waste for \$6/cubic yard ABCWUA – No hauling service, also no tip fees. Accept green waste in all forms
<b>Wood</b>	Wood U Recycle - Scrap wood (including broken pallets & crates) RiteWay - Wood pallets that are in decent shape, but need refurbishing ABCWUA - Scrap plywood (can be mixed with “natural” wood) On Site – collection and redistribution of re-usable pallets
<b>Soils</b>	ABCWUA – No hauling service, also no tip fees. Accept soil products. The MSP2 also has an on-site soils “borrow pit” that is adjacent to the Concrete and Asphalt recycle area (CARA)
<b>Ceramics</b>	Kinney Brick could be a potential option. They crush porcelain and add it to their mix
<b>Chemicals</b>	Not in the scope of this project

# Policy, Program and Facility Recommendations

The tour and communications with the MSP2 team were incredible. The MSP2 team is well versed in knowing the site, programs and commodities. The programs are well organized, controlled and designed to maximize value of materials. Our recommendations below focus on strategies that will take the program to the next level. One of the key points noted during observation of the SWCRC operation and corroborated by the 2009 waste audit, is that although there are programs for all common recyclables and many hard to recycle materials, many of these materials are still making their way into the trash. One of the basic tenets of recycling is to make it as easy (or easier) to recycle as it is to trash materials. This is done through a number of means including education and outreach, co-location of recycle bins with trash bins wherever possible and building in infrastructure, policies and procedures that support that goal. With a goal of 90% or better, all of these tools need to be firing on all cylinders. The prioritized listing of recommendations will help to fill the gaps where the already outstanding program has some room for improvement.

<p><b>1</b> <b>Simplify the Process</b></p>	<ul style="list-style-type: none"> <li>• Modified Single Stream Recycling</li> <li>• Capitalize on ABQ program recognition</li> <li>• Desk Collection or Central Trash/Recycle</li> <li>• Ensure Bin availability and co-location</li> <li>• Clear and Concise labeling</li> <li>• Re-address Sensitive Paper Process</li> </ul>
<p><b>2</b> <b>Strategic Communications</b></p>	<ul style="list-style-type: none"> <li>• Green Teams</li> <li>• Awareness</li> <li>• US Zero Waste Business Council Recognition</li> <li>• Education</li> <li>• Training</li> <li>• Reinforcement, Incentives</li> </ul>
<p><b>3</b> <b>Expand reduction, reuse, recycling and composting programs</b></p>	<ul style="list-style-type: none"> <li>• Compost Expansion</li> <li>• Electronics and Peripherals collection system</li> <li>• C&amp;D collection expansion</li> <li>• Lab Recycling Optimization</li> <li>• Lean Path or Trim Trax for Cafeteria Operation</li> <li>• Junk Mail Reduction</li> <li>• Glass Recycling</li> </ul>

## 4

### Develop and Adopt new Policies, Procedures, Rules and Incentives

- Data Tracking and Assessments
- Tactical, Financial and Accountability
- Align with Corporate Lean Six Sigma
- Compliance as a performance measure
- Develop guidelines and policies for selection of scrap sale to vendors
- Include Zero Waste Requirements in Contracts

## 5

### Support use of materials locally in Closed Loops for Highest and Best Use

- Food Donation
- Compost
- Sustainable Development and increasing Green Industry
- Federal and/or Regional Cooperation

## 6

### Procurement and Extended Producer Responsibility

- Extended Producer Responsibility (EPR)
- EPEAT
- Redesign of Products and processes
- Bans of Problem Materials

## SIMPLIFY THE PROCESS FOR PARTICIPANTS

### Single Stream Recycling (High Priority)

Definition: Collect commingled mixed paper, all plastics and aluminum cans in a single stream.

Single Stream Recycling has been widely accepted as a good way to simplify the process of collecting recyclables and thereby increase participation. This process typically sees a 5-8% increase in waste diversion because the building participants do not have to think about where each recyclable goes. This is a system that could not have been implemented before as there was no processing facility in New Mexico that could handle such mixed materials. The Material Recovery Facility (MRF) built by Friedman Recycling to serve the City of Albuquerque expanded curbside recycling program is now able to process such materials. By implementing a system that is similar to what is working at home, it enables SNL to build on the substantial promotions being done by the City to help change behavior and increase participation in recycling by making it easier and simpler.

- To implement the program at SNL here are a few key steps:
  1. Develop relevant signage to re-label bins; and for use at eye level above containers.
  2. Re-lid bins with a Single Stream friendly opening
  3. Develop a prioritization plan for implementation and follow through of all buildings
  4. Educate staff on changes with targeted communication
  5. Train custodial staff to align bins and sort properly
- It is important to color code and align containers in the same types of places throughout the buildings. The Zero Waste Consultant Team recommends that blue be used for recyclables consistently and green for compostables. Other colors could be used for specialized needs.
- The Zero Waste Consultant Team recommends conducting a financial and logistical analysis of Single Stream and compares the simplicity to participants and greater participation vs. the potential loss of revenue.

#### Capitalize on Public's recognition of new CABQ recycling program (High Priority)

In May of 2013 the City of Albuquerque began distribution of new cart-based Single Stream Recycling. Their staged rollout plan included a number of public outreach and education components including a number of videos and messaging “wrapped” on the exterior of their new collection trucks. Public recognition and understanding of this process will continue to grow. The Zero Waste Consultant Team recommends aligning with the City program where it makes practical and business sense. This would include aligning with color coding, collection of similar waste streams and any other collection, possibly signage or icons, recognition or behavioral conditioning aspects of their program.



#### Desk Collection or Central Trash/Recycle (Medium Priority)

The current system for collection of discards at the desk side poses a significant issue. Trash or landfilled waste is picked up 2X/week by the janitorial staff. Desk recycling bins are only installed by request, and are designated for white paper only. Staff is required to move the bin with white paper as well as any other materials that fit into the recycling program (generally mixed paper, bottles and cans) to a centralized location. This is inherently a dis-incentive to recycle. This issue can be resolved one of two ways by putting both trash and recycling on a level playing field:

1. Provide desk side Single Stream recycle bins to every employee universally and then provide desk side recycling pickup on a frequency that is appropriate for the bin size (e.g. 1-2 times per week). For a cost neutral program, trash collection can be reduced to one time per week and the recycle is picked up one time per week.
2. Discontinue desk side trash pickup. Staff is responsible for moving BOTH trash AND recycle to a centralized location. The added benefit to this program is that there is a component of social

norms that is developed by communally sorting discards at the central location. No one wants to be the only person not doing it right. Another added benefit is reduced janitorial labor commitments, which can be used elsewhere or realized as cost savings.

### **Ensure Bin availability and co-location (High Priority)**

In a best case scenario, it is best to have recycling available at all trash locations. That rule may need to bend in some cases where space, budget or other concerns make it difficult. The Zero Waste Consultant Team reviewed several of the floors that are representative of the operation and found that, in many cases, the availability of recycling bins is few and far between. A full review of floor maps of each and every building and floor should be done to determine some approximated totals of areas that are in need of recycle bins (see attachment “Floor Plan Markup Example”). A rule of thumb is one recycle station for every 25 offices or cubes with considerations made for floor layout and concentration of staff. A good portion of the recyclables found in the trash during waste analyses and observed at the SWCRC can be attributed to the lack of availability of recycling bins when compared to the availability of trash only bins.

### **Clear and Concise branding and labeling (High Priority)**

The Zero Waste Consultant Team recommends developing brand recognition around the various recycling programs. SNL should appoint or contract a design team for the development of the brand and associated tag lines, bin labels and additional communications. The MSP2 team should collaborate with the design team and draw upon its experience with Zero Waste, recycling and sustainability best practices to ensure the messaging is targeted to Sandia norms and to drive participation levels. Labeling from [www.recycleacrossamerica.org](http://www.recycleacrossamerica.org) has some good examples of clear signage.

- Deliverables to include
  - Signage system for Recycle Stations
  - Additional communications
    - Posters
    - Insert for Orientation Packet
    - Format for electronic communications (newsletter)
  - Sample Tagline
    - Eye on Sustainability
    - “Care to Recycle”

### **Re-address Sensitive Paper Process (High Priority)**

The Zero Waste Consultant Team recommends a full review of the white paper and confidential waste collection, destruction, and disposal process. Review should include review of the DOE requirements to ensure that all requirements are fully understood and incorporated into the process, but also to ensure that no additional precautions are currently adhered to that are not explicit in the policy. Review should also include employee training, current practices for storage and disposal for all levels of Classified, Unclassified Controlled and Unclassified Uncontrolled document streams. Review should also address the distribution of bins throughout the site for proper disposal of the material by the staff. The overall

program should be clearly communicated, and visual cues should be simple and direct for easy compliance by the staff. Proper training and documentation should be kept and periodic review of compliance should be conducted. A captivating 2-3 minute video detailing the importance of following policy and procedure to ensure that UCI does not enter the recycle stream is recommended as part of the training regimen.

## **STRATEGIC COMMUNICATIONS**

### **Green Teams (High Priority)**

Green teams can be another great way to spread the word about what is happening with the Zero Waste program. The general idea is to gain support from volunteers who have a personal interest in recycling, get them fully up to speed with the program as Green Team Leaders, they would then share their enthusiasm and knowledge of the program with Green Teams in different buildings or business groups. The Green Team would then support educating the general population. Here is one example of a Green Team effort by a Fortune 500 Pharmaceutical company:

- Set up two levels: One level is the advanced teams or Green Guides that are trained and completely knowledgeable about every aspect of the program. They are the additional spokespeople who talk with the different groups in their buildings and area of influence. They are identified with a sign that is above their cubicle or office space.
- Second level is those that are passionate and want to share ideas and learn more. Quarterly meetings are all that is needed. Possible Annual meeting with lunch or ice cream social
  - Hands On meeting
  - Monthly newsletter communication
  - Training level

### **Awareness (Medium Priority)**

A great way to gain involvement is letting the site population know what is happening with the program. This has been done with the Porcelain Press but key points of success or education could also be included in other publications, including lab news, all hand newsletters, TV screens, Posters, Banners and education tables in the café's.

The Zero Waste Consultant Team also recommends that Sandia leaders should view first-hand the success of Vandenberg Air Force Base as a model Zero Waste organization that is comparable in size and complexity as Sandia.

### **US Zero Waste Business Council Recognition (Medium Priority)**

The Zero Waste Consultant Team recommends involvement with the US Zero Waste Business Council (USZWBC) as a great opportunity to capitalize on the growing Zero Waste community. The group has many great success stories and provides the opportunity to network and team with like-minded organizations for the betterment of the SNL Zero Waste Program. Furthermore, upon a full calendar year of 90% or better diversion, SNL can pursue the 3<sup>rd</sup> party Zero Waste certification offered through the USZWBC. This is a great way to announce and publicize the significant efforts required to achieve Zero Waste.

## Education (High Priority)

Education is a key component to the program. The objective is to make the program simple enough to encourage the greatest level of participation and capture a higher percentage of recyclables before they go into the trash. A targeted and direct communication should be done that will reach all of the employees accessing the site informing them of program changes that will affect them and stating the goal and objective of the recycling program from a high level within the organization.

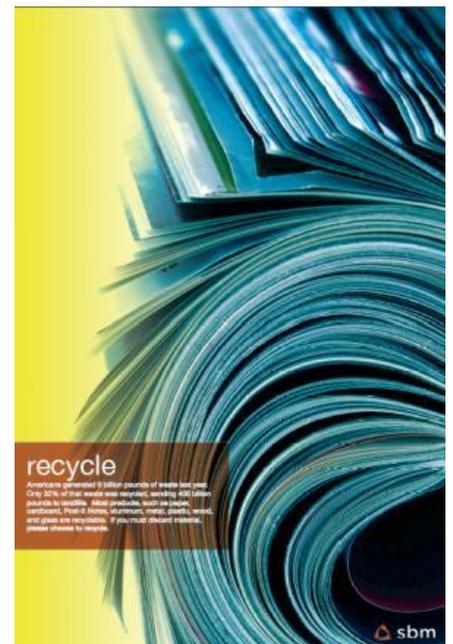
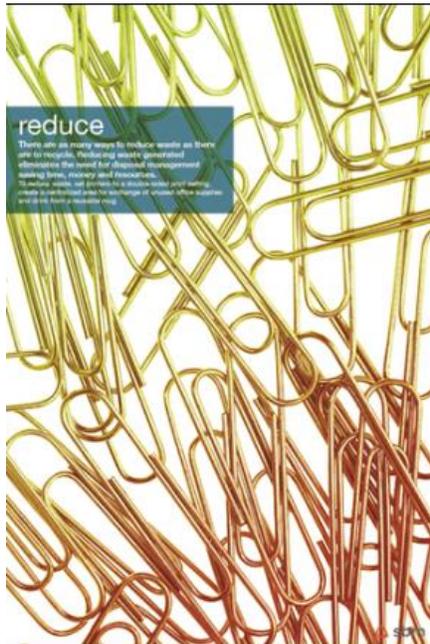
Utilize all avenues for communication to participants. Options for education including the following:

- Porcelain Press
- Electronic Communications
- Video Communications
- Social Media
- Signage for bins and walls
- Program announcements
- Environmentally themed posters
- Waste Analysis Results
- Reminder Cards
- Green Bag Lunch (e.g. environmentally themed seminars)
- Earth Day and America Recycles Day events
- Environmental Benefits Calculator
- Hands on training with staff
- Wall Displays and posters

These education elements will help establish the culture necessary for program success.

Here are some examples of Educational Materials for different purposes:

### General Awareness Posters



## Program Launch/Branding and Sharing Results

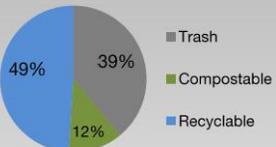
We have been in your trash! Why?

To find out how much material that is recyclable or compostable is still going into the trash.

Here is how you did:

BLDG 4, Shop

HERE IS WHAT YOU CAN DO:



Category	Percentage
Recyclable	49%
Trash	39%
Compostable	12%

- 41 lbs. of waste were sorted
- 44% of trash analyzed was recyclable metal
- 12% was compostable

Metal yields the highest salvageable return, so make sure you throw it in the red metal bin by the building 4 loading dock



Help improve our results next time by finding the right bin for your waste!  
Questions, comments or feedback call Chris Funk extension 45251

Care To Recycle™

# Recycle



Reduce Waste  
Conserve Resources  
Prevent Pollution  
Save Energy  
Sustain the Environment  
Create Jobs

J&J is partnering with SBM Management on an exciting new program in an effort to improve and standardize our recycling across the US. Look for enhancements to your local recycle program including improved communication, labeling and more opportunities to recycle!

## Developing Culture

Give materials a new life by recycling



Keep your recyclables on the right track

sbm

To create a world with **Zero Waste**



recycling is a step in the right direction

sbm

## Communicating Program Changes, Desired Behaviors

### Change in Trash Bins at Your Desk

At the Merck Branchburg facility you will not have personal trash bins; instead, you have been provided with a desktop "mini-bin" in which to collect trash. You will be responsible for taking your trash to designated trash and recycle stations. These stations are located primarily in the following areas:

- Team rooms
- Kitchens
- Conference rooms
- Copy rooms – will have recycle receptacles only
- Other Common Areas

Liners for your mini-bin will be available at centralized locations.



Individual recycle containers will remain in offices and will be labeled to help you identify what materials can be recycled; however you will be responsible for taking your recycling to the designated recycle station.

### step 1

#### Reduce Your Waste

Buy durable products that don't need to be replaced as frequently.

Purchase products with less packaging

Take reusable bags on shopping trips

Use cloth towels for cleanup rather than paper towels

Don't print out emails and other materials unless it is necessary. Consider viewing from your smart phone or tablet

### step 2

#### Look for Opportunities to Re-use

Find new uses for old stuff

Save money on office supplies by sharing with your co-workers and re-filing ink, toner and notebooks

Have you thought of buying used goods? Thrift, second hand and antique stores can have unique items at significant discounts

Bring a travel mug when you go out for coffee or tea

Donate unwanted household items to local schools and non-profit organizations including electronics, furniture, clothes, etc.

### step 3

#### Understand All Your Opportunities to Recycle

Call your waste hauler/recycler to understand your outside recycle program

Your municipal landfill or transfer station may have additional opportunities to recycle that are not offered outside

Recycle your old electronics: [www.mygreenelectronics.com](http://www.mygreenelectronics.com) or at your local Best Buy or Staples

Recycle your old plastic shopping bags; they are recycled at most grocery stores.

### Single Stream Recycling

**Recycle These Things:** Single Stream recycling is the recycling practice at Merck Branchburg. You can recycle the following at your desk and in designated trash free recycle stations together.

#### Empty Food & Beverage Containers

- Plastic containers No. 1 to 7
- Glass bottles
- Glass jars
- Aluminum, tin or steel cans

#### Mixed Paper

- Flattened cardboard/paperboard
- Office paper (Confidential material should go into confidential bins)
- Magazines
- Junk mail
- Phone books
- Brown paper bags
- Newspapers
- File folders

#### Prohibited:

- Loose plastic bags
- Styrofoam
- Food Waste
- Tissues/Napkins/Paper towels
- Plastic Wrap
- Waxy Cartons
- Plastic Utensils



#### Contact Information:

If you have questions regarding this services please contact: 423-HELP, OPTION #4



## Training (Medium Priority)

Zero Waste program goals and tactical specifics for compliance with waste sorting related to job functions within SNL and its on-site contractors should be considered at all points requiring training. This would include new hire orientation, on the job training for job tasks. Contractors that are performing tasks on the facility that generate waste or have the potential to generate waste should be required to receive and acknowledge guidelines for reuse, recycling and diversion programs.

Additionally the MSP2 team should attend group and team meetings with stakeholder groups regularly. The objective would be to inform and refresh the current practices and desired behaviors, field questions or concerns and identify process improvements. This should be conducted at a regular interval determined by the complexity and impact of the waste generation for the particular group, generally quarterly.

As noted in the section above on sensitive paper, short video training segments, with a follow-up quiz or acknowledgment, on different requirements can be a powerful tool to ensure staff is properly educated and improve accountability.

## Reinforcement and Incentives (Medium Priority)

Corporate policies are adopted so that people know how they are supposed to act. Good policies, incentives and continued communications help people change their behavior. In social marketing, they highlight that people need to be told something 6-11 times before they remember to do something differently.

Instead of rigorous enforcement of new policies for Zero Waste, this Plan recommends extensive outreach, education, awareness, training and reinforcement programs. Several Zero Waste communities have hired college students, interns or others to knock on the doors of every business in

town to let them know about the new policies that have been adopted. Through those direct contacts, staff show businesses how they can also save money by wasting less and recycling more while they comply with the new policies. A comparable program for a business is building Green Team or Champions. Sandia has Green Teams, as noted above. As part of the implementation of this Plan, those Green Teams should be trained on Zero Waste policies and programs, and encouraged to monitor and report on the progress for their buildings. When things are not clear, the Green Team Guides should invite MSP2 staff to regularly scheduled staff meetings to review details of those policies and programs.

In the residential sector, some of the most effective tools have been to provide multiple warning notes on top of containers when there have been mistakes in how materials have been set out for recycling. Rather than exacting fines or penalties, these efforts are intended to help educate the user of the new policies, and to remind them when they forget. For SNL, custodial staff could be asked to leave information cards to remind people of how the program works when they see materials being deposited into the wrong containers. For contractors and suppliers, there are clear enforcement tools in their contracts. Prior to using those tools, reminders to contractors and suppliers when they have not complied usually should suffice.

One way to encourage people to better participate is to set up a competition amongst buildings on campus, and between different DOE facilities and/or NNSA facilities. Sandia could work with Green Teams to create a plan that works for Sandia. That could include a beginning sample waste analysis completed by MSP2 staff. The competition could be done between America Recycles Day and Earth Day, similar to what happens with RecycleMania, the collegiate campus competition.<sup>27</sup> MSP2 could create posters that help people know the plan and status and also what they can win. Prizes could include Ice Cream Socials where the MSP2 team are the ones serving the ice cream.

This Plan recommends focusing on such reinforcement approaches rather than more rigorous enforcement tools to get everyone working together for Zero Waste.

## **EXPAND REDUCTION, REUSE, RECYCLING AND COMPOSTING PROGRAMS**

### **Compost Expansion (High Priority)**

One of the most significant components of the remaining waste stream at SNL is food waste (putrescible waste) and non-recyclable paper. Results of the Waste Characterization Report from 2009 showed these two material types contributing 31% of the waste stream in IPB, 41% in IPOC and 64% in the Cafeteria<sup>28</sup>. The Recycling Opportunity Assessment Report in 2013 highlighted that there are some great opportunities to increase diversion with organics, green waste and paper towels using either Soilutions or ABCWUA. The site tour, review of programs and observation of waste loads at the SWCRC confirms that there are still significant opportunities in the capture of these compostable materials.

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<sup>27</sup> <http://recyclemaniacs.org/>

<sup>28</sup> Waste Characterization Report 9-30-2009 Chart 1, Chart 5 and Chart 9

The Zero Waste Consultant Team recommends a tiered expansion of the source segregation and collection of organic materials

- Paper towels: Implement source segregation of paper towels and general waste in all bathrooms. Rollout should include detailed instructions to site staff, labeling and signage in the restroom at the point of collection and possibly additional bins for general waste. Send paper towel materials to ABCWUA: these towels can be staged and delivered every couple weeks
- Food waste compost expansion: The back of house collection in the cafeteria is a great start. However, there are other areas where food waste is generated and disposed.
  - Café seating areas (Front of house)
  - Common Areas: The focus groups gave us the perception that 90% of the SNL staff eat at their desk. Consider using the common areas set up for Single Stream Recycling to include a Food Compost collection bin as well.
- Other considerations to facilitate capture and shipment of “clean” organics:
  - Consider using front loaders for food waste if the volume dictates.
  - Utilization of compostable to-go containers/compostable service ware. This could be negotiated as a requirement of the food service contract, or subsidized through recycle revenues
  - Quality control check of compost may be required from areas of concern to ensure no contaminants are present.



### Lean Path<sup>29</sup> or Trim Trax for Cafeteria Operation (High Priority)

These programs are designed to minimize food waste during the ordering, preparation and production process. By conducting daily tracking of how much volume of food waste is generated at all steps in the process, the vendor could significantly reduce the amount of waste. The Zero Waste Consultant Team recommends one of these types of programs be required as a part of the contract for food service vendor in the future, and voluntarily tested under the current contract.

### Electronics and Peripherals collection system (Medium Priority)

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<sup>29</sup> <http://www.leanpath.com/>

During the observation of trash screening at the SWCRC, it was noted that there was a lot of small electronics and peripherals in the waste stream. Electronics and wires should be called a hazard to the process and additional communication should take place to direct those items to their appropriate location. Additionally the Zero Waste Consultant Team recommends a satellite collection system for small peripherals and cords that do not necessarily fall into the asset managed IT electronic waste recycling program. The Zero Waste Consultant Team also identified a potential market for fiber optic cable with InterconSolutions that should be explored further.



### C&D Collection Expansion (High Priority)

During the stakeholder interviews it was noted that there are some opportunities for expanded collection points for construction and demolition (C&D) materials. This was underscored by the observation of C&D and maintenance type items in the trash screening at the SWCRC. Items included a new porcelain urinal, various cables and wiring, and other items that could be recycled. Four or five remote collection points (possibly with covered access) would be of benefit to maintenance and contract workers that are generating material on one side of the campus, but do not feel it is worth it to travel across to the other side for proper disposal of one or two items. These could be set up with a number of segregations for commonly collected items, or as a mixed stream that could be sorted by staff at the SWCRC.

### Lab Recycling Optimization (Medium Priority)

Lab recycling is an area that can benefit from additional improvements. The building tour revealed that the office areas attached to laboratories are outfitted with common recycling for paper. However, labs viewed in the site walkthrough showed no bins for collection of mixed paper, containers or other materials that have recycle potential. Lab staff interviewed noted that there is a need for additional training on what may be recyclable and where the materials can be disposed. A review of sample waste materials with the management of these operations and the representatives from Friedman may identify a significant opportunity to recycle. In



some cases, a thorough process ensuring triple rinse of containers may be required to ensure recycle opportunities. Components of an optimization project would include a lab-specific waste analysis (with samples representative of various functions), co-locating trash and recycling, lab-specific recycling labels with images of commonly discarded items, and specially designed training for laboratory personnel.

#### **Junk Mail Reduction (Medium Priority)**

Recycling is being done by the mail room. The mail room is recycling excess magazines and catalogues. The next step is to stop the junk mail from being received in the first place. Targeted communication with the direct mail services and cancelation of deliveries to individuals that are no longer at the site are a good starting point for a mail reduction program. Another option is to work with a service such as <http://www.ecologicalmail.org/> that helps facilitate this type of process.

#### **Glass Recycling (Medium Priority)**

Since glass is not accepted in the Single Stream Recycling system offered by Friedman, it is important to capture glass in a segregated stream. The Zero Waste Consultant Team recommends expanding the current collection and diversion program focusing on large generating operations. Conduct a full site analysis of locations that generate glass containers on a regular basis (e.g., laboratory and food service) to identify bin placement and collection needs.

#### **Reapplication (ReApp) (Medium Priority)**

The process of disposition of unwanted but re-usable materials appears to be well developed. Ensure communication between the Reapplication Services Team and the MSP2 team to include all weights and values of scrap material are captured. It was noted during the stakeholder interview and site visit that there may be either some materials that are sold or donated that weight is not captured for, and data from some re-use projects that are benefitting source reduction that may not be captured.

## **DEVELOP AND ADOPT NEW POLICIES, PROCEDURES, RULES AND INCENTIVES**

#### **Formally Adopt Zero Waste Goal for SNL (High Priority)**

One of the keys to getting to Zero Waste is engaging the whole organization in achieving the goal, much like Sandia's safety program. Until now, the Zero Waste goal was set informally by the MSP2 Program. To get everyone to participate and buy in to this goal, it's now time for Sandia to formally adopt the Zero Waste goal at the highest level of the organization. The most successful Zero Waste businesses have had the strong support of their Chief Executive Officers who also have asked all employees to actively participate. The Zero Waste Consultant Team recommends that Kim Sawyer, Executive VP for Mission Support and Deputy Labs Director of Sandia Corporation, adopt the Zero Waste goal as defined in this Plan, and urge all employees to participate or send a letter/email to all staff and contractors, such as the Sample provided.<sup>30</sup>

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<sup>30</sup> See Attachment "Sample Letter to Sandia Employees and Contractors from Upper Mgt"

### Data Tracking and Assessments (High Priority)

The MSP2 team is doing a good job of compiling and rolling up information regarding the weights, measures and financial statistics of the program generally on a quarterly basis. The following is a listing of recommendations from The Zero Waste Consultant Team to aid in maintaining focus over time, celebrating success and identifying areas for opportunity:

- **Monthly Data Tracking:** Include tons of waste, tons of recycling by commodity, waste and recycling cost drivers and revenue received.
- **Recycling Opportunity Assessment:** The ROA document is a good practice and should be continued on a 4 year cycle. Good tracking of progress toward the goal of Zero Waste is an important part of the system.
  - **Review and update** status and progress on an every other year basis
- **Waste Characterization Study:** Should be continued on a 2-3 year cycle. Scope and focus of the assessment should be evaluated based on areas of need
- **Internal Waste Analyses:** Utilize the MSP2 and the SWCRC contracted staff to conduct small sample (200-300lbs) waste analyses for targeted areas on a more regular basis (Quarterly or Semi-annual). Use results to communicate to staff and business groups

### Tactical, Financial and Accountability (High Priority)

- **Tactical Road Map:** This should be conducted at the beginning of the year. Develop a listing of the tactical steps that are required to complete the strategy for each year. Track progress to goals on a quarterly basis adjust and update as needed
- **Annual Budget:** Develop forecast of requirements and targets for upcoming year. This should help drive and preselect activity
- **Quarterly or Semi-annual Business Review:** Compile a report with the data from the program including diversion metrics, finance, significant accomplishments, obstacles, and goals for upcoming quarter or interval. Information should be presented or furnished to appropriate leadership structure

### Align with Corporate Lean Six Sigma (Medium Priority)

By a detailed review of all material inputs and outputs of waste within the nine points of generation<sup>31</sup>, a Lean Six Sigma approach can be taken in any given area and/or as a whole. Decisions on process and policy can then be made that will support continuous improvement that is measured and analyzed through empirical data.

### Compliance as a performance measure (Medium Priority)

During the stakeholder interviews it was made clear that in some cases there are policies in place that drive waste into a recycling path (e.g., disposal of old electronics devices within the asset tag system) and in other cases participation is optional. Strong leadership should be developed in each of the 9

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<sup>31</sup> See Attachment “9 Points of Generation”

points of generation that values the participation with the Zero Waste Plan. Performance should be measured both at the business unit and department as well as the individual level.

### **Develop guidelines and policies for selection of scrap sale to vendors (Medium Priority)**

SNL has strict guidelines in purchasing their goods and services. The sale of scrap materials should be considered equally important and should follow a developed process to the desired outcome of obtaining the highest value for materials, excellent service and mitigated risk. It was noted during the tour of Albuquerque Metals that this process is currently loosely defined and in some cases determining the vendor for particular materials is left to the driver leaving the SNL site. Albuquerque Metals is a part of a larger group of companies offering scrap metal services in Albuquerque. The customer representative noted that each of the subsidiary companies has a certain specialty based on their receiving and processing capabilities and that the facility with the processing that matches the material type will generally have the best pricing. A follow-up meeting with this vendor would benefit this particular program aspect.

### **Include Zero Waste Requirements in Contracts (Medium Priority)**

Include requirements that contractors participate in, monthly or quarterly training regarding MSP2 program and get signed off on test about what they learned.

- Procurement: The procurement team already has started the ball rolling without the MSP2 team even bringing it up. Another option is to ask for all contracts to have a line item in each contract that asks for consideration of each business that works with Sandia National Laboratories to become a Zero Waste Business.

## **SUPPORT USE OF MATERIALS LOCALLY IN CLOSED LOOPS FOR HIGHEST AND BEST USE**

### **Sustainable Development and increasing Green Industry (Medium Priority)**

SNL is doing many things that directly and indirectly influence Sustainable development. This starts with the overall drive for an outstanding diversion program. An example of direct influence includes efforts such as buying paper products that were made from recycled paper generated at the Sandia Site. SNL currently has a program where white paper that is collected at the site is delivered to a paper mill where the material is witnessed in the pulping process; the pulp is made into new office paper, or down-cycled to toilet tissue, packaged, and is available to be repurchased by SNL. This is a great example of closing the loop and promoting and furthering the recycled content paper industry. Another example is that SNL crushes its site generated concrete and asphalt debris into a "conphalt" product that is used on site instead of virgin aggregate.

### **Food Donation (High Priority)**

An evaluation should be made of how much edible food is left over at the end of the day and could the food service provider donate this food. There are some great organizations available that support such

food donations and Sandia and its food service contractor is shielded from liability by the Federal Good Samaritan Law. Locally in Albuquerque the Zero Waste Consultant Team has identified Road Runner Food Bank as a prime partner for this type of program.

### Compost (Medium Priority)

Compost is another great example of highest and best use, and the opportunity to close the loop. The Zero Waste Consultant Team recognizes a difference in end product quality between Soilutions and ABCWUA. The Zero Waste Consultant Team would recommend the use of Soilutions as a local business, generating high quality soil amendments as the higher use of food scraps. ABCWUA is a perfectly fine alternative and should be considered especially for financial considerations, but the end product is less refined and has less value as an end product.

### Federal and/or Regional Cooperation (Low Priority)

Develop public/private and intergovernmental partnerships that are mutually beneficial to the diversion of resources and help to facilitate advancement.

- Develop a focus group that meets to discuss high-level ideas and projects and works their way through them with other government agencies (e.g., City of Albuquerque, Albuquerque Public Schools and Kirtland Air Force Base). The first item could be developing this partnership to achieve economy of scales which would improve availability of Green Building materials that the Facilities team identified as a Zero Waste opportunity.
- Sandia National Laboratories could work with other area organizations to make better use of their infrastructure and economy of scale. This could possibly lead to consolidating materials (some milk run type operations) for products such as expanded polystyrene from other public and private entities in the region; This would make better use of the SNL block densifier.
- Through networking with other organizations, SNL could learn of other new uses or markets for hard to recycle materials, and contribute to the overall region becoming a sustainable community. Collaborative efforts could also lead to the development of additional support for the development of new enterprises for reuse, recycling and composting that would expand the options for SNL to use in the future.

## PROCUREMENT AND EXTENDED PRODUCER RESPONSIBILITY

Sandia has been a leader in using supply chain management to communicate to its suppliers how it would like to reduce wasting. On January 27, 2014, Director of Supply Chain Management Nancy Davis sent a letter (see Attachment Supplier Community Ltr Dtd 27 Jan 2014) to **all** Sandia suppliers saying:

- “Effective immediately, **Sandia will no longer accept unsolicited mail and marketing materials** such as catalogues from the supplier community. Any material of this nature received in our mail processing facility will be immediately placed in recycling containers for further processing...
- To balance suppliers' desire to market their companies with Sandia while protecting our environment and reducing waste... [after review of websites with background information on

Sandia needs, if] ...you believe Sandia is your market, please send an **electronic copy** of your company's capabilities to [supplier@sandia.gov](mailto:supplier@sandia.gov). Our Business Point of Contact will review your submission and contact you if it is indeed determined that Sandia National Laboratories is a potential market for your company. ”

Sandia also has the following corporate ES&H policy and Supply Chain Management process:

- “protect the environment through integration of environmental stewardship and sustainability throughout the life-cycle of its activities, and ensure regulatory compliance. Sandia Corporation conserves natural resources and protects the environment.”<sup>32</sup>
- “acquire items composed of recovered/recycled materials in the highest percentage practicable, without paying a price premium or adversely affecting performance requirements, level of competition, or cost”<sup>33</sup>

The following are other examples of related policies and programs that have been established:

- Sandia has told suppliers that they are to submit proposals only electronically
- Sandia has set up all invoicing to be done electronically.
- One of Sandia suppliers of High Performance Computers (HPC) requires the shipping of Shock Pallets to be sent back to the supplier

### **Extended Producer Responsibility (EPR) (Medium Priority)**

EPR refers to policies and programs established for producers to take-back products and/or packaging for reuse, recycling, composting or proper disposal at no cost to their customers. Product Stewardship refers to voluntary initiatives by producer, retailers and/or distributors. EPR policies and programs are implemented in response to laws, regulations or corporate specifications.

Extended Producer Responsibility programs can also be pursued on a more local scale. This should be pursued when materials are delivered to the site in packaging or crating that is difficult to recycle or the product itself is hard to recycle. Agreements can be made for the producer to take back the packaging and backhaul it at the time of delivery, or at the following delivery. A good example of this for SNL is the return of shock pallets with the delivery of server cabinets. Although these items are not easily recycled by SNL, they are valued by the company that provides the servers to be utilized in the same function as reuse.

In addition to the product stewardship initiatives already described, the following items are suggested to be targeted for additional product stewardship or EPR efforts:

- Compostable containers (require to be used by all food vendors serving Sandia)
- Disposable wood crating (require shift to reusable crating)

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<sup>32</sup> Corporate Policy: ESH100 Environment Safety & Health

<sup>33</sup> Corporate Process: SCM100.2 Acquire Property, Material, and Services

- Other Reusable shipping containers (require suppliers to provide products and materials in reusable shipping containers instead of corrugated cartons)

Others will become clear as further efforts are made to refine and enhance reuse, recycling and composting programs.

### **EPEAT (Medium Priority)**

Sandia is required by Federal and DOE acquisition regulations to purchase EPEAT qualified electronic office equipment. This assures a comprehensive evaluation has been made of the environmental impact of the manufacture and operation of the equipment. For end of life electronics that are no longer compatible with Sandia’s operating environment, they are purchased, donated, remanufactured or recycled by an e-Stewards and/or R2-certified recycler.



### **Redesign of Products and Processes (Medium Priority)**

One of the key goals for product stewardship and EPR is the redesign of products and processes. The Zero Waste Consultant Team recommends a review of materials that are not recyclable or compostable and determine what point of generation they are coming from. It may be possible to work directly with the supplier to have the product shipped differently to avoid bringing these material types onto the site. There are also scenarios where a different process for SNL could avoid the use of non-recyclable materials at the site.

- A good example of how that’s been done at Sandia is the Supply Chain Management letter calling for marketing materials such as catalogues to be replaced by electronic information as described above. Similarly, the elimination of hard copies of proposals from suppliers reduced not only the paper waste, but also the labor waste that was required to file and store those materials. That reduced staffing needs by two staff, and eliminated the need for physical files and rooms for the files.

### **Cradle to Cradle Certified Products<sup>34</sup> (Medium Priority)**

The Cradle to Cradle Certified™ Products Program certifies products that meet the criteria noted above in the Goals and Objectives section on page 16. This is a system for product designers and manufacturers to create innovative products that are more sustainable.

SNL procurement staff should identify products that SNL purchases that are C2C certified and purchase those C2C certified products when quality and price are competitive.

<sup>34</sup> Source: <http://www.c2ccertified.org/>

### **Bans of Problem Materials (Medium Priority)**

A key product stewardship tool that Sandia can use is to ban materials that are problems for Sandia to reuse, recycle or compost or are not economical within the existing end markets. This could include expanded polystyrene food products, mixed material packaging, single use products, or toxics. For example, Sandia could include in specifications for food contractors serving the campus to use only compostable takeout containers, like those used currently in the Sandia cafeteria. This tool should be used primarily when other tools have not succeeded in changing practices and behaviors that are wasteful.

# Economic and Impact Analysis

## IMPLEMENTATION BUDGET

Most of the recommendations in this strategic plan revolve around policy and program refinement and do not require significant capital investment. The following listing of budgetary estimates should be considered a forecasting tool and in the planning process for rollout of programs actual figures will need to be developed by the MSP2 staff with specific products, labor and SNL secured pricing. The revenues generated in the existing diversion program and additional revenues or cost savings from the implementation of this plan should be sufficient to fund these initiatives. A limited amount of additional labor support will be required for the implementation of this Plan, particularly for the following areas:

- Sustainable Acquisition in contracting
- Green Purchasing
- Waste Minimization

Additional funding should not be needed from SNL above or beyond that.

Item	Startup Cost (one time)	Ongoing Cost
<b>Purchase, re-labeling and redistribution of collection bins</b>	<ul style="list-style-type: none"> <li>• Desk Bin Purchase \$24K</li> <li>• Common Area Bin and Lid Purchase \$80K</li> <li>• Design and layout and printing of labeling \$4-8K</li> <li>• 250 – 300 labor hours for distribution and labeling</li> </ul>	N/A
<b>Expanded Compost</b>	<ul style="list-style-type: none"> <li>• Common area Bin Purchase \$40K (should combine with bin and lid purchase noted above)</li> </ul>	<ul style="list-style-type: none"> <li>• Purchase of compostable liners \$50K</li> <li>• Purchase of compostable service ware \$36K</li> <li>• Additional collection and service costs \$48K</li> <li>• Additional labor cost for preparation of material (removing contaminates)</li> </ul>

<b>Communications</b>	N/A	\$32K/year <sup>35</sup> <ul style="list-style-type: none"> <li>• Design and Layout of materials</li> <li>• Printing and distribution costs</li> </ul>
<b>C&amp;D collection satellites</b>	Covered Roll-off purchase \$20K	N/A
<b>Labor</b>		\$75K/year <ul style="list-style-type: none"> <li>• Sustainable Acquisition</li> <li>• Green Purchasing</li> <li>• Waste Minimization</li> </ul>
<b>Total</b>	<b>\$162K (One time)</b>	<b>\$241K (yearly)</b>

**COST SAVINGS THROUGH PROGRAM ENHANCEMENT**

By increasing the efficiency of the program through the means outlined in this plan, cost savings can be realized in the form of landfill avoidance, avoidance of hazardous waste facility fees, avoided purchases and revenues from recyclable commodities that hold value can be increased by getting them out of the trash. The following analysis of the materials currently going into the waste stream was developed in a joint effort between the MSP2 team and the Zero Waste Consultant Team. Input was from the 2009 waste analysis results, comments from the stakeholder meetings, and the visual review of loads at the SWCRC during the site tour in August. The baseline volume of waste was derived from total Routine and Non-routine waste in the documentation provided by SNL for CY2013 (SNL Waste Trends for ZW Strategic Plan). Upon completion of the next waste analysis project the figures should be updated to account for new empirical data gained in that process.

<b>Material By Type</b>	<b>Percent in the waste</b>	<b>Est. Metric Tons per year</b>	<b>Estimated Value</b>
<b>Reuse</b>	3.00%	58.97	\$21,399
<b>Textiles</b>	1.00%	19.66	N/A
<b>Polymers (Plastic)</b>			
• <b>Containers</b>	4.75%	93.37	\$847
• <b>Rigid and non-container</b>	7.00%	137.60	\$1,248
• <b>Film</b>	5.75%	113.03	\$7,178
<b>Metals</b>			
• <b>Steel/mixed metal</b>	2.00%	39.31	\$6,420
• <b>Non-Ferrous Metal</b>	2.75%	54.06	\$101,512
<b>Glass</b>	2.75%	54.06	N/A
<b>Paper</b>			
• <b>White Paper</b>	11.25%	221.14	\$28,086

<sup>35</sup> \$4/person based on outreach forecast utilized in many municipal recycling programs

• <b>Mixed Paper</b>	15.25%	299.77	\$9,518
• <b>Cardboard</b>	8.00%	157.26	\$11,413
• <b>Non-Recyclable Paper</b>	9.25%	181.83	N/A
<b>Putrescibles (Food Scraps)</b>	8.50%	167.08	N/A
<b>Plant Debris (Yard Trimmings)</b>	1.75%	34.40	N/A
<b>Wood</b>			
• <b>Pallets</b>	1.25%	24.57	\$1,271
• <b>Scrap Wood</b>	1.25%	24.57	N/A
<b>Soils</b>	2.00%	39.31	N/A
<b>Ceramics (e.g. concrete, asphalt, brick)</b>	3.00%	58.97	N/A
<b>Chemicals</b>	0.25%	4.91	N/A
<b>Re-design (Not currently reusable, recyclable or compostable)</b>	9.25%	181.83	N/A
		<b>Total Value</b>	<b>\$188,891</b>
		<b>Landfill Avoidance</b>	<b>\$53,516</b>
		<b>Financial Benefit</b>	<b>\$242,407</b>

## ENVIRONMENTAL IMPACTS

SNL is currently participating in the US EPA Waste Wise Program. Data from the reports available shows significant result in the reduction of greenhouse gasses and energy usage through the efforts of waste reduction, reuse and recycling. The WARM model has been faulted for not addressing the "upstream" benefits of use of compost in reducing use of fertilizers and pesticides (which are both energy intensive to produce) and reducing use of water in agriculture (due to the water savings compost provides). EPA acknowledges that but has had problems reconciling data from different regions of the country on that (e.g. dry California has very different impacts than wet Oregon). Further development of the recycling and diversion program will continue to show improvements on the net benefit. Inclusion of the Environmental Benefit from recycling in the DOE Strategic Sustainability Performance Plan will benefit the overall results in GHG reduction

<b>Emission saved</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
<b>The annual GHG emissions from this many passenger vehicles</b>					
Source Reduced		1,458	1,508	2,083	2,269
Recycled	1,310	1,073	1,599	802	817
Composted		4	4	4	5
<b>This many gallons of gasoline (based on CO2 emissions per gallon)</b>					
Source Reduced		784,524	811,486	1,121,157	1,220,951
Recycled	705,045	577,239	860,408	431,433	439,580
Composted		2,084	2,198	2,417	2,805
<b>Barrels of oil</b>					

Source Reduced		16,274	16,834	23,257	25,328
Recycled	14,626	11,974	17,848	8,950	9,119
Composted		43	46	50	58

Based on the current waste composition the net increase in Environmental Benefits on achieving Zero Waste diverting 90% from Landfill, Incineration and the Environment would equate to an additional:

Green House Gas Emissions	Energy Savings			
Net Greenhouse Gas Emissions from Recycling Source Reduction and Reuse as Compared to Disposal (MTCE)	Total (Million BTUs)	Oil Saved (Barrels)	Gas Saved (Gallons)	Reduction of "Average" Passenger Cars on the Road/Year
-739.61	-36326.56	-6263.20	-292282.69	-524.95

**JOB IMPACTS**

The Zero Waste Consultant Team anticipates the need for a limited amount of additional labor for the implementation of this Plan, particularly for the following areas:

- ◆ Sustainable Acquisition in contracting
- ◆ Green Purchasing
- ◆ Waste Minimization

In addition, significant improvements in the diversion of materials will result in a change of responsibilities and focus for the existing staff and contracted support. The Zero Waste Consultant Team recommends a periodic review of job tasks and labor commitments for the entire program at a minimum of every 2 years. Review should include a breakdown of task requirements, routes and schedules, machinery and equipment and opportunities for efficiency

Labor committed to the collection and movement of trash will continue to decline. This labor should be reallocated to the continued improvement of the recycling and diversion program

Reaching the target of 90% diversion from landfill and incineration would result in a reduction of total volume of trash handled at the SWCRC from current (2013) totals of 134.7MT per quarter (see chart below)

- In a review of the current distribution of solid waste and recycling the projection of changed distribution in a 90% diversion scenario shows that handling of Routine solid waste at the

SWCRC would decrease by ~69% and handling of recycling is increased by ~32%. This analysis does not take source reduction efforts into account

**Average Solid waste and Recycling Metric Tons per quarter for last 4 consecutive quarters (2QCY13-1QCY14)<sup>36</sup>**

	Routine Solid Waste	Routine Recycling	Totals
Current 68% distribution	196.3	419.3	615.5
Target 90% distribution	61.6	554.0	615.5
MT change if target met	-134.7	134.7	No change
% change if target met	-69%	32%	

<sup>36</sup> data gathered from “Quarterly Solid Waste and Percent Recycle”

# Timeline, Reporting & Monitoring

## MILESTONES AND PRIORITIES TO REACH ZERO WASTE BY 2025

### Sandia National Labs Zero Waste by 2025 Implementation Timeline

Zero Waste Milestones	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>Simplify the Process for Participants</b>											
Modified Single Stream Recycling	X	X									
Capitalize on ABQ program recognition		X	X								
Desk Collection or Central Trash/Recycle			X	X							
Ensure Bin availability and co-location		X	X								
Clear and Concise labeling		X	X		X			X			X
Re-address Sensitive Paper Process	X	X									
<b>Strategic Communications</b>											
Green Teams	X	X	X		X		X		X		
Awareness	X		X		X		X		X		
Education	X	X			X			X			
Training	X			X			X			X	
Reinforcement and Incentives		X		X		X		X		X	
<b>Expand reduction, reuse, recycling and composting programs</b>											
Compost Expansion											
• Paper Towels	X										
• Food Waste		X	X								
Electronics and Peripherals collection system			X								
C&D collection expansion	X										
Lab Recycling Optimization		X									
Lean Path or Trim Trax for Cafeteria Operation	X										
Junk Mail Reduction		X									
Glass Recycling			X								
ReApp	X										
<b>Develop and Adopt new Policies, Procedures, Rules and Incentives</b>											
Sandia Corp formally adopt Zero Waste goal	X										
Data Tracking and Assessments	X	X	X	X		X					X
Tactical, Financial and Accountability	X	X	X	X		X					X
Align with Corporate Lean Six Sigma				X		X					
Compliance as a performance measure				X		X			X		X
Develop guidelines and policies for selection of scrap sale to vendors	X										
Include Zero Waste Requirements in Contracts		X	X	X	X						
<b>Support use of materials locally in Closed Loops for Highest and Best Use</b>											
Food Donation	X	X									
Compost			X	X							
Sustainable Development and increasing Green Industry			X		X		X				
Federal and/or Regional Cooperation		X		X		X		X			
<b>Product Stewardship and Extended Producer Responsibility</b>											
Federal Green Challenge (FGC)	X	X	X	X	X	X					

Extended Producer Responsibility (EPR)				X	X	X	X				
Redesign of Products and processes				X	X	X	X	X			
Cradle to Cradle Certified Products		X	X	X	X						
Bans of Problem Materials			X			X			X		

Years noted in the timeline represent the main timeframe of focus for the project or strategy. Preparations and forecasting may begin prior to the calendar year, and subsequent years that are not marked as a focus priority may require maintenance of ongoing program performance

# Appendices

**CASE STUDY – VANDENBERG AIR FORCE BASE**

**FLOOR PLAN MARKUP EXAMPLE**

**MONTHLY TRACKING DOCUMENT (SOLID WASTE REPORT)**

**ROA 2013 UPDATE WITH ZERO WASTE CONSULTANT TEAM COMMENTS**

**SUPPLIER COMMUNITY LTR DTD 27 JAN 2014**

**SNL REDUCE REUSE RECYCLE COMPOST ZERO WASTE FACTSHEET FY13**

**9 POINTS OF GENERATION**

**ZERO WASTE RESOLUTION**

**SAMPLE LETTER TO SANDIA EMPLOYEES AND CONTRACTORS FROM UPPER MGT**