

# **SANDIA REPORT**

SAND2010-4311

Unlimited Release

Released July 2010

## **FY09 Recycling Opportunity Assessment for Sandia National Laboratories/New Mexico**

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**Abstract**

This Recycling Opportunity Assessment (ROA) is a revision and expansion of the FY04 ROA. The original 16 materials are updated through FY08, and then 56 material streams are examined through FY09 with action items for ongoing improvement listed for most. In addition to expanding the list of solid waste materials examined, two new sections have been added to cover hazardous waste materials. Appendices include energy equivalencies of materials recycled, trends and recycle data, and summary tables of high, medium, and low priority action items.



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## Acronyms and Abbreviations

6S	Sort, Simplify, Shine, Safety, Standardize, & Sustain
ASER	Annual Site Environmental Report
CARA	Concrete & Asphalt Recycle Area
C&D	Construction & Demolition
CD	Compact Disc
CIS	Chemical Information System
CRT	Cathode Ray Tube
CSU	Computer Support Unit
cy	cubic yard
CY##	Calendar Year 20##
D&D	Decontamination and Demolition
DI	De-Ionized (water)
DOE	U.S. Department of Energy
DSI	Document Solutions Incorporated
DVD	Digital Video Disc
ECC	Environmental Compliance Coordinators
EMS	Environmental Management Systems
ENV112	Environmental Course 112: Hazardous Waste Training
EPS	Expanded Polystyrene (also known as Styrofoam), plastic resin #6
FEC	Federal Electronics Challenge ( <a href="http://www.federalelectronicschallenge.net">www.federalelectronicschallenge.net</a> )
FTE	Full Time Employee
FY##	Fiscal Year 20##
GHG	Greenhouse Gas
GIS	Geographic Information System
HDPE	High Density Polyethylene, plastic resin #2
HWMF	Hazardous Waste Management Facility
KAFB	Kirtland Air Force Base
kg	kilogram
LCD	Liquid Crystal Display
LDPE	Low Density Polyethylene, plastic resin #4
LSS	Lean/Six Sigma
MDL	Microelectronics Development Laboratory
mt	metric ton
NM	New Mexico
NASA	National Aeronautics and Space Administration
NNSA	National Nuclear Security Administration
OUO	Official Use Only
P2	Pollution Prevention
PCB	Polychlorinated biphenyls
PET	Polyethylene Terephthalate (also known as PETE or Polyester), plastic resin #1
PHS	Primary Hazard Screen
PP	Polypropylene, plastic resin #5
PPOA	Pollution Prevention Opportunity Assessment
PVC	Polyvinyl Chloride, plastic resin #3

Q	Quarter
RMWMF	Radioactive and Mixed Waste Management Facility
ROA	Recycling Opportunity Assessment
Sandia	Sandia National Laboratories
SNL/CA	Sandia National Laboratories/California
SNL/NM	Sandia National Laboratories/New Mexico
SWTF	Solid Waste Transfer Facility
TA	Technical Area
TRI	Toxic Release Inventory
TWD	Technical Work Document
WDDR	Waste Description and Disposal Request

## 1.0 Introduction

Since the Fiscal Year 2004 (FY04) Recycling Opportunity Assessment (ROA), the recycling of most of the materials discussed has been implemented, attempted, or reassessed. The objective of this document is to provide a status update on all the materials covered in FY04, and to present new material streams for consideration, chief among these being the two new sections covering hazardous materials being recycled or evaluated.

Ending FY08, the Sandia National Laboratories/New Mexico (SNL/NM) site recycled 57% of all material that would otherwise have been sent as solid waste (if that were legally possible). This percentage is then divided into routine and non-routine waste. Non-routine waste is the result of spills, clean-outs, and construction-like activities. Routine waste is all other waste. Of routine waste generated, only 49.7% was recycled. The goal for FY09 is to recycle 55% of routine waste. Non-routine waste and recycling is unpredictable in nature, so no goals are attached to this waste, only minimization and diversion activities.

In the long-term, Pollution Prevention (P2) is informally working toward and encouraging an objective of “Zero Waste to the Landfill by 2025.” This mirrors a similar objective in our host city, Albuquerque, New Mexico of “Zero Waste to the Landfill by 2030.” To attain Sandia’s objective, a steady increase in total recycling is a critical component to waste reduction. As the majority of the materials which are easy to reduce and recycle are implemented in Sandia’s recycling program, the next tasks become the initiation of difficult to recycle streams and to improve and maintain participation in existing recycle streams.

New tools and approaches are being explored for effectiveness. Examples of this include a light version of Pollution Prevention Opportunity Assessments (PPOA) and formal training and application of Lean/Six Sigma (LSS). Two Lean events were scheduled for FY09 to allow two of the P2 Staff to earn their LSS Green Belt certifications. The first in progress is a Sort, Simplify, Shine, Safety, Standardize, & Sustain (6S) Event to realign and better utilize the dumpsters onsite. The other being targeted is to streamline the scrap metal recycling collection process. A PPOA covering operations at Reapplication is scheduled to be completed by the end of FY09. These projects have the potential to greatly enhance the efficiency of material diversion.

## 2.0 Status of FY04 Recycling Opportunity Assessment through FY08

The FY04 Recycling Opportunity Assessment (ROA) covered twelve routine solid waste materials and six non-routine construction-related waste materials. In the two sections below, you will find tables that follow the format found in the FY04 ROA that states each material’s feasibility and priority for implementation in FY05 and beyond. The third column states the status of the material stream at the end of FY08. Following the table is a description of the status of each material waste stream. See section 3.2 and 3.3 for progress reports through FY09 and paths forward for material streams evaluated in FY04.

### 2.1 Routine Material Status Description

Table 1: Status of Routine Materials under Consideration in FY04

<i>Material</i>	<i>FY04 Feasibility</i>	<i>FY04 Priority</i>	<i>End FY08 Status</i>
Alkaline Batteries	Low	Low	No Progress
Electronic Media	Low	Medium	Partial
Food Waste	Low	Very Low	No progress
Glass	Very Low	Very Low	No progress
Mixed Paper	Medium	Very High	Partial
Plastics (Separated)	High	Medium	Partial
Pulverized Paper	High	High	<b>Complete</b>
Shredded Paper	Medium	Not Prioritized	No progress
Styrofoam®	High	High	Partial
Transparencies	Medium	Low	<b>Complete</b>
Tyvek®	Medium	Medium	Partial
Yard Waste	Medium	Low	No progress

#### Alkaline Batteries

Some discussions were held with the Environmental Compliance Coordinators (ECCs), formerly the Environmental Protection Representatives, but no process could be agreed upon. A renewed effort was undertaken in FY09.

#### Electronic Media (non-hard drives)

Due to security concerns, all removable electronic media, such as Compact Discs (CD), Digital Video Discs (DVD), and magnetic disks and cassettes were being stockpiled with no disposal path. In FY07, a new Department of Energy (DOE) directive was released allowing for certified offsite destruction of electronic media. With SNL Cyber Security’s approval, two shipments were made clearing out the accumulation of electronic media at the Reapplication Yard. The Solid Waste Transfer Facility (SWTF) then contacted Cyber Security regarding their larger accumulation, and the approval was reversed. Commercial, read-only CDs and DVDs have been slowly accumulating in a cubic yard box to send to the recycling vendor, ECS Refining.

## **Food Waste**

A Pollution Prevention Opportunity Assessment (PPOA) was conducted on the two onsite cafeterias in FY05. It was decided that there was little-to-no potential for corporate food waste collection/composting. The cafeterias claim to have a streamlined process that generates very little food waste beyond the grease that is already captured and reused by an outside vendor.<sup>1</sup> Food waste generated by line personnel was deemed too distributed and of small quantity to be worth pursuing.

## **Glass**

There has not been a market for glass recycling. A renewed market is possible in FY09.

## **Mixed Paper**

The SWTF continued to receive mixed paper from the Building 957 Mailroom recycling dumpster. In FY06, a second mixed paper dumpster was placed at the Building 894 Print Shop, to capture all of their non-white paper waste. After that, paper separation was initiated at the Reapplication Yard, diverting additional white paper from the solid waste, and moving the mixed paper from solid waste to the Building 894 mixed paper dumpster. Another initiative in FY07 resulted in a third mixed paper dumpster, placed at the Technical Library, Building 804. A more programmatic effort has been underway since Third Quarter (3Q) FY08.

## **Plastics (Separated)**

Plastics # 1 and # 2 are no longer comingled with aluminum cans. Metal and plastic beverage containers now have separate collection containers and signage. The Microelectronics Development Laboratory (MDL) relocated into the new Building 858 MicroLAB and continues to triple-rinse # 2 acid bottles with de-ionized (DI) water and set them aside for recycle. In FY07, this MicroLAB generator also began diverting two varieties of wafer casings made from # 5 polypropylene plastic. All their plastic went into the 20 cubic yard roll-off outside the building and was collected by the SWTF approximately quarterly. The current status was determined, and the process has somewhat broken down. A developing effort for plastics has been under way since 3Q FY08.

## **Pulverized Paper**

All paper collected through the White Destruction Bags and Red Destruction Bags is ranked between sensitive and classified and must be completely destroyed to meet National Nuclear Security Administration (NNSA) requirements. Soon after the FY04 ROA, this opportunity was fully implemented resulting in 33 metric tons (mt) in FY04, 42mt in FY05, 75mt in FY06, 77mt in FY07, and 58mt in FY08. The process continues in FY09, and the recipient vendor Soilutions uses the material in their compost products.

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<sup>1</sup> Samuel McCord, *Pollution Prevention Opportunity Assessment of the SNL/NM Cafeterias*, 2005, p29.

## **Shredded Paper**

Paper that is shredded in office-sized machines by line personnel is primarily white paper, but includes plastic transparencies and colored paper. By NNSA requirement, all shredders on site must be certified to shred to a maximum width of ¼ inch. Shredded paper is not capable of being baled. Therefore, all office shredded paper goes into the solid waste.

## **Styrofoam®**

Little action was taken to divert this light weight material until recently. A pilot effort for Styrofoam® has been under way since 1Q FY09.

## **Transparencies**

This opportunity was fully implemented beginning 3Q FY06. SNL followed the same model as laid out by Los Alamos National Laboratory. Nearly ¼ mt had been recycled by the end of 1Q FY09. A push to clear supply cabinets of this outdated technology is in process during 3Q-4Q FY09. A full cubic yard box is anticipated to be generated and sent to the plastics recycling vendor, Berg Mill. This stream is expected to be declining.

## **Tyvek®**

Quantitative data has been established for the usage of Tyvek® garments onsite. A successful recycle stream is in place from the Neutron Generator department's cleanrooms. There has been 2.4 mt of Tyvek® garments recycled since 3Q FY06.

Additionally, it was discovered that certain mailing envelopes and weatherproof printer paper are made with Tyvek® and are directly recyclable with DuPont™ via free mailing pouches. These are collected via interoffice mail. At least one small shipment was made in FY08, but the weight and date were not recorded.

## **Yard Waste**

Data for landscaping material reuse has not been successfully captured. Composting of leaves is not known to have been pursued.

## 2.2 Status of Non-Routine Materials in FY04 ROA through FY08

Table 2: Status of Non-Routine Materials under Consideration in FY04

<i>Material</i>	<i>FY04 Feasibility</i>	<i>FY04 Priority</i>	<i>End FY08 Status</i>
Asphalt	Medium	High	<b>Complete</b>
Carpet Tiles	Unknown	Unknown	<b>Complete</b>
Ceiling Tiles	Low	Low	<b>Complete</b>
Concrete	Unknown	Very High	<b>Complete</b>
Wallboard	High	High	Discontinued
Wood	High	High	<b>Complete</b>

### Asphalt & Concrete

The Kirtland Air Force Base (KAFB) Landfill for Construction & Demolition (C&D) materials was visited and partnered with in FY05-FY07. P2 sponsored two or more crushing events to use up quantities of accumulated material that came from SNL. The crushed material was provided at cost to SNL customers for use in their projects. Beginning in June 2006, all further material generated by SNL was diverted from the KAFB Landfill to P2's new Concrete & Asphalt Recycle Area (CARA) in Technical Area (TA) 3 south of the Facilities' Soil Borrow Pit. SNL contracts and guidance documents now direct all projects to deliver material to the CARA.

Weights reported by the KAFB Landfill to SNL P2 were formulated based upon an assumed mix of asphalt and concrete. This formula was researched and recalculated to remove asphalt and concrete from the weight, and the spreadsheet being used at the Landfill was revised to increase accuracy and minimize opportunities for reporting errors.

### Carpet Tiles

Utilizing the new P2 Tent constructed in FY07, carpet tiles from all Facilities maintenance, renovation, and demolition projects are accumulated and stored at the Reapplication Yard. When a full shipment is accumulated, P2 coordinates the material pick-up by the manufacturer and recycler, Interface. This is documented in P2's Material Recycling Assessment spreadsheet, should vendors change.

### Ceiling Tiles

Utilizing the new P2 Tent constructed in FY07, ceiling tiles from all Facilities maintenance, renovation, and demolition projects are accumulated and stored at the Reapplication Yard. When a full shipment is accumulated, P2 coordinates the material pick-up by the manufacturer and recycler, Armstrong World Industries.

## **Concrete**

See Asphalt & Concrete above.

## **Wallboard**

Wallboard, or drywall, was collected from several new building construction projects from 2003 to 2006 to the Centex manufacturing plant north of Albuquerque, now called American Gypsum. While the material was successfully diverted at the source, the tolerance for contamination at the manufacturing plant was extremely low. Contamination resulted in the manufacturer cancelling all post-consumer recycling efforts; this was confirmed by a visit to the plant and discussion with the plant supervisor in fall 2006.

## **Wood**

Wood pallets received by Building 957 Shipping & Receiving are reused internally to deliver purchased materials to buildings all over the site, and are set out for the vendor companies to take back. Across the site, the Facilities group routinely goes around and collects empty pallets and delivers them to the C&D Recycle Center. All broken pallets, barring heavy contamination, go into a wood recycle roll-off. Unbroken pallets are sorted by size to meet Riteway Pallets specifications for reuse. The pallets are free to any group such as Reapplication and Facilities to come and reuse as needed. If an excess quantity is accumulated, Riteway Pallets is called to pick-up a shipment.

Shipping crates, scrap lumber and any other wood-based material is processed through the C&D Recycle Center. Clean wood materials are collected and transported to local companies to be recycled by either grinding into reusable mulch or manufacturing into wood pellets for fuel. Painted, finished, or otherwise treated wood items are separated for disposal at the KAFB Landfill.

### 3.0 FY09 Recycling Opportunity Assessment

The objective of this FY09 ROA is to provide the current status of the original eighteen materials covered in FY04, and to expand the breadth of discussion in a couple of ways. The list of materials has been expanded to include 54 materials or material groupings. These have then been divided into:

- Routine solid waste (section 3.2),
- Non-routine solid waste (section 3.3),
- Routine hazardous waste (section 3.4), and
- Non-routine hazardous waste (section 3.5).

The four tables in this section attempt to prioritize future efforts devoted to the materials discussed, to establish a qualitative assessment of the percent complete toward being fully implemented, and a brief text status of the material stream. At the end of each material discussed is some number of action items that can be applied to further improve the materials' diversion rate or process. Sections 3.4 and 3.5 are new compared to the FY04 ROA, as material reuse and recycle is not limited to solid waste.

The decision process chart below illustrates how each of the materials for recycle were evaluated and ranked as low, medium, or high. Ranks of “very high” and “very low” were utilized in the FY04 ROA, but were not as clearly applicable in the FY09 ROA and therefore not used.



### 3.1 Solid & Hazardous Waste Reporting

Solid Waste at Sandia National Laboratories is categorized into two types: routine and non-routine. Routine solid waste results from ongoing activities, whereas non-routine solid waste results from finite activities such as construction or demolition. This categorization of waste is required for reporting and is helpful as a planning tool to better understand the waste generated at Sandia. Each waste material is a specific portion of the total solid waste, and as we are able to identify, reduce, and divert the material, we get closer to our goal of zero waste to the landfill by 2025. Hazardous waste is similarly divided into routine and non-routine waste categories.

### 3.2 Routine Solid Waste Materials

Table 3: FY09 Prioritization of Routine Materials for Diversion

<i>Material</i>	<i>Priority</i>	<i>Percent Complete / Status</i>	
<i>Batteries: Alkaline &amp; Carbon Zinc</i>	Low	20%	Pilot in progress and optimizing process
Electronics: Computers	Medium	95%	Process in place; ongoing optimization
<i>Electronics: Media (non-hard drive)</i>	Low	25%	Partial capture of material
Electronics: Printing Supplies	Medium	100%	<i>Complete</i>
<i>Food Waste</i>	Medium	0%	Pilot being considered
<i>Glass</i>	Low	0%	Not being considered
Metal: Aluminum Cans	Medium	75%	Process in place; ongoing optimization
Metal: Scrap	High	75%	Process in place; ongoing optimization
Paper: Cardboard	Medium	75%	Process in place; ongoing optimization
<i>Paper: Mixed</i>	High	25%	Process in place; ongoing optimization
<i>Paper: Pulverized</i>	Low	100%	<i>Complete</i>
Paper: Restroom Paper Towels	Low	0%	Need to investigate
<i>Paper: Shredded</i>	Medium	0%	Need to investigate
Paper: White	Medium	90%	Process in place; ongoing optimization
<i>Plastics: #1 PET and #2 HDPE</i>	Medium	75%	Process in place; ongoing optimization
<i>Plastics: #1 Transparencies (coated)</i>	Low	50%	Process in place
Plastics: #2 HDPE	High	50%	Reduce contamination levels
<i>Plastics: #2 Tyvek® (woven)</i>	Low	10%	Process in place
Plastics: #3 PVC	Low	0%	Unknown generation or potential
Plastics: #4 LDPE (packing foam)	High	0%	Pilot failed; need to reinitialize
Plastics: #4 Shrink Wrap (film)	Medium	50%	Process in place; ongoing optimization
Plastics: #5 PP (packing foam)	Low	0%	Not being considered
Plastics: #5 PP (rigid)	Low	25%	Process in place; ongoing optimization
<i>Plastics: #6 EPS (Styrofoam®)</i>	Medium	50%	Process in place; ongoing optimization
Plastics: Lucite®, Plexiglas®, & Teflon®	Low	75%	Process in place
Plastics: Polyurethane Foam	Medium	0%	Pilot with restart of LDPE #4
Tires	Low	99%	<i>Complete</i>
<i>Yard Waste</i>	Low	5%	Not being considered

*Materials included in the FY04 ROA are italicized.*

#### **Batteries: Alkaline & Carbon Zinc**

– Priority: Low

Alkaline and carbon-zinc batteries, D-cell sized or smaller, are not considered hazardous and permitted to be thrown away in the trash. It was found that the Hazardous Waste Management Facility (HWMF) was capable of recycling alkaline and carbon zinc batteries that are currently going in the trash. To do so would require submission of the batteries to the HWMF via a Waste Description and Disposal Request (WDDR), a process only permitted by personnel having taken the added training course ENV112: Hazardous Waste Training. Additionally, this would incur a

charge to a provided project and task number. Under the current HWMF Service Center full cost recovery business model, each battery recycling submission would be charged a \$30 package fee and \$4 per kg. For small quantities this would be unreasonable. For larger quantities it might be reasonable (e.g., 50lbs is \$120, and 100lbs is \$210), but a pre-submission collection system would need to be devised.

Since the Corporate Procedure: *ESH100.2.ENV.22 Manage Hazardous Waste at SNL/NM*, permits the disposal of these batteries that are smaller than lantern size in the trash, P2 has evaluated available recycling vendors for options less expensive and with fewer restrictions than the WDDR process. The vendors Air Cycle, Battery Solutions, and Big Green Box were compared. The fee schedule of each company was standardized by determining the number of AA and AAA batteries it takes to create a kilogram of each. This allowed for comparison with current fees from the HWMF which charges, in part, by the weight of waste generated. This comparison file is available:

P2staff:\\07 Reuse & Recycling\Materials for Recycle\Batteries

The preferred path selected to use was Battery Solutions to recycle moderate quantities of batteries at one time. P2 met with the ECCs, and coordinated a path forward beginning on Earth Day 2009. P2 purchased four reusable pails each capable of containing and shipping 45 pounds to the vendor, and has sent three shipments, each with two pails, totaling approximately 225 pounds. Approximately 60 collection bins have been distributed by the end of FY09, and with minimal effort, regular slow growth is anticipated.

After the initial shipments and experiencing the actual costs of shipments, P2 learned from Battery Solutions that alkaline and carbon-zinc batteries received are sent to a scrap metal smelter for reclamation. This is different from other battery types that have specific processes to reclaim their hazardous constituents. A scrap metal hauler was then contacted to learn if they had heard of this practice, and indeed they already had an alkaline battery recycling process in place for several of their local customers. The customer provides the first drum, and from then out, a filled drum of batteries is switched out with an empty drum at no cost and no revenue.

*Action 1:*

A study should be conducted to identify all local scrap metal dealers willing to recycle alkaline and carbon zinc batteries.

*Action 2:*

Consider bulking batteries in a 55 gallon drum at the P2 Tent when sufficient quantities are being generated equaling at least two shipments per year.

## **Electronics: Computers**

– Priority: Medium

Prior to FY06, excess computers were being sent to the scrap metal recycling vendor to be shredded and recycled. However, Reapplication's ECC, with agreement from management, deemed this practice environmentally unsound. The Computers for Learning School Donation Program was discontinued at the same time by Reapplication Services, citing lack of personnel to support the events. With no acceptable disposition path, the computers were amassing at Reapplication. Prompted by goals set when Sandia/P2 joined the Federal Electronics Challenge in February 2006, P2 began to investigate the environmentally preferred method of e-scrap disposal. A new recycling vendor meeting the Federal Electronics Challenge (FEC) criteria and approved for use by SNL Waste Management was identified, and shipments to clear the Reapplication Yard of electronics began. P2 purchased a new sprung structure in FY07 in cooperation with and installed at Reapplication. Called the P2 Tent, its primary objective is to house excess electronics waiting to be shipped to a recycling vendor, and secondarily, it houses several other recycling projects as well.

The P2 Tent now receives all computer cathode ray tube (CRT) monitors, all broken liquid crystal display (LCD) monitors, and all desktops, laptops, thin clients, and servers. All computers have their hard drives removed prior to being placed in the P2 Tent. CRTs are a dead technology being phased out, and are a decreasing recycle stream with few left past FY10. LCDs, which have been replacing the CRTs steadily since FY04, will be an increasing recycle stream. A reuse program for desktops and laptops that meet the computer common operating environment at Sandia was in operation until FY08, but it has since been scaled back to minimal operation. Nearly all desktops and laptops are directly recycled with little-to-no opportunity for reuse, regardless of age or quality.

### *Action 1:*

Reinvigorate the reuse of desktops and laptops within Sandia through Reapplication or a new organization. This has met with preliminary approval by the new Reapplication team leader and an investigation is underway.

### *Action 2:*

A new method of executing Computers for Learning should be identified. The old process was labor and time intensive, thus it was cancelled. See FEC objectives regarding Computers for Learning. See the FY09 Reapplication PPOA for specific activities identified.

### *Action 3:*

Require that Sandia take back all electronics sent to auction that do not sell. Otherwise the electronics are being thrown away in the landfill. This is known as "disposal via a third party."

*Action 4:*

Methods should be found to protect and prolong individual LCDs onsite. Repair and refurbishment services will become more common as the technology becomes standard. Transportation to and handling of parts at Reapplication must be addressed.

*Action 5:*

Include all worn and broken printers and peripherals in electronics recycle stream.

**Electronics: Media (non-hard drives)**

– Priority: Low

Non-hard drive electronic media is collected three ways. There are 30 removable electronic media (REM) disposal boxes across the site, maintained by the SWTF; individuals may submit REM to Reapplication; and individuals may interoffice commercial read-only CDs and DVDs to P2. Only commercial read-only CDs and DVDs are known to be free of potentially sensitive Sandia information, and do not fall under the security controls. Since FY08, commercial read-only CDs and DVDs received by Reapplication or P2 are stripped of their containers and placed in a cubic yard box. These boxes are stored in the P2 Tent for shipment to the plastic materials broker, Berg Mill. All other REM received by Reapplication and P2, and all REM received by the SWTF in disposal boxes are bulked for destruction. As of the end of FY09, there is not an approved vendor to destroy the potentially sensitive REM. An incinerator facility in the Midwest has been identified by the SWTF for potential use.

*Action 1:*

When a vendor has been approved for REM destruction, learn if the material is being used for waste-to-energy purposes. If so, it can count as “recycled”.

**Electronics: Printing Supplies**

– Priority: Medium

Sandia’s current printer toner recycler and JIT vendor, Document Solutions Incorporated (DSI), accepts all printer consumables for recycle. This includes ink cartridges, toner cartridges, drums, fusers, imaging kits, maintenance kits, waste toner cartridges, and so on. DSI pursues an unofficial “zero waste” objective with all of its materials and recycles all possible materials remaining from their remanufacturing processes either in-house or through the original equipment manufacturer. They will even pick up unused consumables from the P2 Tent and have verbally agreed to pay Sandia some amount for each if it retains value to them. By the end of FY09, nine pallets of excess toners (to the Toner Exchange inventory) have been returned to DSI in the last two years.

*Action 1:*

Contractually establish a process to receive payment for unused printer consumables returned to DSI.

## **Food Waste**

– Priority: Medium

Food waste generated both across the site and at the cafeterias has previously been considered and discounted. At the FY09 Earth, Wind, and Sun event, a local composting vendor, Soilutions, approached the P2 booth with an offer of service to collect the food scraps from the Building 861 cafeteria in a feasible way.

The placement of a 65-gallon tote for composting at the cafeteria has been discussed with cafeteria management. It would need to be picked up daily and replaced with a clean tote. Based on a waste characterization study of the cafeteria, and contrary to the findings of the FY05 Cafeteria PPOA, there is sufficient quantity of food waste to justify a composting effort; a tote should be located in the kitchen where the largest quantity of food waste is generated. An option exists to have additional bins with biodegradable liners placed elsewhere for customers.

### *Action 1:*

Arrange an FY10 pilot of food composting at the Thunderbird Cafeteria with recycling revenues paying for it.

### *Action 2:*

Encourage workers to establish home compost bins and to take their office food waste home each day.

## **Glass**

– Priority: Low

Sandia continues to support the placement of glass disposal boxes around the site. Placing broken or fragile glass in these disposal boxes is required by Environment, Safety, & Health corporate policy as a safety measure to protect the custodians, solid waste screeners, and others. Otherwise empty, intact glass containers are permitted to be placed in the trash.<sup>2</sup>

The City of Albuquerque maintains a glass collection system through drop-off locations around the city. The glass they collect is crushed and used in several ways. Large quantities are to be sold to local road construction companies for base course additive. Smaller quantities are sold to Growstones ([www.growstone.com](http://www.growstone.com)), to landscaping companies, and some is used as landfill cover. The limited glass recycling opportunities in New Mexico has previously made creating a glass diversion program at Sandia unfeasible.

### *Action 1:*

Investigate cooperative methods between the city, KAFB, and Sandia to establish collection points or a collection system onsite. Onsite food service facilities are primary sources, and may be a logical beginning point.

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<sup>2</sup> <http://www.sandia.gov/esh/ESH100.2.ENV.22.html>, Mgmt of Common Waste Streams, Glass Boxes.

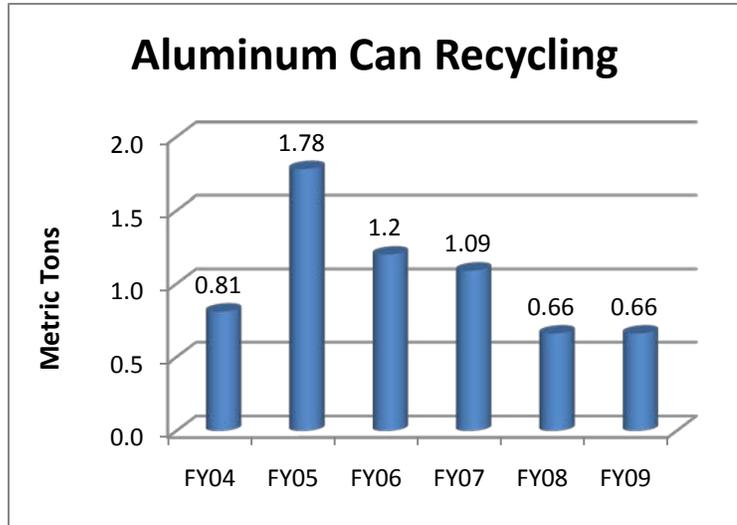
*Action 2:*

Investigate potential for glass recycled onsite to be crushed and used as additive for Sandia's base course production.

**Metal: Aluminum Cans**

– Priority: Medium

Now separated from the plastic collection bins, aluminum can collection has been trending down since FY05. Possible explanations include the displacement of aluminum by plastic beverage containers, though some vending machines and a few beverages for sale at the cafeterias are still aluminum; and individuals opting to take their aluminum home for resale. However, aluminum cans remain a small, but regular fixture in the solid waste regardless of diversion efforts.



*Action 1:*

Assure adequate recycle bin distribution in buildings. Special focus should be placed on conference rooms, break rooms, and open meeting areas.

*Action 2:*

Decrease the number of trash cans in common spaces (hallways, outside, etc.) to force generators to locate one of the special focus areas mentioned above that should have recycle bins present. Identified areas for focus outdoors include the Building 898 centrally enclosed courtyard and the south and east sides of the Thunderbird Cafeteria, Building 861.

**Metal: Scrap**

– Priority: High

Process-generated scrap metal is routinely collected and managed by Reapplication Services. Tilt hoppers of varying sizes are staged across the site, and when full, the scrap metal generator initiates an electronic pickup ticket. Depending on the process and the generator's diligence, the tilt hoppers may contain mixed scrap metal or segregated scrap metal. Segregated scrap metal has a higher value than mixed and is environmentally preferable.



The west end of the Reapplication Services Yard, where scrap metal is bulked in rolloffs or drums, was reorganized in FY08 by assigning and labeling a “parking spot” to each of the primary metal types: aluminum, copper, magnesium, mixed metals, and stainless steel. Through FY07, all scrap metal generation was considered routine, but for FY08 and forward, the scrap metal recycling coming from construction activities, with pick-ups being coordinated by P2, is being separately tracked and categorized as non-routine.

An LSS effort to establish sustainable segregation practices was scheduled for FY09 in Building 840, SNL’s primary machine shop and largest scrap metal generator. However, in the third quarter, it was announced that the majority of the machine shop operations would cease by the end of FY09. This will negatively impact recycling quantities and revenues. A revised LSS effort will be implemented in FY10 based on remaining scrap generators and P2 staff availability.

*Action 1:*

Review compiled weight tickets to see if there are rolloffs of segregated metals being generated and tracked at Reapplication.

*Action 2:*

Identify a new building or process for the LSS effort.

*Action 3:*

Map and identify the locations and materials collected in tilt hoppers across Sandia.

**Paper: Cardboard**

– Priority: Medium

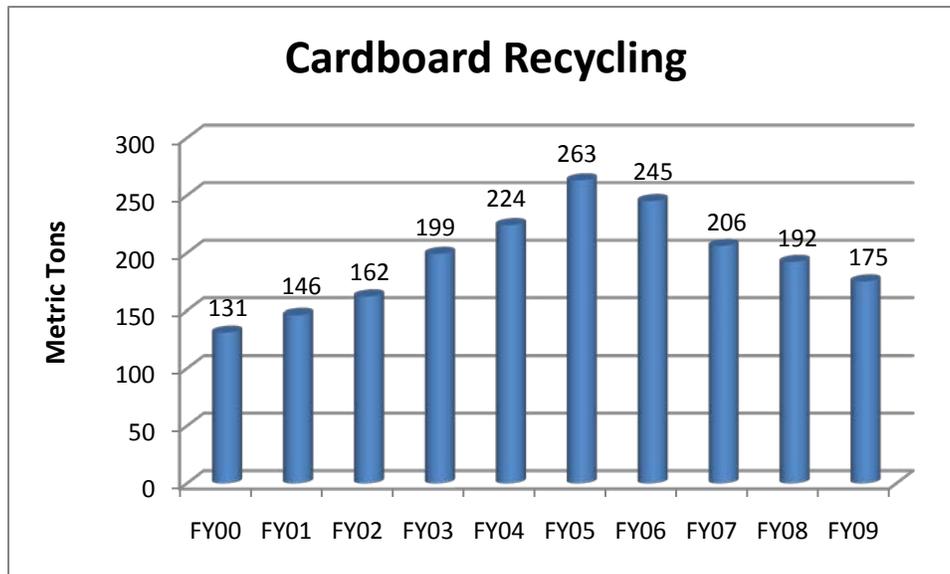
At the beginning FY09, 66 blue dumpsters were counted as deployed across the site for cardboard collection, and eight new cardboard dumpsters were available at the SWTF. For comparison, there are over 200 solid waste dumpsters and the two types of dumpsters are often not co-located. The SWTF estimated that they are pulling approximately 50mt of cardboard, or one quarter of the annual recycled total, out of the solid waste each year. There are many reasons for this:



- In the remote areas, there are only solid waste dumpsters.
- Approximately one third of the solid waste dumpsters in TAI, TAI, and TAIV do not have a cardboard dumpster next to them.
- Several large buildings have trash service off their raised docks, and the style of cardboard dumpster present was not conducive to use from a dock.
- Many of the cardboard dumpsters are half the size of a standard solid waste dumpster and fill rapidly, leaving solid waste dumpsters to serve as overflow.
- Some individuals refuse to pay attention or participate.

This quantity of cardboard in the solid waste is overwhelming the SWTF personnel, preventing them from being able to participate in other recycling and waste-screening efforts.

Cardboard recycling peaked in FY05, when SNL/NM was at its height of new building construction. Cardboard recovery weights dropped 33% from FY05 through FY09. Total solid waste dropped 84% from 22,011mt in FY05 to 3,522mt in FY09. In FY00, the cardboard recycled would have equated to 0.7% of the solid waste. In FY09, the cardboard recycled would have equated to 4.7% of the solid waste. This indicates the overall capture of cardboard for recycle from the solid waste has trended upwards over the past decade.



Through an FY09 LSS 6S event, this problem was evaluated and several systemic changes are being made with the support of the SWTF. The eight excess blue dumpsters at the SWTF have been deployed to upgrade and replace undersized cardboard dumpsters. Three buildings with solid waste service off their loading docks have had their cardboard dumpsters rotated out and replaced with larger, top-loading dumpsters designed for use at a dock. At least 15 solid waste dumpsters were identified as excess and removed from service. These solid waste dumpsters are being painted blue and deployed to upgrade and replace additional undersized cardboard dumpsters and fill current gaps in the collection system. Some of the undersized dumpsters will be redeployed to new gap locations, while most will be repainted yellow to be used as mixed paper collection dumpsters. A cardboard awareness article discussing the above information was submitted and published in the Porcelain Press during 3Q FY09.

An excess cardboard compacting rolloff was located just south of the Facilities Warehouse, Building 954. It has been inactive for approximately 4 years, since Facilities stopped generating cardboard from installing new furniture, a task that was contracted out to the JIT furniture vendors. The equipment is from the local company Environmental Systems, 505-242-3030, and runs on 208V/30Amps. The power feed next to it at building 954 is 3 phase/240V/100Amps. It is 10 feet wide and 26 feet long.

*Action 1:*

Expand cardboard dumpster collection into TAIH. The cardboard truck already drives there every other week to the Radioactive and Mixed Waste Management Facility (RMWMF) at the south end, so adding dumpsters along the route appears feasible.

*Action 2:*

Logically group dumpsters in clusters, and arrange for the cardboard to be the most easily accessed dumpster. This is an objective of the FY09 Dumpster Realignment LSS 6S event that has been partially accomplished.

*Action 3:*

Conduct awareness activities and communicate periodically with the SWTF to learn if the quantity of cardboard in the solid waste is decreasing.

*Action 4:*

Identify current owner of the derelict cardboard compacting rolloff, and work to identify a new use for the equipment.

*Action 5:*

Work with JIT furniture vendors to assure recycling of cardboard and other packaging materials.

**Paper: Mixed**

– Priority: High

Since 3Q FY08, a new collection system utilizing yellow dumpsters and volunteer “Champions” to move mixed paper in yellow plastic mail crates from inside buildings to the dumpsters has been in place and growing. At the end of FY09, including the Mail Room and Building 894’s initial efforts, there are 30 yellow mixed paper dumpsters throughout TAs I, II, and IV. P2 has purchased approximately 700 yellow plastic mail crates for inside collection points, and more than 500 of them have been distributed. Mixed paper also includes most newsprint collected onsite, previously a separate recycle stream with low participation.

During 3Q and 4Q FY08, a large effort to clean out and reduce the size of the Building 804 Technical Library was supported by P2 and this upgraded recycle stream. This effort resulted in a non-routine surge of 59.9mt of mixed paper being recycled.

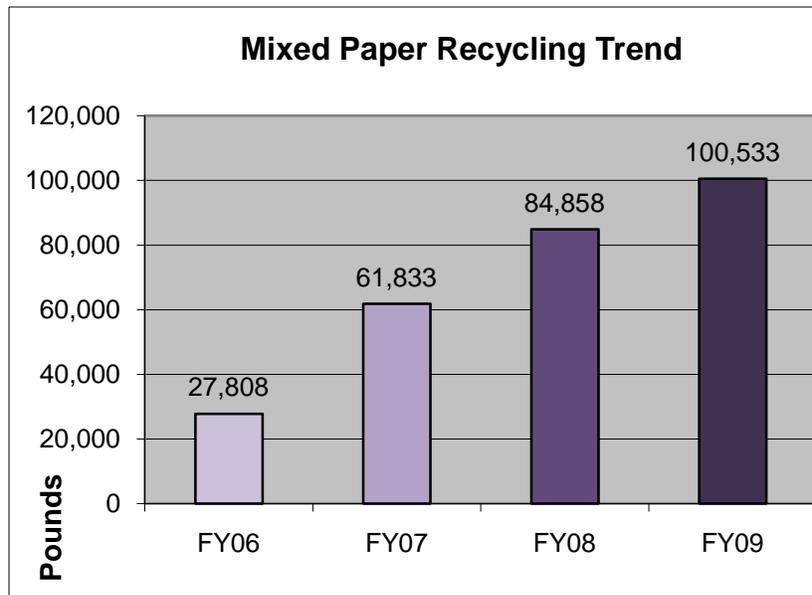


Also in 3Q FY08, coincident with Earth Day and spurred by P2, a decision was made by upper management to cease the printing and distribution of about 95% of the *Lockheed Martin Today* publication and rely on the electronic version. While this is no longer a potential mixed paper recycling stream, it resulted in a waste reduction of 12mt of mixed paper per year, and eliminated a common contamination in the white paper recycling.

A growing list of Champions is maintained by P2 and communicated with at least quarterly through an e-mail providing a chart similar to the one below as a status update. Many of the Champions take their participation quite seriously and have a vested interest in the success of this program. Sandia is not currently able to implement the mixed paper recycle stream in the same fashion as the white paper, which is corporately supported through a full-time employee (FTE) at the SWTF.

Through an FY09 LSS 6S event, nine new mixed paper dumpsters have been introduced across the site. New locations are selected by identifying current Champions without a nearby dumpster, and locating spatial gaps in the collection system using the Recycling Geographic Information System (GIS) setup in FY09. A study of dumpster usage onsite resulted in many excess dumpsters, some of which are being painted yellow. No new dumpsters were required to be purchased for this effort to grow mixed paper collection.

The following chart is only routine mixed paper recycling quantities, and does not include the 59.9mt from the Building 804 Technical Library clean out in FY08.



*Action 1:*

Deploy three new mixed paper dumpsters in FY10.

*Action 2:*

Obtain corporate support for site wide mixed paper collection through the adding of an FTE to the SWTF recycling staff. Use this FTE to implement a concurrent rolling tote program for mixed paper alongside that of the white paper.

*Action 3:*

P2 to become involved in Lean 6S events and the office/personnel moves process to minimize loss of recyclable material to purges of outdated paper, supplies, and other materials.

**Paper: Pulverized**

– Priority: Low

All paper collected in white and red destruction bags go out to TAIH to be pulverized. The destruction bags are a custom design and cost \$0.92-\$1.52 each from Sandia Paper Company. The pulverized paper is blown into an enclosed rolloff and provided to a local company, Soilutions, as an ingredient to their compost products. Destruction bags are tied or taped shut, and often ripped open to process.

*Action 1:*

Quantify destruction bag purchases for FY08 and FY09, and find out what happens to the bags after use.

*Action 2:*

Set up a reuse system for any salvageable destruction bags, and seek alternative means to make more bags reusable.

*Action 3:*

Attempt to recycle non-salvageable destruction bags. This could require the removal of any contaminating tape, or slicing away of the taped portions of the bags.

**Paper: Restroom Paper Towels**

– Priority: Low

Approximately five percent of the annual routine solid waste is restroom paper towel waste. The majority of the paper is used once to dry hands, and then thrown away. While some of the paper towels become soiled, the majority are clean, but damp. If a way could be found to first reduce and then recycle or compost these, a measurable impact could be realized.

Two ideas exist to date. A fast, energy efficient hand dryer called the Dyson AirBlade could replace the use of paper towels. Electrical wiring would be an expensive start-up expense in many locations. Second, clean paper towels could go into a separate bin than the trash and be taken out to the mixed paper for recycling. Perhaps even yellow “Slim Jim” trash cans could be used to maintain the color coordinated nature of the mixed paper recycle stream and differentiate the container from being regular trash.

*Action 1:*

Brainstorm on the ideas above within P2 and formulate follow-on action.

**Paper: Shredded**

– Priority: Medium

All paper that is shredded in normal building shredders gets bagged and placed in the solid waste dumpsters. These bags currently go through the SWTF to the landfill.

*Action 1:*

Find out if the SWTF and the team from Logistics that handles destruction bag transport and processing would be willing to test adding a regular pick-up of screened shredded paper from the SWTF to be fed into the TAIII pulverizer. A multi-week test would provide data as to how much of the current solid waste stream is shredded paper.

*Action 2:*

Investigate diverting bags of shredded paper to be sent directly to Soilutions for composting.

*Action 3:*

Investigate replacing non-classified shredders with locked Official Use Only (OUO) white destruction bag containers. This has the added benefits of reducing the need for shredder oil, electricity, and reducing the burden on Custodial.

**Paper: White**

– Priority: Medium

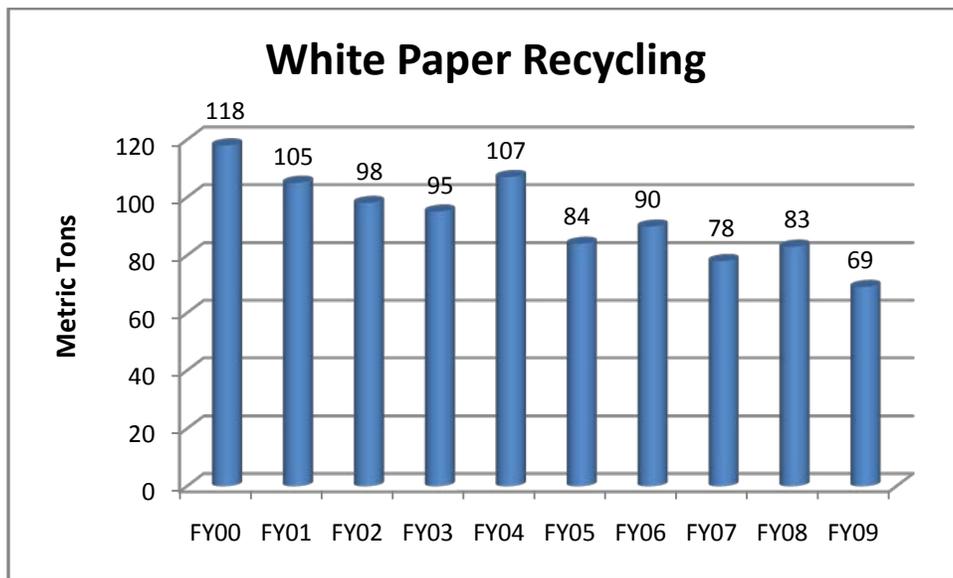
As most workers contribute to the white paper recycle stream, and white paper is collected across the site, there are ample opportunities for improvement. Currently individuals collect white copy paper and printer paper in blue bins in their offices and common areas. These small desk-side and medium copier-side bins are then emptied into 64-96 gallon rolling blue totes.

Approximately once per week, a SWTF worker stops by and checks each rolling blue tote. If the tote is nearing full, the worker will take away the full tote and leave an empty tote in its place.

The full totes are taken back to the SWTF and accumulated until about full 25 totes are ready.

The totes are then dumped on the floor of the SWTF and lightly screened for contaminants while being fed into the baler. These totes will result in approximately one bale. Once 2-3 truckloads of white paper are accumulated, they are shipped to a Boise paper mill in Alabama. Three truckloads were shipped in mid-FY09, but were so contaminated they were barely acceptable in the waste slurry, and no revenue was generated. Additional training and screening needs to take place to maintain the quality of the white paper, and a new mill with less stringent criteria should be identified.

The chart below shows the trend of white paper recycling over the past decade. A decreasing trend is the desired result, assuming usage reductions are being sought and implemented. There have been reductions in the production runs of the *Sandia Lab News*, a bi-weekly paper. The publication, *Lockheed Martin Today*, is no longer distributed at SNL/NM, and was a significant contaminate in the white paper recycling as it was on glossy paper. The usage of white copy paper dropped for one year when departments became responsible for the cost of purchasing, but has since returned to previous levels. The quantity of paper being categorized as OOU / Unclassified Controlled Information or sensitive by generators has increased over the past five years, perhaps the significant reason for the downward trend in white paper recycling and the increased in the volume of paper being pulverized via white and red destruction bags.



*Action 1:*

The *Sandia Lab News* is printed on white paper to enable it to be recycled. This biweekly newspaper will represent 12mt of paper in FY09, and 10mt in FY10. In FY09, this is projected to equate to more than 14% of the recycle stream. The labels used on all collection bins until FY09, harkened from a time when the *Sandia Lab News* was not printed on white paper, and calls it out to not include. These labels have been replaced on most rolling totes with current information, but the old labels remain on all small collection bins. Perform awareness activities surrounding the *Sandia Lab News*.

- *Sandia Daily News* article to cross out “*Sandia Lab News*” on personal bins,
  - Include offer of personal bins – warn SWTF ahead of time,
- Advertisement in the *Sandia Lab News*, and
- Submit daily promotional phrases to the Techweb “Something to Think About”.

*Action 2:*

Using Recycling GIS, analyze the SWTF white paper collection data spatially for gaps in collection, and any white paper pick-up requests for process improvements.

*Action 3:*

P2 participate in the screening of materials during bale creation to reduce contamination, and learn where additional awareness efforts should be focused.

*Action 4:*

P2 to become involved in the office/personnel moves process to minimize purges of outdated paper, supplies, and other materials.

**Plastics: An Overview**

The national and global recycling of plastic materials is in constant flux, and a strong channel of communication with the plastic broker, Berg Mill, needs to be maintained. The material resale market must be considered when developing and maintaining Sandia’s plastic recycle streams. Currently, much of the plastics generated through the SWTF are contaminated with incompatible forms of plastic. One example of this is the #1 and #2 commingled bottles collected in office spaces which are mixed with the general rigid plastics from C&D activities that include all varieties of plastic resins. Another example is allowing the rigid #5 to go through the baler with the #2 acid bottles collected from Building 858. Also recently learned is that a bottle made from number #1 or #2 is not of equivalent reuse value as generic rigid #1 or #2 not in bottle form.

Just prior to the market decline in late 2008, P2 began collecting various plastics that were not the standard #1 and #2 bottles in the P2 Tent at Reapplication. First was mixed plastic films generated by Reapplication’s sorting operations. This was followed by new sources of rigid #5, acrylic and brand name plastic sheeting, rigid #2 shavings from a finite process, shrink wrap, Teflon® blocks, PVC pipes and rolls, bulk transparencies, fiber optic cable (plastic sheathing), and shrink wrap. Beyond the geologic timeframe required for any realistic decomposition to occur in the landfill, the objective and hope was that by acquiring bulk quantities of many plastic types would result in more frequent shipments of material to Berg Mill, an increase in recycling revenue, and a corresponding decrease in solid waste. The first mixed shipment to Berg Mill is anticipated in early FY10.

**Table 4: General pricing per pound for plastics in 2010**

<i>Material</i>	<i>Price/pound</i>
Mixed rigid (#1-7)	\$0.04
PET #1 bottles	\$0.15
HDPE #2 natural bottles	\$0.20
HDPE #2 colored	\$0.10
LDPE #4 film	\$0.15
LDPE #4 foam	\$0.15
PP #5 rigid	\$0.05
PS #6 foam	\$0.15
Nylon block	\$0.02
Acrylic sheeting/scrap	\$0.07

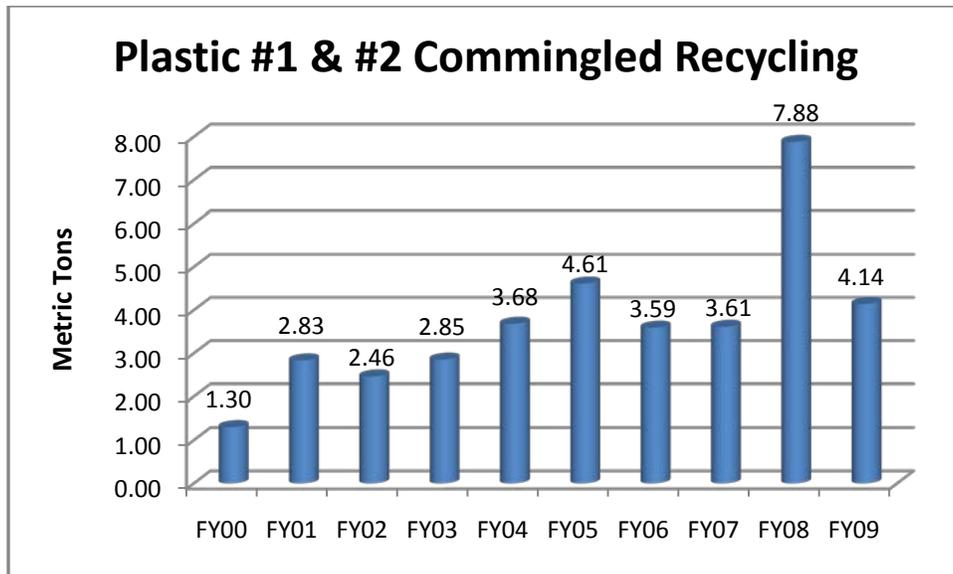
*Action 1:*

Maintain information on plastics #1-6 and others in the Material Recycling Assessment spreadsheet as current as possible, perhaps bi-annually.  
(p2staff:\\07 Reuse & Recycling\Materials for Recycle)

**Plastics: #1 PET and #2 HDPE (Commingled)**

– Priority: Medium

The commingled collection of Polyethylene Terephthalate (PET) #1 and High Density Polyethylene (HDPE) #2 bottles has continued to grow as plastic beverage containers, including personal water bottles, supplant the use of aluminum cans. Some recycle bins still display commingled aluminum and plastic labels. There was an effort in FY07 to work with custodians to identify these. An awareness brochure at Earth Day 2009 and an ongoing effort in FY09-FY10 to identify and correct recycle bin signage is intended to complete the elimination of these outdated labels onsite. Mixed bags of aluminum and plastic are otherwise assumed to be sent to the landfill.



*Action 1:*

Complete the removal of all mixed aluminum and plastic labels from collection bins.

*Action 2:*

Assure that commingled bottles are not mixed with other plastic resins at the SWTF, and raise awareness to minimize mixing in of non-bottles by members of the workforce.

**Plastics: #1 Transparencies (coated PET)**

– Priority: Low

This opportunity identified in the original FY04 ROA was completed. Used transparencies stream steadily in through interoffice mail to P2, and they are shipped to a contractor of 3M that turns them back into raw feedstock for new transparencies. This is a no revenue arrangement that costs shipping for each box sent to Pennsylvania.

As this is an obsolete technology at Sandia, boxes of unused transparencies are being solicited from the site in an effort to purge the majority of the material from the site. The plan is to generate a cubic yard box of pure transparencies (ink does not matter) which would be shipped to California to the materials broker for revenue that would at least offset the shipping.

**Plastics: #2 HDPE**

– Priority: High

Beside beverage containers, a large number of laboratory chemical bottles are made of HDPE #2. Both buildings 858N and 518 are known to generate and to segregate these bottles. After triple rinsing with DI water, the bottles are collected into large trash bags. Building 858N has a rolloff from the SWTF in its northeast alley that fills with these bagged bottles at least once per quarter. Each rolloff load will produce a complete plastic bale at the SWTF. Building 518 does not generate enough quantity to warrant a rolloff, so the bagged bottles are placed in the solid waste dumpsters, and screened out at the SWTF to be recycled with the commingled beverage bottles. To date, the bales of HDPE #2 have not been tracked separate from the commingled bales, though they are of higher value to the materials broker than commingled bales. Additionally, for the past two years, these bales have been contaminated with Polypropylene (PP) #5 cassette trays and wafer boxes. Bags of these trays and boxes were intended to be screened out from the rolloff by the SWTF, but communication broke down and they were not trained to do so. In theory, this was corrected in the 3Q of FY09, but it needs to be monitored.

The HWMF generates empty containers made of HDPE #2 that are 5 gallons in capacity or greater and required to be disposed on a WDDR. These containers are crushed and placed in the same rolloff at the SWTF that bags of commingled plastics #1 and #2 are bulked in prior to baling.

*Action 1:*

Initiate tracking and reporting of separate plastics by bale type.

*Action 2:*

Create a rolloff at the SWTF for bagged bottles of HDPE #2 and bagged bottles of commingled #1 and #2, separate from the generic C&D/HWMF plastic stream.

*Action 3:*

Seek and initiate additional sources of laboratory HDPE #2.

*Action 4:*

Monitor for the screening out of PP #5 from the acid bottle rolloff.

**Plastics: #2 Tyvek® (woven HDPE)**

– Priority: Low

Tyvek®, made by DuPont™, is used in the manufacture of protective garments, waterproof printing paper, and mailing envelopes. Lead by Division 2000, Tyvek® protective garments after clean room use are collected and sent to Garment Recovery Systems ([www.tyvekrecycling.com](http://www.tyvekrecycling.com)). The revenue generated from the Tyvek® garment recycling is donated by Garment Recovery Systems to a local charity. Waterproof printing paper and mailing envelopes made from Tyvek® are sent to P2 through interoffice mail. A postage-paid mailing pouch is provided by DuPont™ for the return and recycle of the non-garment material. Some non-garment quantities were shipped in FY08 and materials continue to slowly accumulate, but no record of the material being recycled exists in the P2 Trends database. If now weight is recorded through the WebShipper process, then small, light shipments can now be weighed using a recently acquired desktop scale.

*Action 1:*

Work with Division 2000 to assess and pursue the potential for growth of the clean room garment recycle stream to other users at Sandia.

*Action 2:*

Publicize the Tyvek® envelope and sheet recycle stream.

**Plastics: #3 PVC**

– Priority: Low

Polyvinyl Chloride (PVC) has not been extensively researched, and waste volumes generated are not known. Most PVC piping waste would originate from construction, renovation, and demolition activities, and be seen at the C&D Recycle Center. Our plastics vendor, Berg Mill, advertises that they accept PVC piping, but we would not be able to bale this material and piping is mostly void space. Any transportation of scrap piping would be inefficient. However, small quantities could be placed between the palletized plastics materials being shipped to Berg Mill. No local vendor for PVC was identified.

*Action 1:*

Assess the quantity and sources of PVC that come to the C&D Recycle Center.

**Plastics: #4 LDPE (packing foam)**

– Priority: High

Packaging foam made from Low Density Polyethylene (LDPE) #4 is prolific in computer equipment shipments. In a 3Q FY09 attempt to begin an LDPE #4 recycle stream, a 30-cubic yard rolloff was filled during a server upgrade project in Building 880. The rolloff was then moved to the C&D Recycle Center. However, when the first load of material was processed at the SWTF, it would not stay baled. Shipping loose to the materials broker in California is not an effective option. Many local vendors and plastics companies were contacted to accept loose shipments. Only Master Fibers thought they might be able to accept the material, but after providing samples they were not. Plans to ask the Computer Support Unit (CSU) to begin diverting the material for pick-up by P2 were delayed.

The remaining option is to densify the material. Two pieces of multi-material densifying equipment were identified, the RecycleTech XT300 and the Heger GSV-E-200-600. P2 collected information on both and did an analysis for our situation. The RecycleTech XT300 will melt LDPE #4 foam, PP #5 foam and Expanded Polystyrene (EPS) #6 foam (Styrofoam®). The manufacturer is the only identified buyer of the melted material. The XT300 was decided against due to this, as well as safety and emission concerns. The Heger GSV-E-200-600 uses an auger to densify the same three foam types into easily palletized, industry standard logs that we can market to our current plastics vendor, Berg Mill. The Heger model was purchased with year-end recycling revenues and installed at the SWTF.

To preserve the value and marketability of the material, each of the foam resin types must be kept separate. Additionally, the material is worth more when sorted by color. For LDPE #4, white foam was found to make up 90-95% of test rolloff, 3-4% blue, and a small amount of pink and black. Four new 40 cubic yard rolloffs were purchased for use at the C&D Recycle Center to support collection of the separate foam types. Three of these will be covered and used for LDPE #4; one for mixed colors and two for white foam. Accumulating #4 for as long as possible without densifying it will reduce the number of material processing changes through the densifier, resulting in less mixed foam waste.

*Action 1:*

Work with SWTF to get an updated Primary Hazard Screen (PHS) and a new technical work document (TWD) for foam densifier operations approved.

*Action 2:*

Have covers/tarps installed on the new rolloff to minimize moisture content of the foam.

*Action 3:*

Expand collection of LDPE #4 packing foam to the yellow mixed paper dumpsters.

*Action 4:*

Work with the CSU to increase foam recycling awareness.

**Plastics: #4 Shrink Wrap (LDPE film)**

– Priority: Medium

Shrink wrap is used to keep materials clean and protect them from falling off of pallets during transit. Primary generators of used shrink wrap include Reapplication Services, Receiving (Building 957), and potentially Custodial Services and the Facilities Warehouse (Building 954). Reapplication Services, Receiving, and Building 702 are now collecting used shrink wrap for



accumulation in the P2 Tent. Eleven cubic yard boxes of the lightweight material were accumulated in FY09 for the SWTF to test-bale. A 634 pound bale resulted, but it took up to two hours to process. The operator requested more material for the next run (1,200 pounds), so P2 will aim to accumulate at least 20 cubic yard boxes of material.

*Action 1:*

Contact Custodial Services and the Facilities Warehouse to gauge the volume of shrink wrap waste they produce and to solicit their participation in the recycling of it.

**Plastics: #5 PP (packing foam)**

– Priority: Low

While investigating the potential recycling of LDPE #4, the previously unknown packing foam was found onsite. PP #5 foam looks like EPS #6 Styrofoam®, but has a waxy feel and is marked as PP #5. This packing foam has been found in both white and black colors, but much smaller quantities than the other packing foams. It was determined that it will take too long to accumulate rolloff loads of material to build a pallet's worth of logs. If received, the material will be thrown away.

*Action 1:*

Monitor for an increase of material to reevaluate feasibility for collection.

**Plastics: #5 PP (rigid)**

– Priority: Low

In FY07, a proactive laboratory technician in Building 858N noticed they were generating a constant stream of PP #5 cassette trays and wafer boxes from their labs. He set up collection containers and segregated the material from the solid waste. He was directed to place the bagged PP #5 in the HDPE #2 rolloff that was already next to the building, and the SWTF personnel were to screen out the PP #5 and collect it separately.

By FY09, the technician had left SNL and the SWTF personnel did not remember this stream. The building is continuing to collect the PP #5, but it has become a contaminant in the HDPE #2 rolloff since the SWTF was not watching to screen it out. Several bales at the SWTF were visually identified as coming from 858N by the PP #5 wafer boxes intermixed. A new sample of the PP #5 was obtained from the rolloff, had instructions written on it, and was given to the SWTF team lead as a training example for the screeners to watch for. The material will be set aside for P2 to take to the P2 Tent and accumulate in cubic yard boxes. The building's waste manager was met with in FY09 to maximize capture of both PP #5 and the HDPE #2 acid bottles. Both recycle streams are being actively managed well at the point of generation.



*Action 1:*

Follow up with the SWTF periodically to assure the rigid PP #5 is being set aside.

*Action 2:*

Seek additional rigid PP #5 sources, such as old cases for video cassettes.

**Plastics: #6 EPS (Styrofoam®)**

– Priority: Medium

After a false start in FY07 for recycling Styrofoam®, with the company leaving town, RASTRA returned to Albuquerque in FY08 and accepted large-beaded EPS #6. They ground up and used the raw material as the primary constituent of RASTRA blocks, an insulated concrete form for building construction. This was a no revenue, no fee arrangement. A 40 cubic yard rolloff has been established at the C&D Recycle Center for drop-off collection since 1Q FY09. Collection has now been expanded in the 4Q of FY09 to using the yellow mixed paper dumpsters. The Styrofoam® was then collected and bulked into the 40cy rolloff for delivery to RASTRA.

In 3Q FY09, CSU management agreed that one of its Pods would begin bagging and setting aside EPS #6 for P2 to pick-up. This is a test to see what quantities are generated by the CSUs onsite. To date, none has been picked up and in follow-up communication the majority of the material being encountered by CSU is the LDPE #4 packing foam.

Coincident with the multi-material foam densifier coming online, P2 found out that RASTRA again left New Mexico at the end of 2009, so the foam densifier purchase turns out to be a decision that assures the continuation of the foam packing recycle stream. One of the four new 40cy rolloffs is to be covered and dedicated to collection of Styrofoam®.

*Action 1:*

Maintain relationship with CSU.

**Plastics: Lucite®, Plexiglas®, and Teflon®**

– Priority: Low

Non-standard types of plastic such as Lucite®, Plexiglas®, and Teflon® appear as waste from time to time. These materials have value and are included in the shipments to Berg Mill. Often they are not in readily containerized or in a palletized form, so they are to be added to the shipment in any way that will get them into the truck with as little destructive size reduction as possible.

*Action 1:*

Be available to collect and store odd pieces of plastic as needed.

**Plastics: Polyurethane Foam**

– Priority: Medium

This foam comes as a packing material. It will most likely become a contamination in the collection of #4 and #6 foams for densification. This foam is able to be baled, can be delivered locally to Green Planet Recycling, and will generate revenue.

*Action 1:*

Set up a covered 40cy rolloff at the C&D Recycle Center to collect this light foam.

**Tires**

– Priority: Low

Tires of all sizes are recycled through a Fleet Services vendor. The SWTF screens out any tires that come through to dumpsters to assure they are recycled. This occurs rarely, and primary comes from the Air Force solid waste collected. Tires identified as coming from the Air Force are returned for processing to the Air Force. Rubber inner tubes are also sent for recycle with the tires. Two bales of tires, probably of Air Force origin, were created at the SWTF in FY07 or FY08. By baling the tires, they were rendered unmarketable, and will probably be sent to the landfill by the end of FY10.



*Action 1:*

A common problem across the state, two problematic bales of tires exist behind the SWTF and need to be sourced to a recycler or have a reuse purpose identified.

*Action 2:*

Identify what happens to construction site waste tires.

## **Yard Waste**

– Priority: Low

Ground and Roads Maintenance generates yard waste from general vegetation upkeep and from construction projects that impact landscaping. Some effort is made to preserve trees and plants through relocation, but routine trimmings are hauled to the dump. It is believed that this unknown quantity of waste is relatively small, and a green recycling vendor has not been identified, though Soilutions might be a possibility. Accumulation may need to occur at the C&D Recycle Center, and hauling time and frequency would be key factors. No efforts toward yard waste are currently being considered.

### *Action 1:*

Review the FY07 PPOA for Sandia National Laboratories/California (SNL/CA). They decided to collect and compost their own green waste onsite. A grinder/chipper onsite at SNL/NM is a potential solution. This could be a reduction in Scope 3 GHG emissions, and possibly a benefit to the Grounds & Roads Maintenance team.

### *Action 2:*

Gauge Soilutions level of interest in receiving yard waste.

### *Action 3:*

Identify what KAFB does with their yard wastes.

### 3.3 Non-Routine Solid Waste Materials

Table 5: FY09 Prioritization of Non-Routine Materials for Diversion

<i>Material</i>	<i>Priority</i>	<i>Percent Complete / Status</i>
Asphalt & Concrete	Medium	90% / Ongoing support
Carpet Tiles	Medium	75% / Process optimization
Ceiling Tiles	Low	100% / Complete
Fiber Optic Cable	High	5% / New recycle stream initialization
Kevlar® Scraps	High	5% / New recycle stream initialization
Scrap Metals at the C&D Recycle Center	Low	90% / Ongoing support
Wallboard	n/a	0% / No material outlet at this time
Wood	Medium	90% / Process optimization

#### Asphalt & Concrete

– Priority: Medium

Operation of the CARA in Tech Area III is in full swing as of FY07. A new contractor, PG Enterprises, was selected in FY09 for annual crushing events. Asphalt and concrete (unreinforced and reinforced) primarily collected from construction projects, are accumulated and processed onsite. The reinforcing metal is recycled as scrap metal. The asphalt and concrete is crushed to different sizes according to City of Albuquerque specifications, Section 302 “Aggregate Base Course Construction” and Section 308 “Natural Gravel Surface for Unpaved Roadways”, as well as other aggregate sizes as needed. The resulting aggregate products can be reused onsite for such applications as track-off pads at construction sites, as base course for roadway pavement projects, or as a blended concrete and asphalt mix (“conphalt”) for surfacing remote area dirt roads.

#### Action 1:

Evaluate options for protecting crushed material stockpiles from pilfering.

#### Action 2:

Continue to seek Facilities and Thunder Range project commitments to use crushed aggregate products.

#### Carpet Tiles

– Priority: Medium

With the advent of the P2 tent in FY07, this is now a functionally mature recycle stream. However, the recycling vendor Interface carpet manufacturing has recently made significant changes to their ReEntry carpet reclamation program. When contacted to arrange a new shipment in FY09, the vendor Interface had changed their cost structure from charging \$1,100 per shipment to \$2,900 per shipment. In addition, they now charge an additional fee (\$0.11/lb) for any non-vinyl backed carpet, because instead of recycling this carpet-type, it is further

processed for incineration energy recovery. A credit of \$0.03/lb is now provided for shipments of vinyl backed carpet (or \$0.01/lb if mixed with non-vinyl backed carpet).

*Action 1:*

Identify less expensive shipping options to Interface.

*Action 2:*

Identify alternative vendors for recycling non-vinyl backed carpet, as opposed to incineration for energy recovery.

**Ceiling Tiles**

– Priority: Low

Ceiling tile recycling through the P2 Tent or direct from a large demolition site is an established process. Ceiling tiles from renovation and demolition projects are stacked neatly on a pallet and typically brought to the P2 Tent. When a full truckload is accumulated, Armstrong World Industries is contacted to send a truck to take the materials for recycle. This is a no-cost arrangement as long as full truckloads are shipped.

**Fiber Optic Cable**

– Priority: High

Fiber optic cable, largely generated by telephony activities and some laboratory laser experiments, has previously been an untracked portion of construction solid waste. The cable is a sheath of plastic, and the optical medium is mostly silica with perhaps 2-4% being a semiconductor metal called germanium. P2 has begun segregating fiber optic cable in the P2 Tent. The plastics broker Berg Mill evaluated a sample but will not be able to use the material. ECS Refining has been shipped a sample for a vendor that may be interested in the germanium.

*Action 1:*

Continue to identify vendors interested in fiber optic cables. The germanium is the priority constituent.

**Kevlar® Scraps**

– Priority: High

Approximately 200 weapon carrying Kevlar® parachutes remain onsite. The demilitarized scraps from each parachute weigh approximately 250 pounds. Property Management decided that the material is not considered high risk and can be sent out for recycle. One vendor has been identified in North Carolina, Harmony Industries ([www.harmonyrecycling.com](http://www.harmonyrecycling.com)), and would use the scraps to make reinforced rubber products. The process to demilitarize the parachutes stopped operations at the end of FY09. This potential recycle stream is in a holding pattern until the group in possession of the whole parachutes can be determined.

*Action 1:*

Obtain samples from the owners and identify additional Kevlar® recycling vendors.

## **Scrap Metals at C&D Recycle Center**

– Priority: Low

Scrap metal recycling at the C&D Recycle Center is an established process. A 30-yard roll-off is designated for mixed scrap metal collected by construction contractors and SNL maintenance personnel. Additionally, 4-yard tilt hoppers are designated for higher value metals, including copper wire, copper (not wire), aluminum, and brass. Other metal types can be separately collected on an as needed basis, such as stainless steel.

### *Action 1:*

Pending feedback from ECS Refining regarding scrap value, designate a tilt hopper or wire cage for collection of fiber optic cable. This action would also require advertising the new recycle stream to the potential fiber optic cable waste generators, such as B&D Industries and Verizon.

## **Wallboard**

– Priority: n/a

Although a wallboard recycling pilot program had been conducted with a local wallboard manufacturer (American Gypsum), the vendor's requirement for "zero" contamination has terminated the program. Based on the high interest in recycling wallboard within the construction industry, the New Mexico Recycling Coalition has been exploring opportunities to establish a means of recycling wallboard. However, no viable options have been identified at this point in time. Until a feasible wallboard recycling option becomes available, this potential recycle stream will no longer be pursued.

## **Wood**

– Priority: Medium

Scrap wood for recycle has quadrupled as a result of changing vendors to a more contaminant-tolerant facility. Previous averages had one 30cy rolloff being taken to Soilutions per month, and now one 30cy rolloff per week is taken to Wood-U-Recycle. This diversion success has become a thorn in the side of the operations personnel at the SWTF, as more trips equates to more time on the road for the driver, leaving less time for other processing activities.

### *Action 1:*

Evaluate upgrading the size of the wood rolloff to 40cy. Based on the numbers above, this would reduce trips to Wood-U-Recycle by one per month. If the side of the rolloff is too high to access off the C&D Recycle Center dock, then perhaps a project to create a deeper parking spot for the rolloff should be pursued.

### 3.4 Routine Hazardous Waste Materials

The discussion here of routine hazardous waste for recycle is new over the FY04 ROA. The HWMF grouping smaller quantities of waste from across the labs and separately Fleet Services are SNL/NM's primary sources of routine hazardous materials that can be recycled.

Table 6: FY09 Prioritization of Routine Hazardous Materials for Diversion

<i>Material</i>	<i>Priority</i>	<i>Percent Complete / Status</i>
Antifreeze	Medium	90% / Optimize process
Batteries	Low	95% / Increase awareness
Brake Chambers	n/a	100% / Complete
Brake Shoes	n/a	100% / Complete
Capacitors	n/a	100% / Complete
Fuels	Low	95% / Ongoing support
Hydraulic Fluids	Medium	80% / Optimize process
Lead Ingots	Medium	95% / Increase awareness
Lead Solder	High	50% / Optimize process; Increase awareness
Light Ballasts	n/a	100% / Complete
Light Bulbs	Medium	80% / Optimize process; Increase awareness
Mercury	High	50% / Increase awareness
Oil Filters	Low	75% / Optimize process
PRS-1000	Low	0% / Process needs renewal
Shock Absorbers	Low	0% / Alternatives needed
Shop Rags	Low	95% / Document process
Transformers	n/a	100% / Complete
Used Oil	Low	95% / Ongoing support

*Action 1:*

Include in FY11 P2 Program Plan to work with the HWMF to evaluate the downstream recyclers of hazardous materials to assure proper handling and treatment, while minimizing material exporting.

**Antifreeze**

– Priority: Medium

Antifreeze or coolant is collected in drums at Fleet Services and taken by Safety Kleen to be filtered and rejuvenated into new coolant. The HWMF also receives quantities of propylene glycol and ethylene glycol from other locations around SNL/NM, but those are not recycled.

*Action 1:*

Work with the HWMF to create a path forward for recycling the small quantities of propylene glycol and ethylene glycol that they receive.

## Batteries

– Priority: Medium

Alkaline and carbon-zinc batteries are discussed in section 3.2, as they are non-hazardous. Lead-acid batteries have a 100% capture and recycle rate at SNL/NM. They are collected and recycled at Fleet Services through Parts Plus, and from across the rest of the site at the HWMF. All other batteries generated onsite are considered hazardous and must be processed through the HWMF. This includes lithium, lithium-ion, nickel-cadmium, nickel-metal-hydride, silver oxide, alkalines larger than D-cell, and non-alkaline button cell batteries. These are mandatory to collect, and largely a successful recycle stream. An area of concern is button cell batteries and rechargeable batteries that look like alkalines that could easily be thrown away in the bagged trash and therefore go undetected.

### *Action 1:*

Work with the ECCs to develop an awareness effort regarding button cell and small rechargeable batteries, an add-on to a preexisting training, or both.

### *Action 2:*

Work with the ECCs and HWMF for a less costly means of disposal for rechargeable batteries.

### *Action 3:*

Identify what a thermal battery is, and why we are unable to recycle them.

## Brake Chambers

– Priority: n/a

Used brake chambers from Fleet Services are accumulated in drums and taken by the parts vendor for refurbishment or recycle.



## Brake Shoes

– Priority: n/a

Used brake shoes from Fleet are accumulated in drums and taken by the parts vendor for refurbishment or recycle.



## Capacitors

– Priority: n/a

Capacitors are considered hazardous because of the electrical charge they may carry, and the potential for containing polychlorinated biphenyls (PCBs). Therefore, capacitors must be sent to the HWMF, and from there they are recycled as electronic scrap. Due to the inherent safety concerns, this process is well understood and followed by waste generators.



## **Fuels**

– Priority: Low

Containers of wasted unleaded gasoline, diesel, and oil contaminated with coolant or water were being generated often from Fleet Services up to FY07. These were then sent for hazardous waste disposal rather than being recycled separately. P2 worked with Fleet to eliminate coolant contamination by separating and labeling the tools and containers used for coolant work from those used on fuel and oil work. Fleet has also greatly reduced the number of fuel tank purges needed to be done. Uncontaminated containers of gasoline and diesel are still sent to the HWMF but are now managed as fuels for energy recovery. Oil mixed with water is still a waste stream of concern for the entire site. For further discussion on oil mixed with water, see section 3.5.

### *Action 1:*

Continue to monitor Fleet-generated waste streams for cross contamination that can be prevented.

### *Action 2:*

Obtain or assist in the creation of a procedure to document maintaining clean, separate waste streams.

## **Hydraulic Fluids**

– Priority: Medium

Fleet Services does not typically use petroleum-based hydraulic fluids, but instead uses soy-based and more recently canola-based hydraulic fluids that are recycled directly with the biobased vendor, Renewable Lubricants. If Fleet does generate petroleum hydraulic fluid, it is mixed with the used oil for recycle as they are compatible, and picked up by Safety Kleen. All other hydraulic fluid from around the site is sent to the HWMF for recycle.

### *Action 1:*

Work with the HWMF to find alternatives for soil contaminated with hydraulic fluid in concert with the efforts aimed at soil contaminated with oil. See section 3.5.

## **Lead Ingots**

– Priority: Medium

Ingots of lead are used across the site and managed according to corporate procedure ESH100.2.ENV.8 – Manage Excess Metallic Lead. When no longer needed, they are submitted to the Lead Bank, maintained by Organization 4139. To do so, the Lead Transfer Request Form (SF 2001-CTR) must be submitted to the program lead. A radiological release survey is required to be attached. If an organization needs lead ingots, they can be requested for free from the Lead Bank by contacting the program lead. If an excess of lead is accumulated at the Lead Bank, it is

shipped for recycle, historically to ECS Refining, and the revenue used to support the Lead Bank.

*Action 1:*

Work with the Lead Bank to share data and integrate efforts with P2.

**Lead Solder**

– Priority: High

Lead solder alloys are used in numerous applications and exists across the site and are supposed to be tracked in the Chemical Information System (CIS). Currently, 136 containers of lead solder are recorded in CIS (9/15/2009); this will be tracked through FY13 and reevaluated at that point. Activities concerning lead and lead solder will be included in the annual P2 Program Plans. Before promoting lead-free solders, be sure to understand the “whisker” effect, where the reduction of lead in the solder leads to the growth of metallic whiskers that can cause shorts and fires, and the possible implications to projects using it. For example, lead-free solder on satellites would be an unacceptable risk because potential problems could not be corrected.<sup>3</sup>

*Action 1:*

Work with CIS to learn perceived accuracy and potential gaps in the inventory data.

*Action 2:*

Work with the Air Quality group to learn their concerns and efforts regarding lead solder usage and the Toxic Release Inventory (TRI) report due June 1<sup>st</sup> annually.

*Action 3:*

Seek to identify users and ways to improve tracking.

*Action 4:*

Learn when lead-free alternatives are appropriate and disseminate to applicable users.

**Light Ballasts**

– Priority: n/a

Light ballasts are managed as hazardous waste because of the potential for containing PCBs. Therefore, all light ballasts must be sent to the HWMF. Almost all ballasts for disposal are generated by Facilities, and this process is followed well.

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<sup>3</sup> NASA: Metal Whiskers, <http://nepp.nasa.gov/whisker/>.

## **Light Bulbs**

– Priority: Medium

Incandescent, fluorescent, high-pressure sodium, and High Intensity Discharge/xenon bulbs or lamps are all fully recycled through the HWMF. Most of these lamps around the site are changed out by Facilities personnel and/or supporting contractors and managed properly for recycle. Disposition data is reported in the Waste Information Management System. Occasionally, burnt out lamps are generated by the workforce in laboratories or office spaces. It is dubious if these are being properly disposed. Lamps are often found in glass disposal boxes which are used to protect custodians from broken glass, which are sealed and placed in the solid waste dumpsters, never to be opened. Lamps that do arrive at the HWMF are bulked and shipped intact to the recycling vendor in Arizona. The majority of lamps received at the HWMF are fluorescent straight-tubes. The capability to crush lamps onsite, capturing the mercury and minimizing shipment volumes, exists at other DOE Complex Labs, such as Princeton Plasma Physics Laboratory, and is documented as working safely and effectively.

### *Action 1:*

Work with the ECCs to develop an awareness effort for office and laboratory generated light bulbs, an add-on to a preexisting training, or both.

### *Action 2:*

Work with the HWMF to evaluate the use of a fluorescent lamp crusher to minimize void space and save on shipping expenses.

## **Mercury**

– Priority: High

Mercury is used extensively onsite, both as a chemical tracked in the CIS and as a component in laboratory equipment. The *FY09 Assessment of Mercury Reduction at SNL/NM* document was the result of a recent effort made to learn the scope of mercury onsite. Approximately 72% of the known mercury waste over the past 10 years was recycled.

Aside: Lead and Mercury are reported in Sandia's annual TRI and are of concern because they are close to or exceed the reporting threshold. Appropriate reductions of these two materials would be a benefit to Sandia. Through ways such as tracking, P2 is working to make inroads with the Air Quality Program that is responsible for reporting to the TRI.

### *Action 1:*

Create a mercury awareness program in FY10.

### *Action 2:*

Investigate the usage of mercury in equipment and potential alternatives.

### **Oil Filters (Fleet Services)**

– Priority: Medium

Used oil filters are placed in a machine at Fleet Services that spins the filters to remove excess used oil. This used oil goes into a connected drum and gets recycled with the rest of the used oil. Glass and paper oil filters are then thrown away in the solid waste. Metal oil filters are placed in a drum to be recycled as scrap metal by the parts vendor.

#### *Action 1:*

Review HWMF records for non-Fleet Services filter disposals.

#### *Action 2:*

Work with Fleet and the HWMF to see if a broadened recycle program is possible.

### **PRS-1000**

– Priority: Low

PRS-1000 is a photoresist stripper used for cleaning in the manufacture of microelectronics. Prior to FY06, the manufacturer of the chemical would take back used product for recycle, but this closed-loop process ended.

#### *Action 1:*

Contact the manufacturer and other resources to investigate restarting the recycle process for PRS-1000 and the smaller waste stream of PRS-3000.

### **Shock Absorbers (Fleet Services)**

– Priority: Low

Used shock absorbers are being accumulated in drums at Fleet Services. The shock absorbers need to be drained of oil, but for safety reasons they cannot be drained by personnel onsite.

#### *Action 1:*

A vendor for refurbishment or recycle needs to be identified.

### **Shop Rags (Fleet Services)**

– Priority: Low

Red, cotton shop rags used and contaminated at Fleet Services are collected in red step cans and taken by a vendor for laundering. There had been an issue in FY07 of the mechanics sending rags for laundering with ridiculous heaps of wrapped-up grease, but this practice was stopped and a grease container established for periodic submission to the HWMF.

*Action 1:*

Obtain or assist in the creation of a procedure to document maintaining clean, separate waste streams.

**Transformers**

– Priority: n/a

Transformers contain oil and have the potential for containing PCBs. Therefore, transformers must be sent to the HWMF, and from there they are recycled. Due to the inherent safety factors, this process is well understood and followed by waste generators, of which the only source in FY09 was Center 1600.

**Used Oil**

– Priority: Low

Used petroleum based oil is recycled by Safety Kleen from Fleet Services and the HWMF. This recycle stream is well captured and recorded. Contamination has been an issue in the past though. Biobased oils cannot be included with the petroleum based oils. The biobased oils cause emulsification issues for the petroleum recycler and must be sent to a biobased vendor for recycle. As vacuum pump oil and other laboratory chemicals are slowly replaced with biobased products, this is an issue that will need to be periodically addressed with the HWMF. See “Oil Mixed with Water” in section 3.5 below.

*Action 1:*

Work with early adopters of biobased alternatives, such as vacuum pump oil and shredder oil, to assure proper notation to identify and differentiate the used biobased oil for disposal from used petroleum oil.

*Action 2:*

Obtain or assist in the creation of a Fleet Services procedure to document maintaining clean, separate waste streams.

### 3.5 Non-Routine Hazardous Waste Materials

The discussion here of non-routine hazardous waste for recycle is new over the FY04 ROA.

Table 7: FY09 Prioritization of Non-Routine Hazardous Materials for Diversion

<i>Material</i>	<i>Priority</i>	<i>Percent Complete / Status</i>
Oil Mixed with Water	High	25% / Not yet at HWMF
Soil Contaminated with Oil	High	0% / Need to investigate

#### Oil Mixed with Water

Oil mixed with water is not a well understood waste stream; however, it is a relatively high-volume non-routine waste stream. Some waste generators have distilleries in place to boil off the water constituent to permit recycle of the used oil. This has both financial and environmental benefits; first, the oil can then be recycled rather than disposed; and second, after package fees, the cost to recycle oil only \$5/kg versus \$42/kg to dispose, approximately \$7,400 in savings per drum, plus a volume reduction.

*Action 1:*

Pursue establishing an oil-water separator at the HWMF to enable the recycle of ongoing small quantities of oil mixed with water.

<i>Material</i>	<b>FY09</b>	<b>FY08</b>	<b>FY07</b>
Oil mixed with water	997 kg	1,572 kg	379 kg

#### Soil Contaminated with Oil

Oil discharges to the ground result in contaminated soil being cleaned up and handled as regulated waste.

*Action 1:*

Investigate using soil contaminated with oil as feedstock for asphalt plants.<sup>4</sup>

*Action 2:*

Look to include other petroleum soil contaminants such as hydraulic fluid.

<i>Material</i>	<b>FY09</b>	<b>FY08</b>	<b>FY07</b>
Soil contaminated with oil	2,572 kg	4,673 kg	5,325 kg
Soil contaminated with hydraulic fluid	477 kg	2,722 kg	3,586 kg

<sup>4</sup> Peter Pohlot, Implemented at Brookhaven National Laboratory, New York.

## **4.0 Conclusion**

The writing of this ROA took place over a large portion of FY09 and into FY10. The status of some of the materials discussed changed frequently. Eventually, a stopping point for updates had to be selected to permit the conclusion of this document. As the recommended action items are completed or become irrelevant, and new material recycle streams are identified, this document will become dated. It is recommended that a new ROA revision be completed by the end of FY11. This document will be referenced frequently in the effort to create a high-level outline for milestones and categories of work to strive for Sustainable Community goal of Zero Waste to Landfill by 2025.

## **5.0 Appendices**

### **Energy Equivalencies of Materials Recycled**

In an ongoing attempt to quantify the energy savings attained through recycling, conversion formulae have been sought to convert materials recycled into barrels of oil conserved. This data will be increasingly important to document, as the Federal Government and DOE in particular will seek to account for what are called Scope 3 Greenhouse Gas (GHG) Emissions in Executive Order 13514, signed October 5, 2009. To see the findings to date, please see attachments 5.1-5.3.

## 5.1 Conversion Data and Sources

	Average:	Savings Reported			Energy Savings	Source
		Barr els of Oil	kW h Sav ed	kBT Us		
Alkaline Batteries	2.77	2.8				<a href="http://www.batteryrecycling.com">www.batteryrecycling.com</a> Recycled as molten steel feedstock - therefore using steel figure
Aluminum	38.81	40.0	14,000		95%	
Aluminum		39.2	60,357	206,000		National Geographic Magazine, 1/2008, p82-83 Natural Resources Defense Council -
Aluminum		37.2	57,427	196,000	95%	<a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Cardboard	2.13	1.1	390		26%	
Cardboard		2.9	4,395	15,000		National Geographic Magazine, 1/2008, p82-83 Natural Resources Defense Council -
Cardboard		2.4	3,750	12,800	26%	<a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Carpet	20.19	20.2	31,058	106,000		National Geographic Magazine, 1/2008, p82-83
Ceiling Tiles	0.08	0.1	126	431		<a href="http://www.armstrong.com/common/c2002/content/files/15976.pdf">http://www.armstrong.com/common/c2002/content/files/15976.pdf</a>
Copper	15.81	15.8	24,319	83,000		National Geographic Magazine, 1/2008, p82-83 University of Cambridge (UK) -
Copper					87%	<a href="http://www.msm.cam.ac.uk/doi/poms/tlplib/recycling-metals/what.php">http://www.msm.cam.ac.uk/doi/poms/tlplib/recycling-metals/what.php</a>
Food Grease	3.43	3.4	5,274	18,000		<a href="http://www-online.com/articles/51830/">http://www-online.com/articles/51830/</a>
Glass	0.46	0.1	42		31%	
Glass		0.4	586	2,000		National Geographic Magazine, 1/2008, p82-83 Natural Resources Defense Council -
Glass		0.9	1,389	4,740	31%	<a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Lead	3.37	3.4	5,183	17,689	60%	International Lead Association, Energy & Climate Change presentation, Dr. Wilson
Lead-Acid Battery	4.05	4.1				Sam making an educated estimate based on PP # 5 and Lead components
Mixed Paper	2.41	1.9	2,930	10,000		National Geographic Magazine, 1/2008, p82-83 Natural Resources Defense Council -
Mixed Paper		4.0	6,094	20,800	35%	<a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Mixed Paper (Magazines)		0.2	293	1,000		National Geographic Magazine, 1/2008, p82-83
Mixed Paper (Newspaper)		3.0	4,688	16,000		National Geographic Magazine, 1/2008, p82-83
Mixed Paper (Newspaper)		1.7	601		45%	
Mixed Paper (Newspaper)		4.0	6,124	20,900	45%	Natural Resources Defense Council - <a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Mixed Paper (Phone books)		2.1	3,223	11,000		National Geographic Magazine, 1/2008, p82-83
Personal Computers	8.19	8.2	12,599	43,000		National Geographic Magazine, 1/2008, p82-83
Plastic #1 (PET)	12.37	16.0	7,034		57%	
Plastic #1 (PET)		10.1	15,529	53,000		National Geographic Magazine, 1/2008, p82-83 Natural Resources Defense Council -
Plastic #1 (PET)		11.0	16,965	57,900	57%	<a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Plastic #2 (HDPE)	12.86	16.0	5,774		75%	
Plastic #2 (HDPE)		9.7	14,943	51,000		National Geographic Magazine, 1/2008, p82-83

Plastic #4 (LDPE)	10.67	10.7	16,408	56,000		National Geographic Magazine, 1/2008, p82-83
Plastic #5 (PP)	10.20	10.2	15,705	53,600	74%	Natural Resources Defense Council - <a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Steel	2.77	1.8	642		61%	
Steel		3.8	5,860	20,000		National Geographic Magazine, 1/2008, p82-83 University of Cambridge (UK) - <a href="http://www.msm.cam.ac.uk/doitpoms/tlplib/recycling-metals/what.php">http://www.msm.cam.ac.uk/doitpoms/tlplib/recycling-metals/what.php</a>
Steel			4,190	14,300	62%	Natural Resources Defense Council - <a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Steel		2.7	0	00	61%	<a href="http://www.nrdc.org/cities/recycling/recyc/recytbls.asp">http://www.nrdc.org/cities/recycling/recyc/recytbls.asp</a>
Tin (mixed metals)	1.69	1.7	2,600	8,873		<a href="http://www.thriftyfun.com/tf001320.tip.html">http://www.thriftyfun.com/tf001320.tip.html</a>
Tires	14.29	14.3			68%	<a href="http://www.Earth911.org">www.Earth911.org</a> , retreading saving 15 gallons of oil per tire (of 22 gallons for a new tire)
Toner Cartridges	17.86	17.86				Promo material P2 created previously, and a 2lb/toner cartridge estimate
Used Oil	5.95	6.0				Trends assumes 8lbs per gallon, and here assumes 100% reuse
White Paper	9.00	9.0	4,100		35%	
Zinc					63%	University of Cambridge (UK) - <a href="http://www.msm.cam.ac.uk/doitpoms/tlplib/recycling-metals/what.php">http://www.msm.cam.ac.uk/doitpoms/tlplib/recycling-metals/what.php</a>

## 5.2 Energy Equivalencies of Routine Materials Recycled in FY09

Specific Stream	Pounds	Metric Tons	Barrels of Oil Saved
Aluminum	4,800	2.18	93.15
Aluminum Cans	1,453	0.66	28.20
Antifreeze / Coolant	1,533	0.70	
Batteries/Lead-Acid	8,995	4.08	18.23
Capacitors	12,146	5.51	49.74
Cardboard	385,105	174.73	409.95
Circuit boards	6,514	2.96	26.68
Copper & Brass	5,230	2.37	41.34
CPUs	63,943	29.01	261.86
CRT Monitors	38,098	17.29	156.02
Fluorescent & Other	23,435	10.63	
Grease (food)	64,413	29.23	110.42
Laptops	2,675	1.21	10.95
LCD Monitors	2,365	1.07	9.69
Lead	2,747	1.25	4.63
Lead-Acid & all other	61,249	27.79	124.12
Mercury	463	0.21	
Mixed	15,751	7.15	64.50
Mixed	100,533	45.61	121.06
Motor Oil/Other Oils	60,815	27.59	181.00
Non-PCB light ballasts	21,045	9.55	86.18
Other scrap - mixed	358,100	162.48	302.64
PCB Items	3,644	1.65	
Plastic # 1 & # 2 mixed	9,115	4.14	56.35
Plastic # 1 Transparencies	120	0.05	0.74
Plastic # 2 Tyvek®	580	0.26	3.73
Plastic # 6 Styrofoam®	1,365	0.62	
Precious	522	0.24	
Pulverized	199,360	90.45	0.00
Scrap Wood	197,760	89.73	0.00
Steel	204,524	92.80	283.59
Tin	511,815	232.22	432.55
Tires	28,100	12.75	200.71
Toner Cartridges	20,033	9.09	178.89
Transformers	79	0.04	0.32
White	152,352	69.13	685.58
Wire	7,070	3.21	55.89
<b>Totals</b>	<b>2,577,847</b>	<b>1,170</b>	<b>3998.73</b>

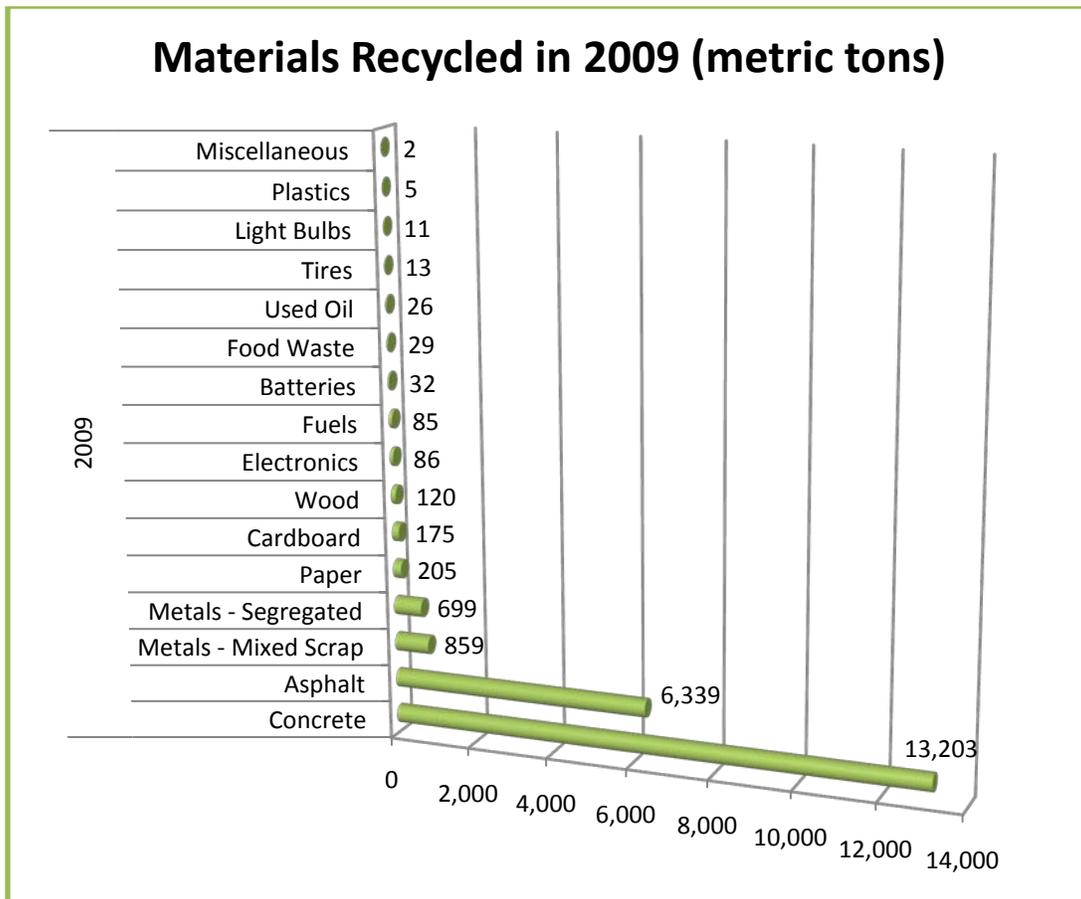
### 5.3 Energy Equivalencies of Non-Routine Materials Recycled in FY09

<b>Specific Material</b>	<b>Pounds</b>	<b>Metric Tons</b>	<b>Barrels of Oil Saved</b>
Aluminum	1	0.00	0.02
Asphalt	13,972,000	6339.38	
Binders	247	0.11	
Concrete	29,100,000	13203.27	
Copper / Brass	3	0.00	0.02
Diesel w/ Oil	181,912	82.54	541.40
Gasoline w/ Oil	360	0.16	1.07
Mixed	6,962	3.16	28.51
Mixed Scrap	861,542	390.90	728.11
Precious	2,087	0.95	
Salvage	140,000	63.52	118.32
Scrap Wood	16,750	7.60	0.00
Steel	1,310,430	594.57	1817.03
Tin	21,800	9.89	18.42
Trees and Shrubs	50,380	22.86	0.00
Wire	1,886	0.86	14.91
<b>Totals</b>	<b>45,666,360</b>	<b>20,719.77</b>	<b>3267.82</b>

## Trends and Recycle Data

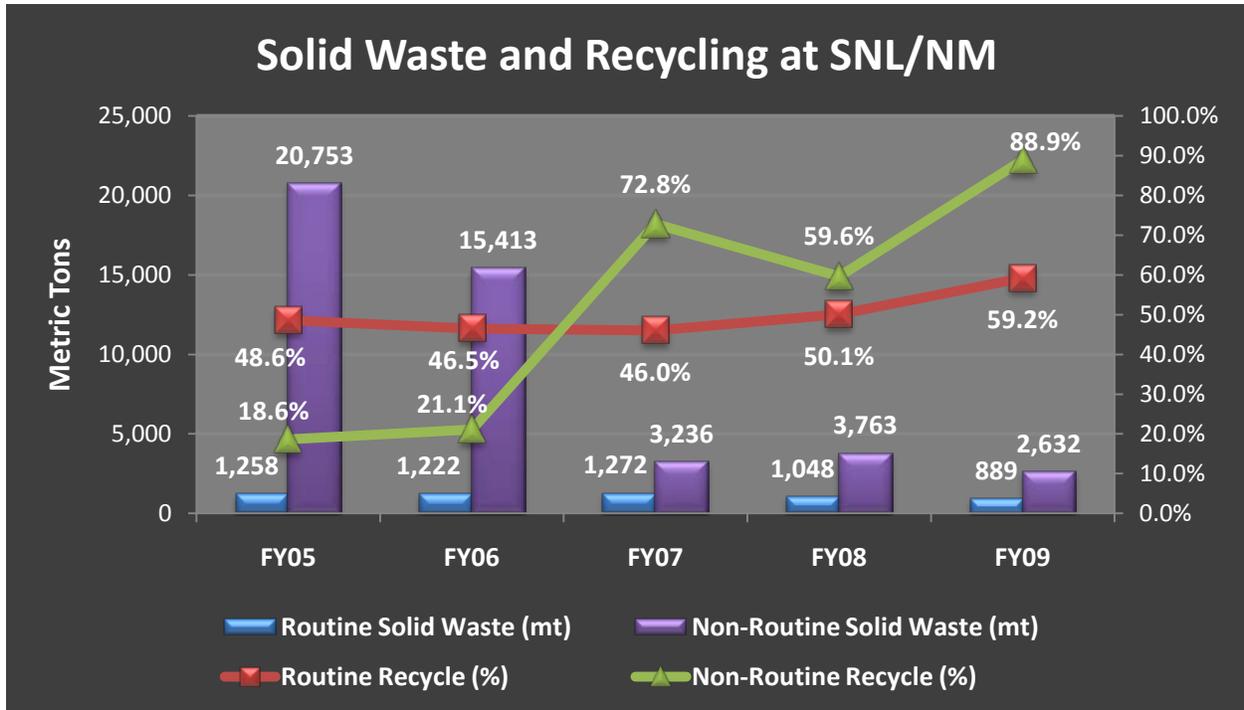
The Pollution Prevention Program maintains records from each quarter for hazardous waste, solid waste, and materials recycled. These records are used to supply data for various reporting requirements. An example of a report is the Annual Site Environmental Report (ASER), which requires text and data input on a calendar year basis. The chart in Section 5.4 is drawn from the most recent ASER. The chart in Section 5.5 presents a historical trend of solid waste generation, routine recycling, and non-routine recycling.

### 5.4 Quantity of materials recycled, as reported in the CY09 ASER.



## 5.5 Historic Trend of Solid Waste and Recycling at SNL/NM

Solid waste generation is continuing a downward trend. This trend and the increasing mixed paper recycle stream are pushing the routine recycle rate up. Metals factor heavily into the routine recycle rate, but the quantities of metal generated each year can be quite variable. Hazardous waste recycled is aggregated in the totals used to create the routine recycle rate. The non-routine recycle rate displayed is trending strongly upward following the establishment of the CARA in TA 3.



## Summary of FY09 ROA Action Items

All the action items from Section 3 have been summarized in the three tables below, separated by priority level. These action items will also be tracked in the PPOA action item tracking spreadsheet found at:

p2staff:\\02 Technical Assistance & Customer Support\PPOAs\PPOA Action Item Status.xlsx

### 5.6 Table of high priority materials and associated action items

Material	Action Items
Fiber Optic Cable	1. Continue to identify vendors interested in fiber optic cables. The germanium is the priority constituent.
Hazardous Materials	1. Include in FY11 P2 Program Plan to work with the HWMF to evaluate the downstream recyclers of hazardous materials to assure proper handling and treatment, while minimizing material exporting.
Kevlar® Scraps	1. Obtain samples from the owners and identify additional Kevlar® recycling vendors.
Lead Solder	1. Work with CIS to learn perceived accuracy and potential gaps in the inventory data. 2. Work with the Air Quality group to learn their concerns and efforts regarding lead solder usage and the TRI report due June 1 <sup>st</sup> annually. 3. Seek to identify users and ways to improve tracking. 4. Learn when lead-free alternatives are appropriate and disseminate to applicable users.
Mercury	1. Create a mercury awareness program in FY10. 2. Investigate the usage of mercury in equipment and potential alternatives.
Metal: Scrap	1. Review compiled weight tickets to see if there are rollofs of segregated metals being generated and tracked at Reapplication. 2. Identify a new building or process for the LSS effort. 3. Map and identify the locations and materials collected in tilt hoppers across Sandia.
Oil Mixed with Water	1. Pursue establishing an oil-water separator at the HWMF to enable the recycle of ongoing small quantities of oil mixed with water.

Paper: Mixed	<ol style="list-style-type: none"> <li>1. Deploy three new mixed paper dumpsters in FY10.</li> <li>2. Obtain corporate support for site wide mixed paper collection through the adding of an FTE to the SWTF recycling staff. Use this FTE to implement a concurrent rolling tote program for mixed paper alongside that of the white paper.</li> <li>3. P2 to become involved in Lean 6S events and the office / personnel moves process to minimize loss of recyclable material to purges of outdated paper, supplies, and other materials.</li> </ol>
Plastics: #2 HDPE	<ol style="list-style-type: none"> <li>1. Initiate tracking and reporting of separate plastics by bale type.</li> <li>2. Create a rolloff at the SWTF for bagged bottles of HDPE #2 and bagged bottles of commingled #1 and #2, separate from the generic C&amp;D/HWMF plastic stream.</li> <li>3. Seek and initiate additional sources of laboratory HDPE #2.</li> <li>4. Monitor for the screening out of PP #5 from the acid bottle rolloff.</li> </ol>
Plastics: #4 LDPE (foam)	<ol style="list-style-type: none"> <li>1. Work with SWTF to get an updated PHS and a new TWD for foam densifier operations approved.</li> <li>2. Have covers / tarps installed on the new rolloff to minimize moisture content of the foam.</li> <li>3. Expand collection of LDPE #4 packing foam to the yellow mixed paper dumpsters.</li> <li>4. Work with the Computer Support Units to increase foam recycling awareness.</li> </ol>
Soil Contaminated w/ Oil	<ol style="list-style-type: none"> <li>1. Investigate using soil contaminated with oil as feedstock for asphalt plants.</li> <li>2. Look to include other petroleum soil contaminants such as hydraulic fluid.</li> </ol>

## 5.7 Table of medium priority materials and associated action items

Material	Action Items
Antifreeze	<ol style="list-style-type: none"> <li>1. Work with the HWMF to create a path forward for recycling the small quantities of propylene glycol and ethylene glycol that they receive.</li> </ol>
Asphalt & Concrete	<ol style="list-style-type: none"> <li>1. Evaluate options for protecting crushed material stockpiles from pilfering.</li> <li>2. Continue to seek Facilities and Thunder Range project commitments to use crushed aggregate products.</li> </ol>
Batteries	<ol style="list-style-type: none"> <li>1. Work with the ECCs to develop an awareness effort regarding button cell and small rechargeable batteries, an add-on to a preexisting training, or both.</li> <li>2. Work with the ECC's and HWMF for a less costly means of disposal for rechargeable batteries.</li> <li>3. Identify what a thermal battery is, and why we are unable to recycle them.</li> </ol>
Carpet Tiles	<ol style="list-style-type: none"> <li>1. Identify less expensive shipping options to Interface.</li> <li>2. Identify alternative vendors for recycling non-vinyl backed carpet, as opposed to incineration for energy recovery.</li> </ol>
Electronics: Computers	<ol style="list-style-type: none"> <li>1. Reinvigorate the reuse of desktops and laptops within Sandia through Reapplication or a new organization. This has met with preliminary approval by the new Reapplication team leader and an investigation is underway.</li> <li>2. A new method of executing Computers for Learning should be identified. The old process was labor and time intensive, thus it was cancelled. See FEC objectives regarding Computers for Learning. See the FY09 Reapplication PPOA for specific activities identified.</li> <li>3. Require that Sandia take back all electronics sent to auction that do not sell. Otherwise the electronics are being thrown away in the landfill. This is known as "disposal via a third party."</li> <li>4. Methods should be found to protect and prolong individual LCDs onsite. Repair and refurbishment services will become more common as the technology becomes standard. Transportation to and handling of parts at Reapplication must be addressed.</li> <li>5. Include all worn and broken printers and peripherals in electronics recycle stream.</li> </ol>
Electronics: Printing Supplies	<ol style="list-style-type: none"> <li>1. Contractually establish a process to receive payment for unused printer consumables returned to Document Solutions.</li> </ol>

Food Waste	<ol style="list-style-type: none"> <li>1. Arrange an FY10 pilot of food composting at the Thunderbird Cafeteria with recycling revenues paying for it.</li> <li>2. Encourage workers to establish home compost bins and to take their office food waste home each day.</li> </ol>
Hydraulic Fluids	<ol style="list-style-type: none"> <li>1. Work with the HWMF to find alternatives for soil contaminated with hydraulic fluid in concert with the efforts aimed at soil contaminated with oil.</li> </ol>
Lead Ingots	<ol style="list-style-type: none"> <li>1. Work with the Lead Bank to share data and integrate efforts with P2.</li> </ol>
Light Bulbs	<ol style="list-style-type: none"> <li>1. Work with the ECCs to develop an awareness effort for office and laboratory generated light bulbs, an add-on to a preexisting training, or both.</li> <li>2. Work with the HWMF to evaluate the use of a fluorescent lamp crusher to minimize void space and save on shipping expenses.</li> </ol>
Metal: Aluminum Cans	<ol style="list-style-type: none"> <li>1. Assure adequate recycle bin distribution in buildings. Special focus should be placed on conference rooms, break rooms and open meeting areas.</li> <li>2. Decrease the number of trash cans in common spaces (hallways, outside, etc.) to force generators to locate one of the special focus areas mentioned above that should have recycle bins present. Identified areas for focus outdoors include the Building 898 centrally enclosed courtyard and the south and east sides of the Thunderbird Cafeteria, Building 861.</li> </ol>
Oil Filters	<ol style="list-style-type: none"> <li>1. Review HWMF records for non-Fleet Services filter disposals.</li> <li>2. Work with Fleet and the HWMF to see if a broadened recycle program is possible.</li> </ol>
Paper: Cardboard	<ol style="list-style-type: none"> <li>1. Expand cardboard dumpster collection into TAIH. The cardboard truck already drives there every other week to the RMWFM at the south end, so adding dumpsters along the route appears feasible.</li> <li>2. Logically group dumpsters in clusters, and arrange for the cardboard to be the most easily accessed dumpster. This is an objective of the FY09 Dumpster Realignment LSS 6S event that has been partially accomplished.</li> <li>3. Conduct awareness activities and communicate periodically with the SWTF to learn if the quantity of cardboard in the solid waste is decreasing.</li> <li>4. Identify current owner of the derelict cardboard compacting rolloff, and work to identify a new use for the equipment.</li> <li>5. Work with JIT furniture vendors to assure recycling of cardboard and other packaging materials.</li> </ol>

Paper: Shredded	<ol style="list-style-type: none"> <li>1. Find out if the SWTF and the team from Logistics that handles destruction bag transport and processing would be willing to test adding a regular pick-up of screened shredded paper from the SWTF to be fed into the TAIH pulverizer. A multi-week test would provide data as to how much of the current solid waste stream is shredded paper.</li> <li>2. Investigate diverting bags of shredded paper to be sent directly to Soilutions for composting.</li> <li>3. Investigate replacing non-classified shredders with locked OOU white destruction bag containers. This has the added benefits of reducing the need for shredder oil, electricity, and reducing the burden on Custodial.</li> </ol>
Paper: White	<ol style="list-style-type: none"> <li>1. Perform awareness activities surrounding the <i>Sandia Lab News</i>.</li> <li>2. Using Recycling GIS, analyze the SWTF white paper collection data spatially for gaps in collection, and any white paper pick-up requests for process improvements.</li> <li>3. P2 participate in the screening of materials during bale creation to reduce contamination, and learn where additional awareness efforts should be focused.</li> <li>4. P2 to become involved in the office / personnel moves process to minimize purges of outdated paper, supplies, and other materials.</li> </ol>
Plastics: #1 & #2	<ol style="list-style-type: none"> <li>1. Complete the removal of all mixed aluminum and plastic labels from collection bins.</li> <li>2. Assure that commingled bottles are not mixed with other plastic resins at the SWTF, and raise awareness to minimize mixing in of non-bottles by members of the workforce.</li> </ol>
Plastics: #4 LDPE (film)	<ol style="list-style-type: none"> <li>1. Contact Custodial Services and the Facilities Warehouse to gauge the volume of shrink wrap waste they produce and to solicit their participation in the recycling of it.</li> </ol>
Plastics: #6 EPS (foam)	<ol style="list-style-type: none"> <li>1. Maintain relationship with CSU.</li> </ol>
Plastics: Polyurethane foam	<ol style="list-style-type: none"> <li>1. Set up a covered 40cy rolloff at the C&amp;D Recycle Center to collect this light foam.</li> </ol>
Wood	<ol style="list-style-type: none"> <li>1. Evaluate upgrading the size of the wood rolloff to 40cy. Based on the numbers above, this would reduce trips to Wood-U-Recycle by one per month. If the side of the rolloff is too high to access off the C&amp;D Recycle Center dock, then perhaps a project to create a deeper parking spot for the rolloff should be pursued.</li> </ol>

## 5.8 Table of low priority materials and associated action items

<b>Material</b>	<b>Action Items</b>
Batteries: Alkaline & Carbon Zinc	<ol style="list-style-type: none"> <li>1. A study should be conducted to identify all local scrap metal dealers willing to recycle alkaline and carbon zinc batteries.</li> <li>2. Consider bulking batteries in a 55 gallon drum at the P2 Tent when sufficient quantities are being generated equaling at least two shipments per year.</li> </ol>
Brake Chambers	<i>No action items.</i>
Brake Shoes	<i>No action items.</i>
Capacitors	<i>No action items.</i>
Ceiling Tiles	<i>No action items.</i>
Electronics: Media (non-hard drives)	<ol style="list-style-type: none"> <li>1. When a vendor has been approved for REM destruction, learn if the material is being used for waste-to-energy purposes. If so, it can count as “recycled”.</li> </ol>
Fuels	<ol style="list-style-type: none"> <li>1. Continue to monitor Fleet-generated waste streams for cross contamination that can be prevented.</li> <li>2. Obtain or assist in the creation of a procedure to document maintaining clean, separate waste streams.</li> </ol>
Glass	<ol style="list-style-type: none"> <li>1. Investigate cooperative methods between the city, KAFB, and Sandia to establish collection points or a collection system onsite. Onsite food service facilities are primary sources, and may be a logical beginning point.</li> <li>2. Investigate potential for glass recycled onsite to be crushed and used as additive for Sandia’s base course production.</li> </ol>
Light Ballasts	<i>No action items.</i>
Paper: Pulverized	<ol style="list-style-type: none"> <li>1. Quantify destruction bag purchases for FY08 and FY09, and find out what happens to the bags after use.</li> <li>2. Set up a reuse system for any salvageable destruction bags, and seek alternative means to make more bags reusable.</li> <li>3. Attempt to recycle non-salvageable destruction bags. This could require the removal of any contaminating tape, or slicing away of the taped portions of the bags.</li> </ol>
Paper: Restroom Paper Towels	<ol style="list-style-type: none"> <li>1. Brainstorm ideas within P2 and formulate follow-on action.</li> </ol>
Plastics: An Overview	<ol style="list-style-type: none"> <li>1. Maintain information on plastics #1-6 and others in the Material Recycling Assessment spreadsheet as current as possible, perhaps bi-annually.</li> </ol>
Plastics: #1 Transparencies	<i>No action items.</i>

Plastics: #2 Tyvek®	<ol style="list-style-type: none"> <li>1. Work with Division 2000 to assess and pursue the potential for growth of the clean room garment recycle stream to other users at Sandia.</li> <li>2. Publicize the Tyvek® envelope and sheet recycle stream.</li> </ol>
Plastics: #3 PVC	<ol style="list-style-type: none"> <li>1. Assess the quantity and sources of PVC that come to the C&amp;D Recycle Center.</li> </ol>
Plastics: #5 PP (foam)	<ol style="list-style-type: none"> <li>1. Monitor for an increase of material to reevaluate feasibility for collection.</li> </ol>
Plastics: #5 (rigid)	<ol style="list-style-type: none"> <li>1. Follow up with the SWTF periodically to assure the rigid PP #5 is being set aside.</li> <li>2. Seek additional rigid PP #5 sources, such as old VHS plastic enclosing cases.</li> </ol>
Plastics: Lucite®, Plexiglas®, and Teflon®	<ol style="list-style-type: none"> <li>1. Be available to collect and store odd pieces of plastic as needed.</li> </ol>
PRS-1000	<ol style="list-style-type: none"> <li>1. Contact the manufacturer and other resources to investigate restarting the recycle process for PRS-1000 and the smaller waste stream of PRS-3000.</li> </ol>
Scrap Metals at C&D Recycle Center	<ol style="list-style-type: none"> <li>1. Pending feedback from ECS Refining regarding scrap value, designate a tilt hopper or wire cage for collection of fiber optic cable. This action would also require advertising the new recycle stream to the potential fiber optic cable waste generators, such as B&amp;D Industries and Verizon.</li> </ol>
Shock Absorbers	<ol style="list-style-type: none"> <li>1. A vendor for refurbishment or recycle needs to be identified.</li> </ol>
Shop Rags	<ol style="list-style-type: none"> <li>1. Obtain or assist in the creation of a procedure to document maintaining clean, separate waste streams.</li> </ol>
Tires	<ol style="list-style-type: none"> <li>1. A common problem across the state, two problematic bales of tires exist behind the SWTF and need to be sourced to a recycler or have a reuse purpose identified.</li> <li>2. Identify what happens to construction site waste tires.</li> </ol>
Transformers	<i>No action items.</i>
Used Oil	<ol style="list-style-type: none"> <li>1. Work with early adopters of biobased alternatives, such as vacuum pump oil and shredder oil, to assure proper notation to identify and differentiate the used biobased oil for disposal from used petroleum oil.</li> <li>2. Obtain or assist in the creation of a Fleet Services procedure to document maintaining clean, separate waste streams.</li> </ol>
Wallboard	<i>No action items.</i>

Yard Waste	<ol style="list-style-type: none"><li>1. Review the FY07 PPOA for SNL/CA. They decided to collect and compost their own green waste onsite. A grinder/chipper onsite at SNL/NM is a potential solution. This could be a reduction in Scope 3 GHG emissions, and possibly a benefit to the Grounds &amp; Roads Maintenance team.</li><li>2. Gauge Soilutions level of interest in receiving yard waste.</li><li>3. Identify what KAFB does with their yard wastes.</li></ol>
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