

SANDIA REPORT

SAND2013-7578

Unlimited Release

Released September 2013

FY13 Recycling Opportunity Assessment for Sandia National Laboratories/New Mexico

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Prepared by
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**FY13 Recycling Opportunity Assessment for
Sandia National Laboratories/New Mexico**

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Abstract

Sandia National Laboratories is driven to reduce waste and increase waste diversion by both external entities and internal goals. Zero Waste to the Landfill is an example of an internal goal. This Recycling Opportunity Assessment (ROA) is an update of the FY09 ROA, and an organizing mechanism to maintain accomplishments and approach new levels of success. The materials addressed in the FY09 ROA have been revised with current information and action items, and new materials have been added. The appendices include updated summary tables of high, medium, and low priority action items.

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Acronyms and Abbreviations

| | |
|--------|--|
| 6S | Sort, Simplify, Shine, Safety, Standardize, & Sustain |
| ABS | Acrylonitrile Butadiene Styrene |
| ARS | Action Request System |
| CARA | Concrete & Asphalt Recycle Area |
| C&D | Construction & Demolition |
| CD | Compact Disc |
| CIS | Chemical Information System |
| CRT | Cathode Ray Tube |
| DOE | U.S. Department of Energy |
| DVD | Digital Video Disc |
| ECC | Environmental Compliance Coordinators |
| EMS | Environmental Management Systems |
| EPS | Expanded Polystyrene (also known as Styrofoam), plastic resin #6 |
| FY## | Fiscal Year 20## |
| GIS | Geographic Information System |
| HDPE | High Density Polyethylene, plastic resin #2 |
| HF | Hydrofluoric acid |
| HPC | High Performance Computer |
| HWMF | Hazardous Waste Management Facility |
| ISDN | Integrated Services Digital Network |
| ISO | Polyisocyanurate |
| JIT | Just-In-Time |
| KAFB | Kirtland Air Force Base |
| LCD | Liquid Crystal Display |
| LDPE | Low Density Polyethylene, plastic resin #4 |
| LSS | Lean/Six Sigma |
| MSP2 | Materials Sustainability & Pollution Prevention |
| PCB | Polychlorinated biphenyls |
| PP | Polypropylene, plastic resin #5 |
| ppm | parts per million |
| PRS | Photoresist Stripper |
| PVC | Polyvinyl Chloride, plastic resin #3 |
| R2 | Responsible Recycling |
| REM | Removable Electronic Media |
| ROA | Recycling Opportunity Assessment |
| Sandia | Sandia National Laboratories |
| SNL/NM | Sandia National Laboratories/New Mexico |
| SSTP | Sandia Science & Technology Park |
| SWCRC | Solid Waste Collection and Recycling Center |
| TA | Technical Area |
| TRI | Toxic Release Inventory |
| TWD | Technical Work Document |
| UCI | Unclassified Controlled Information |
| WDDR | Waste Description and Disposal Request |

1.0 Introduction

The objective of this document is to provide an update on all the materials covered in the Fiscal Year 2009 (FY09) Recycling Opportunity Assessment (ROA), and to present new material streams and activities for consideration. The Materials Sustainability and Pollution Prevention (MSP2) goal of Zero Waste to the Landfill by 2025 is a driver for the ongoing review and maintenance of this document. This mirrors a similar long-term 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.

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 and demolition (C&D). 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 can similarly be divided into routine and non-routine waste categories, however for the purpose of this report remain consolidated.

Ending FY12, the Sandia National Laboratories/New Mexico (SNL/NM) site recycled 51% of all material that would otherwise have been sent as solid waste. Of routine waste generated, 67% was recycled. The Sandia/New Mexico site goal through the Site Sustainability Plan is to divert 70% of routine waste by the end of FY14, much more aggressive than the 50% by FY15 called for in the Department of Energy’s (DOE) Site Sustainability Performance Plan.

2.0 Recycling Opportunity Assessment

The objective of this FY13 ROA is to provide the status of the materials covered in FY09, and to continue to identify new material streams for reduction and/or diversion. The material streams discussed have then been divided into:

- Routine solid waste (section 2.1),
- Non-routine solid waste (section 2.2), and
- Hazardous waste (section 2.3).

The 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. The decision process chart below illustrates how each of the materials for recycle were evaluated and ranked as low, medium, or high.



2.1 Routine Solid Waste Materials

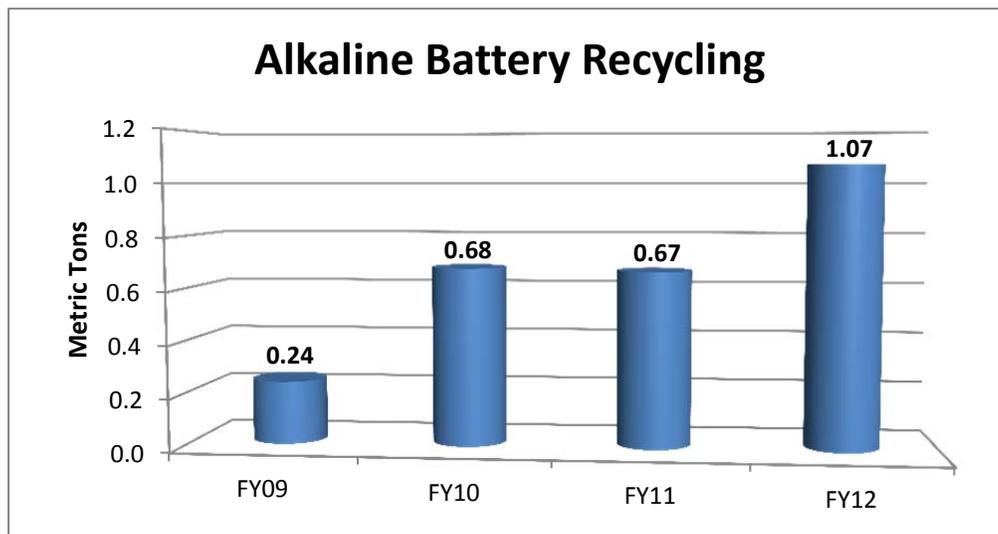
Table 1: FY13 Prioritization of Routine Materials for Diversion

| <i>Material</i> | <i>Priority</i> | <i>Status</i> |
|--|-----------------|---------------------------------------|
| Batteries: Alkaline & Carbon Zinc | Low | Seek to expand |
| Electronics: Circuit Boards | High | Establish process contract |
| Electronics: Computers and Monitors | Low | Improved management contract in place |
| Electronics: High Performance Computers | High | Establish process contract |
| Electronics: ISDN Telephones | Medium | Seek to audit |
| Electronics: Printers and Peripherals | Medium | Seek to expand scope |
| Electronics: Printing Supplies | Low | Advertising needed |
| Electronics: Removable Media | Low | Seek to expand |
| Food Waste: Organics | Low | Seek to expand |
| Food Waste: Snack Bags | Low | Advertising needed |
| Glass | Low | Seek to expand |
| Metal: Aluminum Cans | Low | Seek to expand |
| Metal: Exotic | Low | Seek to expand |
| Metal: Neodymium Magnets | Low | Process refinement needed |
| Metal: Precious | Medium | Process evaluation and teaming needed |
| Metal: Scrap | High | Process refinement needed |
| Paper: Cardboard | Low | Seek to expand |
| Paper: Mixed | High | Aggressive expansion plans |
| Paper: Pulverized | Low | Process refinement needed |
| Paper: Restroom Paper Towels | Medium | Begin limited diversion |
| Paper: Shredded | Low | Seek to expand |
| Paper: White | Medium | Process refinement needed |
| Plastics: #1 and #2 Mixed Bottles | Low | Seek to expand |
| Plastics: #2 Bottles and Containers | Low | Seek to expand |
| Plastics: #2 Tyvek® | Low | Seek to expand |
| Plastics: #3 PVC | Low | Divert as possible |
| Plastics: #4 Shrink Wrap | Low | Seek to expand |
| Plastics: #5 Rigid Containers | Low | Seek to expand |
| Plastics: ABS | Low | Seek to expand |
| Plastics: Foams (#4, #6, Polyurethane) | Low | Seek to expand |
| Plastics: Lucite®, Plexiglas®, & Teflon® | Low | Seek to expand |
| Plastics: Mixed | Medium | Vendor teaming needed |
| Plastics: Polycarbonate | Low | Seek to expand |
| Tires | Medium | Vendor teaming needed |

Batteries: Alkaline & Carbon Zinc

– Priority: Low

Corporate Procedure *ESH100.2.ENV.22 Manage Hazardous Waste at SNL/NM*, permits the disposal of alkaline and carbon zinc batteries that are smaller than lantern size in the trash. MSP2 evaluated available recycling vendors and selected the vendor Battery Solutions to recycle collected batteries. Approximately 250 battery recycle bins were distributed by the end of FY12. Division Environmental Management System (EMS) action plans are responsible for some of the ongoing growth of this recycle stream.



MSP2 previously 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. Some local scrap metal haulers already have an alkaline battery recycling process in place for several of their local customers. An example of how it would work is that the customer would provide the first 55 gallon drum, and from then out, a filled drum of batteries is switched out with an empty drum at no cost and no revenue.

In cooperation with the Environment Compliance Coordinators (ECCs), lantern-sized alkaline batteries are now permitted in this recycle stream.

Action 1:

A draft procedure for alkaline and carbon zinc batteries has been written, but needs to be converted to technical work document (TWD) format.

Action 2:

After the Logistics scrap metal contract is awarded, MSP2 should evaluate the new vendor for bulk battery recycling feasibility and environmental implications. Calculate the financial impact, and consider bulking batteries in a 55 gallon drum at STENT11.

Action 3:

Implement an initiative to expand the distribution of current battery recycle bins. There are approximately 150 spare bins in STENT11. Bins were obtained from Busch Systems.

Action 4:

Follow up on the request to revise Corporate Procedure *ESH100.2.ENV.22 Manage Hazardous Waste at SNL/NM* to remove lantern sized batteries as an example of waste required to go to the hazardous waste management facility (HWMF).

Electronics: Circuit Boards

– Priority: High

The MSP2 Tent receives circuit boards from Reutilization in rotating plastic tubs filled in Tent 1. The material from the tubs are sorted by MSP2 personnel into cubic yard boxes in the MSP2 Tent; a circuit board yard box for items with gold, or a mixed electronics yard box for items with no gold or very high plastic and scrap metal content. The circuit boards are shipped to a separate vendor than other electronics in order to receive better revenue based on the precious metals and high percentage of copper in circuit boards. Site audits are performed on vendors receiving circuit boards before they are approved to receive material. A vendor that is e-Steward certified is preferred.

Action 1:

Identify and compare competing vendors. Consider a procurement action to establish an annual contract.

Electronics: Computers and Monitors

– Priority: Low

The MSP2 Tent continues to receive all computer cathode ray tube (CRT) monitors, broken liquid crystal display (LCD) monitors, and scrap desktops, laptops, thin clients, server blades and server racks. Any computer not being reapplied to a Sandia organization has the hard drive removed prior to being placed in the MSP2 Tent. CRTs are a dead technology and continue to peter out. LCDs will continue to be an increasing recycle stream.

Reutilization successfully restarted the computer donation process for New Mexico school districts in May of 2011. They are continuing to divert higher quality machines and equipment for this purpose.



Electronics recycling vendors are preferred to be e-Steward certified, and are audited prior to receiving any material from Sandia. An e-Steward vendor was contracted beginning in 2013.

Electronics: High Performance Computers

– Priority: High

High performance computers (HPCs) are servers, processor blades, and steel racks filled with high value components. Much more valuable than standard computers, these units are sent to a specialty vendor that understands the components and their value. The network cables used in HPCs are of higher than average value due to silver content. Electronics recycling vendors are preferred to be e-Steward certified, and are audited prior to receiving any material from Sandia.



Action 1:

Based on the approved contract for common computer equipment, customize a new contract that covers HPCs.

Electronics: ISDN Telephones

– Priority: Medium

Integrated Services Digital Network (ISDN) telephones, typical desktop office phones, can be sent to Reutilization when no longer needed. Reutilization fills boxes with the excess phones, and places the boxes in the MSP2 Tent. Identified at a conference in 2011, the vendor RetroTel has agreed to pay shipping to receive cubic yard boxes of ISDN telephones for refurbishment. All unusable scrap is recycled, and Sandia receives credit towards purchases from the vendor. The current arrangement is that full cubic yard boxes will go to the Telecomm Infrastructure group (Org 9335) for a final check for usable phones and parts. They will then ship the box to RetroTel, and report the weight to MSP2 via the quarterly data call. This type vendor should be Responsible Recycling (R2), or more preferably e-Steward certified.

Action 1:

Pursue a downstream audit of this vendor.

Electronics: Printers and Peripherals

– Priority: Medium

Printers, scanners, and small mixed electronics come to the MSP2 Tent from Reutilization. Often they are palletized with the CRT monitors, making it impractical to segregate out. Various containers of random mixed electronics are received and will be placed in a “Mixed Electronics” cubic yard box to go to the general computer scrap vendor for recycle.

Action 1:

Seek to broaden what equipment Reutilization will provide to the MSP2 Tent, possibly even after the 90 day browsing period, such as worn and broken printers, peripherals, keyboards and mice.

Action 2:

Require that Sandia take back all electronics sent to auction that do not sell. Otherwise the electronics will be managed by others in a less cautious manner.

Electronics: Printing Supplies

– Priority: Low

All printer consumables are accepted for recycle. This includes ink cartridges, toner cartridges, drums, fusers, imaging kits, maintenance kits, waste toner cartridges, and so on. Those collected by the Solid Waste Collection & Recycling Center (SWCRC) are placed in cages at building 967 for return pick-up by the Just-In-Time (JIT) vendor on a no cost, no revenue basis. Unused toner cartridges and parts that come to the Toner Exchange but are unable to find a new user onsite are shipped for free to a print cartridge remanufacturer, which pays Sandia per unit received. This type vendor should be R2, or more preferably e-Steward certified.

Action 1:

Complete Toner Exchange online inventory transition to new method of posting, or else implement spreadsheet improvements for an easier customer experience.

Action 2:

Periodically advertise the Toner Exchange to keep it fresh on purchasers' minds.

Action 3:

Create a procedure for the Toner Exchange to include specific ongoing maintenance expectations.

Action 4:

Identify if auditing toner cartridge recyclers and remanufacturers is practical, and if they participate in the electronics certification community.

Electronics: Removable Media

– Priority: Low

Non-hard drive removable electronic media (REM) is collected three ways. There are 35 REM disposal boxes across the site, maintained by the SWCRC; individuals may submit REM to Reutilization; and individuals may interoffice commercial read-only compact discs (CDs) and digital video discs (DVDs) to MSP2.

From the REM received by the SWCRC in disposal boxes, all optical media is screened out and set aside for MSP2. CDs and DVDs received by Reutilization or MSP2 are stripped of their

containers and accumulated. Once MSP2 has a large quantity of both commercial and Sandia-generated CDs and DVDs, they are shredded onsite for recycle as polycarbonate.

All magnetic and solid-state REM received are placed in cubic yard boxes as Unclassified Controlled Information (UCI) media for destruction via incineration.

Action 1:

After confirming a successful test shredding event of optical media with Logistics, evaluate collection processes to eliminate duplication of effort.

Action 2:

Support needed relabeling of disposal boxes, and the acquisition and redistribution of disposal boxes for even campus coverage.

Food Waste: Organics

– Priority: Low

Based on a waste characterization study of the cafeteria at the end of FY09, there was sufficient quantity of food waste to justify composting. Since March, 2010, a local vendor has managed multiple green carts for composting at Building 861, the Thunderbird Café. In April, 2011, composting was expanded to the kitchen of the Tech Area 4 (TA4) Café. Green slim jim containers with composting labels and compostable liners are at food preparation stations in the kitchens, and one of the leased carts is in the wash room to receive plate scrapings. The vendor is paid with recycling revenues managed by MSP2. This composting process won a 2010 EMS Excellence award, and had a Sandia Lab News article published about it in early 2011.

Awareness efforts also increased to let the Cafeteria customers know what was happening to the food waste and how they could help, which is by leaving leftovers and paper trash on their plates to be scraped off in the kitchen. A banner was hung above the tray return in Building 861, and composting promotion cards for the napkin dispensers on the dining room tables were produced.

Zero Waste Lunch Events are hosted during the spring, summer and fall, with four each occurring in both FY11 and FY12. A team brainstorm at the end of FY12 was held that developed eight specific process improvements for the FY13 season, including better visibility for the Zero Waste Stations using portable shade structures, and improved signage.



Action 1:

Implement remaining 2012 Zero Waste Lunch Event process improvements.

Action 2:

Establish new multi-bins for trash, recycle and composting at the TA4 Café, and replace common utensils and plates at the TA4 Café to allow direct composting by customers that dine there.

Action 3:

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

Food Waste: Snack Bags

– Priority: Low

In 2011, Sandia created a “snack bag brigade” through TerraCycle.com to collect and recycle Frito Lay brand snack bags. This was in combination with the Zero Waste Events, and trying to manage every unique piece of potential trash. In two years of seasonal events, over 800 snack bags were collected and sent to TerraCycle. Credit for the recycle stream is sent to the New Mexico Recycling Coalition, a non-profit organization capable of receiving it.

In 2013, six custom recycle bins were acquired to set up permanent collection points in the two cafeterias for year-round snack bag diversion, and to have more visible and consistent collection bins at the Zero Waste Events. After a month of deployment to the cafeterias, an additional average of 40 snack bags per week are being diverted for recycle.



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.¹

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. Quantities are sold to Growstone (www.growstone.com), to local road construction companies for base course additive, to landscaping companies, and some is used as landfill cover by the City. Utilizing the City’s facilities and drop-off location model, Sandia now has two 15 cubic yard gabled rolloffs to receive glass bottles for recycle, currently at buildings 870 and 878. Personal recycle bins with

¹ <http://www.sandia.gov/esh/ESH100.2.ENV.22.html>, Mgmt of Common Waste Streams, Glass Boxes.

handles are also available. The rollofts were deployed at the end of FY12, and the first load was delivered to the City after seven months, weighing 3,600 pounds. The majority of this material was previously disposed of as routine industrial solid waste via yard bag.

A very large surge of mirrored glass was generated from 2010 to 2012 by the Solar Tower Facility. Once determined to be non-hazardous, the plate glass went to the onsite concrete and asphalt recycle area to be crushed and mixed with the base course product.

Action 1:

Utilize the Solar Tower glass in the next concrete crushing event.

Action 2:

Identify other process generators of glass for diversion, and deploy additional drop-off locations.

Action 3:

Implement customer-side glass bottle diversion at the Thunderbird Café.

Action 4:

Continue to promote personal glass bottle recycling.

Metal: Aluminum Cans

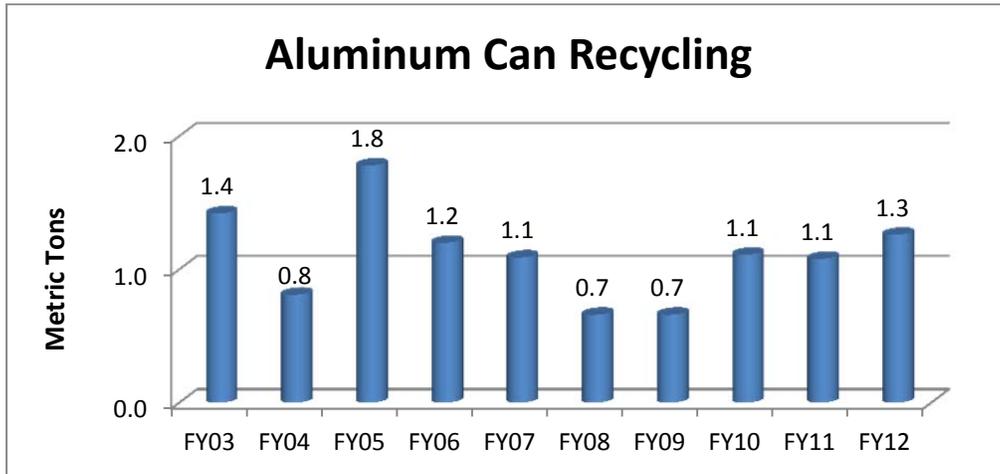
– Priority: Low

Separated from being mixed with the plastic bottle collection since FY05, aluminum can collection has been sporadic. 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.

Over FY11 and FY12, twelve new outdoor recycle bins were deployed to heavily trafficked turnstiles in Tech Areas 1 and 4. Each has a container for segregated aluminum cans and plastic bottles with specific openings to guide users, and is typically placed next to an existing trash can. Facilities' Grounds and Roads group assisted with selecting where they would be placed, and are proactive and pleased to be supporting outdoor recycling. Building 861's Thunderbird Café had their common outdoor trash cans removed, and were given three multi-bins that have a smaller trash receptacle, and both aluminum can and plastic bottle recycle bins. The outdoor recycle bins have been well received and utilized.



As an action item from the FY09 ROA, new liners were investigated to reduce the number of bags breaking in transit from dumpster to the SWCRC processing floor. Once broken, the contents were lost to the solid waste stream. However, no liners were found that adequately tested for improved integrity. A second idea to reduce bags breaking in transit was for Custodial Services to only allow the bags to get half full before tying them off. FY13 aluminum diversion is significantly up, indicating that this may have been an effective solution.



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.

Metal: Exotic

– Priority: Low

Exotic or uncommon metals and alloys are accumulated and shipped as efficiently as possible to a vendor able to recycle the specific metal and retain its refined value.

Action 1:

Raise awareness for the availability of this service to prevent the inadvertent loss of high value metals to the common scrap metal stream.

Metal: Neodymium Magnets

– Priority: Low

Neodymium-Iron-Boron magnets, primarily neodymium and coated with dysprosium, are able to be harvested from hard drives that are not the newer solid state drives. An operation that no longer occurs generated approximately half a cubic yard box of these magnets. A backlog of hard

drives waiting to be destroyed has the possibility of generating much more. Neodymium is a rare earth element, and difficult to recycle. Any recycling vendor found will probably be foreign.

Action 1:

Identify and test an entity to recycle the magnets.

Metal: Precious

– Priority: Medium

Property Management oversees the precious metals program. Any metals they ship offsite are to the DOE Precious Metals Bank in Tennessee, or to a vendor selected by DOE with the funds returning to the DOE Precious Metals Bank.

Action 1:

Work with Property Management to gain access to recycling data.

Action 2:

Develop ideas for teaming between Property Management and Waste Management on precious metals to reduce disposal burden and maximize recovery.

Metal: Scrap

– Priority: High

Process-generated scrap metal is routinely collected and managed by Property Management and Reutilization. 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 and economically preferable. Segregation is breaking down though prior to the metals reaching the scrap market.

The west end of the Reutilization Yard, where scrap metal is bulked in tilt hoppers and rolloffs, was reorganized in FY08 by assigning and labeling a “parking space” to each of the primary



metal types: aluminum, copper, magnesium, mixed metals, and stainless steel. Recently, an insufficient number of rollofts have been provided to maintain this arrangement. Processing drums of magnesium through the local scrap metals contract is not the best method, and is no longer be occurring.

Starting in FY11 and with the help of the scrap metal generators, tilt hoppers began being labeled to identify which segregated metal should be placed in each. The Action Request System (ARS), Logistics' work ticket tracking software was modified in FY12 to force scrap metal generators to select which metal type they have for collection. To date, over 25 tilt hoppers have been labeled, which included several new deployments to allow for multiple metal types from one generator or building. Now in FY13, the tilt hoppers are also being input into the Recycling Geographic Information System (GIS). The objective of labeling is to both help generators know where to place their metal, and to help the collection crews plan their routes and maintain the metal segregation.

Action 1:

Complete mapping and labeling of existing tilt hoppers.

Action 2:

Work with identifiable generators to correctly label existing tilt hoppers, and increase or decrease tilt hopper deployments as needed.

Action 3:

Post signs on tilt hoppers without identifiable generators and advertise their intended removal. Then remove the hoppers that are not in apparent use.

Action 4:

Remove the magnesium "parking space" sign from the Reutilization west wall.

Paper: Cardboard

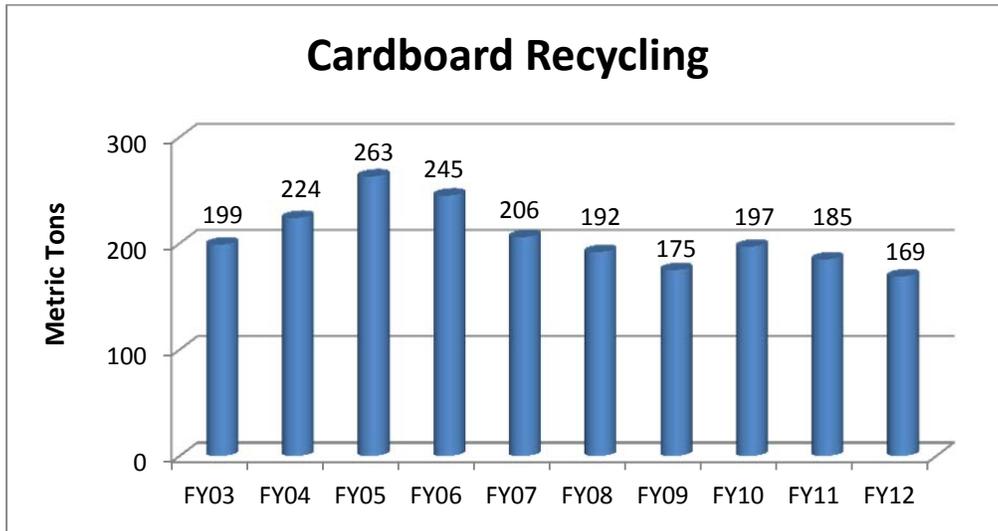
– Priority: Low

In FY13, there are 87 blue dumpsters deployed across the site for cardboard collection, and 6 unassigned cardboard dumpsters available at STENT11. Besides an increasing availability of dumpsters, other improvements include: correcting the size of a cardboard dumpster to match the output for its location and preventing overflow into the solid waste; improved labeling; and significantly, expansion of cardboard collection to Tech Areas 3 and 5.



The weight of cardboard collected in FY12 dropped to its lowest point since FY02 (see chart below). However, the ratio of cardboard to solid waste is nearly double - 162:1387 (11.7%) in FY02 to 169:745 (22.7%). As indicated in the ratios, total solid waste generated has fallen to a

record low. This means there is less cardboard to divert and recycle now than in FY02, thus the collection efficiency has risen.



An excess cardboard compacting rolloff continues to be located just south of the Facilities Warehouse, Building 954. It has been inactive since perhaps FY02 when 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:

Identify stand-alone solid waste dumpsters, and prioritize pairing them with a cardboard dumpster.

Action 2:

Identify aging or undersized cardboard dumpsters for replacement.

Action 3:

Work with JIT furniture vendors to assure continued recycling of cardboard and other packaging materials. Propose SWCRC support of large furniture replacement projects by delivering a rolloff for cardboard as requested, which would reduce an identified cause of dumpster overflows.

Action 4:

Identify a new use for the derelict cardboard compacting rolloff or send it to Reutilization.

Paper: Mixed

– Priority: High

Since FY08, a system of 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. There are 53 yellow mixed paper dumpsters across all five Tech Areas, and in the Sandia Science and Technology Park (SSTP), and approximately 700 yellow plastic mail crates distributed for indoor collection points. Mixed paper has combined and expanded newsprint, telephone book, and junk mail recycling to be all paper product waste, not including white printing paper. The SWCRC now performs a pre-planned monthly dumpster route for mixed paper collection in which they empty any dumpster at least ½ full.

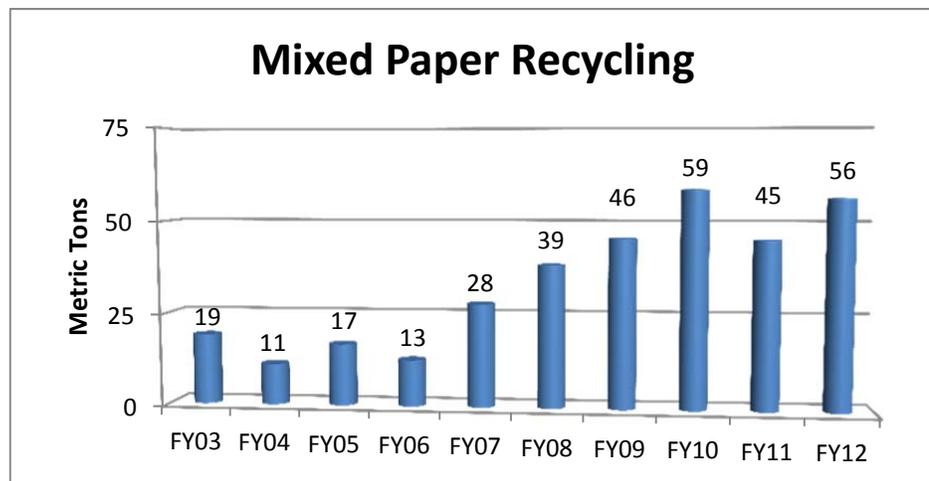


In FY11, the Thunderbird Café agreed to divert unsold and outdated newspapers into a yellow rolling cart that their staff empty into a yellow dumpster for recycle, which is across the street at Fleet Services.



In FY12, Custodial Services piloted supporting mixed paper recycling to fill the niche of the volunteers by using rolling yellow carts to transport accumulated mixed paper from inside buildings to nearby mixed paper dumpsters. They took over the three most challenging buildings (802, 836, and 880), based on the rate of complaints received prior to their involvement, which totaled supporting over 1,000 occupants. After six months of success, at the beginning of CY13 Custodial Services took over an additional five buildings that had pre-existing yellow rolling carts managed by “Champions” (823, 858EL, 858S, 892, and 894). That doubled the population served to over 2,000, or approximately 20% of the Sandia workforce. Custodial Services has agreed to continue expanding their support of mixed paper in FY14. MSP2 identified locations in 43 buildings for 75 more rolling carts. These carts were purchased with end of year funds and will be assembled and distributed in the first quarter.

This chart is of routine mixed paper recycling quantities, and does not include the 60mt from the Building 804 Technical Library clean out in FY08.



Action 1:

Work with Custodial Services to distribute the yellow carts, and match mixed paper dumpsters to new locations as needed.

Action 2:

Implement customer-side magazine and newspaper diversion at the Thunderbird Café.

Action 3:

Become involved in Lean 6S (Sort, Simplify, Shine, Safety, Standardize, & Sustain) 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 TA3 to be pulverized. The destruction bags are a custom design and cost \$0.65-\$1.52 each from Sandia Paper Company. Destruction bags are tied or taped shut, and often ripped open to process. Once pulverized, the paper remains are blown into an enclosed rolloff and sent off to be composted. The vendor was recently changed to save transit time and eliminate the tipping fee.

Next to the pulverized paper rolloff is a catchment drum for fines from the system. These fines have traditionally been bagged and placed in the solid waste. In FY13, MSP2 began working with the operator to identify an acceptable substitute drum liner that is ASTM-certified compostable in order to divert the fines for composting. This effort failed, so the bags of fines continue to be disposed, but are now collected in a rolloff for hauling to the landfill rather than through the routine solid waste to eliminate the mess previously made in the SWCRC facility and equipment.

Action 1:

Continue to pursue a method to divert pulverized fines for compost.

Paper: Restroom Paper Towels

– Priority: Medium

Based on known weights of rolls and purchase records, approximately seven percent of the FY13 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.

In 2011, Custodial Services began replacing paper towel dispensers that have manual pump arms with single sheet dispensers. This has the potential to reduce user consumption.

Action 1:

Implement paper towel composting at the Thunderbird Café.

Paper: Shredded

– Priority: Low

All paper that is shredded in office shredders have traditionally been bagged and placed in solid waste dumpsters. In FY12, the SWCRC indicated it could accept bagged shredded paper in the yellow dumpsters for recycle with the mixed paper. Custodial Services has accepted and is supporting this practice. The bags are left whole to prevent spilling shred at the dumpster collection point, but are then broken open and the plastic bag removed on the processing floor at the SWCRC.

Not having destruction bag support from Logistics, the IPOC building in the SSTP shreds a much higher volume than anywhere else at Sandia, and have consistently diverted so many bags of shredded paper from the trash, that they are the only location to need and have two mixed paper dumpsters.

Action 1:

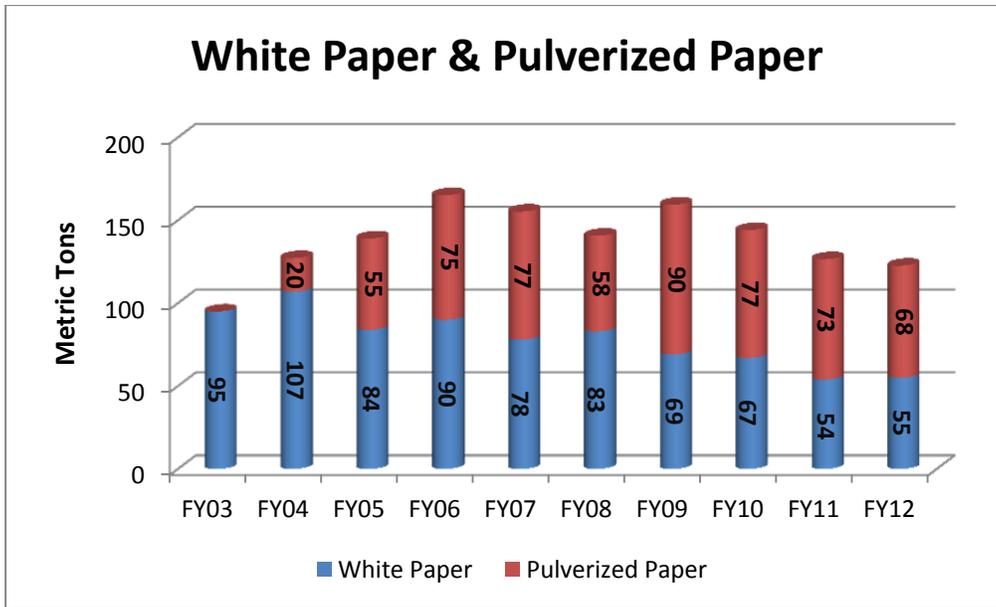
Advertise and encourage generators to seek for their shred to be recycled.

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 by the users into 65 gallon rolling blue carts. Approximately once per week, a SWCRC worker stops by and checks each blue cart. If the cart is nearing full, the worker will take away the full cart and leave an empty cart in its place. The full carts are taken back to the SWCRC and emptied into a rolloff. The rolloff is eventually dumped on the floor of the SWCRC and lightly screened for contaminants while being fed into the baler, result in several bales. Once three truckloads of white paper bales are accumulated, they are shipped to a mill in Wisconsin for witnessed destruction by recycling.

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 were reductions in the production runs of the *Sandia Lab News*, a bi-weekly paper, before the paper type was changed to a lower quality putting it in the category of mixed 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 somewhat in FY07 when departments became responsible for the cost of purchasing. It had been hypothesized that the quantity of paper being categorized as UCI by generators has increased over the past few years, and thus goes for pulverization rather than to white paper recycling, resulting in a decline. However, the chart below shows that this is not the case.



In FY12, users of the blue carts for white paper collection managed by the SWCRC called the recycling hotline 229 times to report their carts were full. Neglected carts may be a discouragement to recycling.

Action 1:

Using the Recycling GIS, analyze the SWCRC white paper collection data spatially for gaps or over-saturation in cart distribution, and white paper pick-up requests for process improvements.

Action 2:

Analyze the SWCRC white paper pick-up requests for process improvements. Consider a Lean/Six Sigma (LSS) kaizen on this process.

Action 3:

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

Action 4:

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 material buyer needs to be maintained. The material resale market must be considered when developing and maintaining Sandia’s plastic recycle streams. The cost of shipping scrap to market must also be considered. In FY12, a contract with a local plastics recycler was established that enabled the recycling of voluminous, yet light plastics, without

having to ship them out of state, and established a container reuse cycle. In FY13, this new vendor stopped accepting half of the materials they did at the beginning – *constant flux*.

Plastics are not a net revenue generator, though the net cost can approach zero.

During a large effort to process a backlog of destruction bags in 2011, the white bags were diverted to test the ability to reuse or recycle the bags. Even with the surge, an insufficient quantity was accumulated to enable recycling. The bags themselves were either destroyed in the process of emptying, or had too much tape to be able to be reused. The plastic shred created during the destruction process is a mixed plastic of transparencies, the destruction bags, and polycarbonate CDs and DVDs. A sample of this was sent to the plastics broker in 2012, and is not able to be recycled. It may be possible to use the mixed plastic shred as a packing fill material at one of the waste facilities to displace the purchase and use of other fill.

Action 1:

Maintain information on plastics in the Material Recycling Assessment spreadsheet as current as possible (\\snl\css\p2staff\07 Reuse & Recycling\Materials for Recycle)

Action 2:

Pursue the reuse of mixed plastic shred from 6583 as a fill material in waste shipments.

Plastics: #1 and #2 Mixed Bottles

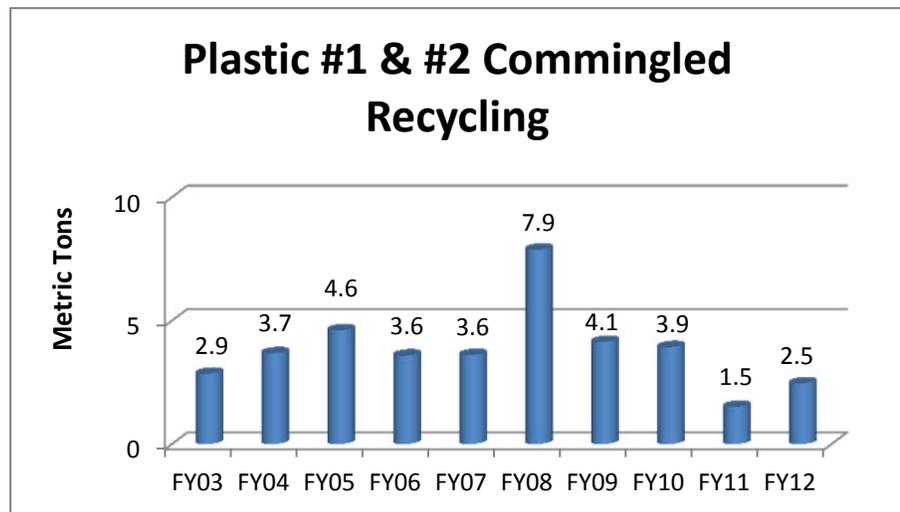
– Priority: Low

Some recycle bins still display commingled aluminum and plastic labels. Ongoing efforts continue to complete the elimination of these outdated labels onsite. Due to lack of time for sorting, mixed bags of aluminum cans and plastic bottles are sent to the landfill. Generation of plastic bottles is highly variable, with the lowest two years in a decade being most recent. This is despite the continued placement of additional recycle bins around the campus, both indoors and outdoors.

The inclusion of many other types and forms of plastic in the bottle recycle bins, as well as the intentional mixing of #1 and #2 bottles has resulted in this material stream actually being considered a mixed plastic, not a high value bottle stream.

Action 1:

Coordinate a brainstorming session to identify methods for improving diversion.



Plastics: #2 Bottles and Containers

– Priority: Low

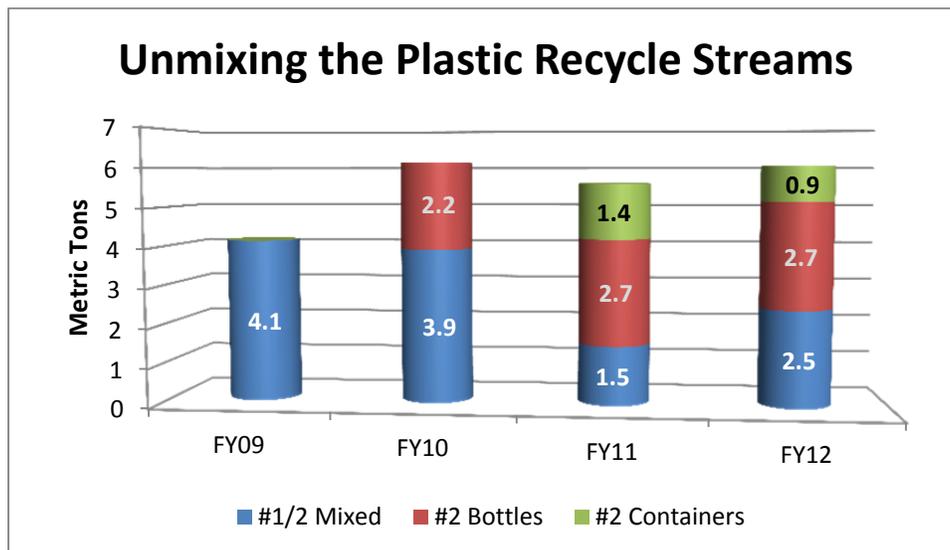
Beside beverage containers, a large number of laboratory chemical bottles are made of high density polyethylene (HDPE) #2. Buildings 858N, 518 and 702 are known to generate and to segregate these bottles. After triple rinsing with de-ionized water, the bottles are collected into large trash bags. Due to volume, building 858N has a “#2 HDPE Bottles” rolloff from the SWCRC 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 SWCRC. The other buildings do not generate enough quantity to warrant rolloffs, so the bagged bottles are placed in the solid waste dumpsters, and screened out at the SWCRC to be recycled with the commingled beverage bottles.

The HWMF generates empty containers made of HDPE #2 that are 5 gallons in capacity or greater and required to be disposed on a waste description and disposal request (WDDR). These containers are crushed and placed in their own rolloff at the SWCRC for “#2 HDPE Containers,” and are no longer mixed with the #1/2 mixed bottles as of FY11.

Separate tracking of these plastics from the #1 and #2 commingled bottles began in FY10. When overlaid with the declining, #1 and #2 commingled bottle data from the previous table, you can see the related impact.

Action 1:

Seek and initiate additional sources of laboratory HDPE #2.



Plastics: #2 Tyvek®

– Priority: Medium

Tyvek®, a woven HDPE made by DuPont™, is used in the manufacture of protective garments, waterproof printing paper, and mailing envelopes. Lead by Center 2700, Tyvek® protective garments after clean room use were collected and sent to Garment Recovery Systems. The clean Tyvek used in the radiation protection training classes were later added to this stream. Waterproof printing paper and mailing envelopes made from Tyvek® are able to be sent to MSP2 through interoffice mail, but is rarely received. Garment Recovery Systems went out of business after the last shipment of FY12. The garments are now accumulated onsite until sufficient quantity exists to bale it, which should be three or four times per year. The bale has been approved for shipment to the plastics broker in California.

Action 1:

Expand garment recycling to other generators at Sandia such as clean rooms occupants.

Action 2:

Publicize the Tyvek® envelope and sheet recycle stream.

Plastics: #3 PVC

– Priority: Low

Poly-Vinyl Chloride (PVC) is possible to recycle, but the transportation of scrap piping would be inefficient and not generate any revenue to offset the cost. That said, eight tons of PVC was able to be recycled in FY12, mostly being the membrane from a building roof replacement project.

Action 1:

Continue to monitor the quantity and sources of scrap PVC for opportunities.

Plastics: #4 Shrink Wrap

– Priority: Low

Shrink wrap, an LDPE film, is used to keep materials clean and protect them from falling off of pallets during transit. The majority of it is clear without color. Primary generators of used shrink wrap include Reutilization, Receiving (Building 957), the Facilities Warehouse (Building 954), the Center 2700 Warehouse (Building 702), and Custodial Services. The first three generators collect shrink wrap in a cubic yard box recycle bin at their facility and call for pickups as needed. The latter two fill large trash bags with shrink wrap, and place it in a yellow mixed paper dumpster for weekly collection. The shrink wrap is taken to an MSP2 sprung and stored until at least 20 cubic yard boxes of material are available. It



is then baled at the SWCRC. To prevent bale expansion and material loss, the bale of shrink wrap must be shrink wrapped. Colored shrink wrap began to grow in volume in FY11. Contacting the plastics broker, Sandia was encouraged to include all colors, rather than throwing any away.

Action 1:

Identify other medium-to-large quantity shrink wrap generators.

Plastics: #5 Rigid Containers

– Priority: Low

A proactive laboratory technician in Building 858N noticed they were generating a constant stream of natural colored 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



SWCRC personnel screen out the PP #5 when processing the #2 natural bottles. The material is set aside at the SWCRC to take and store at the MSP2 Tent in cubic yard boxes.

Action 1:

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

Action 2:

Seek additional natural rigid PP #5 sources.

Plastics: ABS

– Priority: Low

Black acrylonitrile butadiene styrene (ABS), a dense and heavy material, had been a sporadic material stream. Recently in FY13, a steady stream of ABS was diverted from users of 3D printers. The base plate for the printing is a single-use thin square of ABS. Oversized copier paper recycle bins have been repurposed for the collecting of these printer plates. Generator support has been quite positive so far.

Action 1:

Seek additional 3D printer ABS sources.

Plastics: Foams (#4, #6, Polyurethane)

– Priority: Low

Packing foams are collected jointly in the mixed paper dumpsters, and screened out from the paper on a weekly route to all dumpsters. The foams collected are then segregated by type. Packing foam continues to be a large constituent in the solid waste, and is visible in virtually all bales of trash.

Packing foam made from Low Density Polyethylene (LDPE) #4 is prolific in computer equipment and other new product shipments. In a 3Q FY09, an attempt to bale failed due to the high shape-memory property of the foam. 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, but all declined. The remaining option was to densify the material. A Heger GSV-E-200-600 multi-foam grinder and compactor was purchased and installed at the SWCRC using revenues from other recycle streams. It uses an auger to densify multiple foam types into easily palletized, industry standard logs that we can market to our current plastics vendor.



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. While initial collections of LDPE #4 found that white foam made up 90-95% of the volume, later volumes contained a majority mixture of colors. After checking with the plastics broker, it was decided to only process mixed color logs of LDPE #4 foam. Covered forty cubic yard rolloffs are used to accumulate LDPE foam for as long as possible without densifying it to reduce the number of material processing changes in the equipment. Between three and four feet of densified foam, perhaps 50 pounds, is lost during auger clearing when switching foam material types.

While investigating the potential recycling of LDPE #4, the previously unknown packing foam was found onsite. Polypropylene (PP) #5 foam looks like expanded polystyrene (EPS) #6 Styrofoam®, but has a waxy feel, is more flexible, and is marked as PP #5. This packing foam has been found in both white and black colors, but in miniscule quantities, and is not a viable material stream to use the compactor for.

RASTRA returned to Albuquerque in FY08 and accepted large-beaded EPS #6 again. They ground up and used the foam as a constituent of RASTRA blocks, an insulated concrete form for building construction. This was a no revenue, no fee arrangement. A 40 cubic yard rolloff was established at the C&D Recycle Center for drop-off collection and delivery to RASTRA. Collection has been expanded at the end of FY09 to using the yellow mixed paper dumpsters for all foam types.

Coincident with the multi-material foam compactor coming online, RASTRA again left New Mexico at the end of 2009, so the foam densifier purchase turned out to be a decision that assured the continuation of the foam packing recycle stream.

In FY11 and FY12, a few foam cup recycle bins were tested in select locations. All but one failed due to negative reception by the location occupants. At the beginning of FY13, Custodial Services requested one for their break room. That same quarter, Custodial Services came back and requested 25 more foam cup recycle bins for at least two campus teams to put out and manage. The requested bins were purchased with recycling revenues and provided during the second quarter of FY13. The collection bins come in double-packs, and twice as many bins were

inadvertently ordered and delivered to Custodial Services. Yet all 50 foam cup recycle bins were distributed, and more were requested. The bags of foam cups removed from the bins are placed in the mixed paper recycle bins for weekly collection along with the rest of the foam, and then compacted just the same as the white packing Styrofoam®.

Polyurethane foam is another common packing material. Unlike the others, it can be baled or delivered loose locally to a recycling vendor. It also generates a minimal revenue. A forty cubic yard rolloff is parked inside STENT11 for protection from the weather to accumulate polyurethane foam. Two-part spray foam that form fits into containers for product shipping protection is also polyurethane, but is not able to be recycled. This difference is not generally communicated to the workforce to encourage the greatest amount of diversion possible. The two-part foam is easily discerned from the recyclable polyurethane foam, and readily picked out as garbage.



The current procedure calls for white EPS to be processed immediately each week in the compactor when retrieved from the mixed paper dumpsters. This way, there is never a backlog to be processed, and all storage space can be dedicated to LDPE and polyurethane foam types.

Action 1:

Increase the number of mixed paper dumpsters available to receive foams.

Action 2:

Maintain communication Custodial Services and monitoring of foam cup collection, and provide addition foam cup recycle bins as needed.

Action 3:

Advertise and raise awareness of the recyclability of foam via the mixed paper dumpsters.

Plastics: Lucite®, Plexiglas®, and Teflon®

– Priority: Low

Non-standard types of proprietary plastic such as Lucite®, Plexiglas®, and Teflon® appear as scrap from time to time. These materials have value and are included in the shipments to the plastics broker. Often they are not in readily containerized, or received in a palletized manner. 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 these miscellaneous plastics between shipments.

Plastics: Mixed

– Priority: Medium

A significant volume of the lighter, consumer-grade plastic varieties come through Reutilization. They now sort out and set these plastics aside for MSP2, rather than throwing them away. MSP2 then fills cubic yard boxes in the MSP2 Tent. A local vendor was contracted in mid-FY12 to take this mixed plastic, but no longer has the capability to process and recycle it. A new vendor in Santa Fe has been identified as a potential recipient, and the City of Albuquerque's recycling vendor has submitted a quote to purchase the plastics.

Action 1:

Conduct a test shipment to the City of Albuquerque vendor.

Plastics: Polycarbonate

– Priority: Low

Polycarbonate plastic is valuable, and most often found in CDs, DVDs, and safety glasses. All optical media CDs and DVDs are screened from the removable electronic media destruction stream, combined with any commercial CDs and DVDs received via interoffice mail, and shredded according to DOE destructive procedure to protect both government data and commercial software licensing. The shred is combined in a cubic yard box with any whole polycarbonate products diverted, such as safety glasses, and shipped to the plastic broker for recycle.

See *Electronics: Removable Media* for action items.

Plastics: Transparencies

– Priority: n/a

While previously diverted and shipped to a contractor of 3M that could recycle transparencies with their unique coating, the company has since gone out of business. Transparencies have returned to being solid waste.

Tires

– Priority: Medium

Tires of all sizes are recycled through a Fleet Services vendor. The SWCRC screens out the anomalous tire that is received to assure it is recycled. Rubber inner tubes are also sent for recycle with the tires. Two bales of tires were created at the SWCRC in FY07 or FY08, and after much effort, were finally recycled before the end of FY10.

If scrap tires are generated at construction sites, they are generally considered the contractor's responsibility to dispose, and will most likely not be recycled. However, Fleet Services will accept work-generated scrap tires for recycle.

At the end of FY12, a process to bring oversized equipment tires back from Tonopah Test Range in Nevada and be recycled through Fleet Services was established. Tonopah has the ability to recycle common vehicle and truck tires, but the equipment tires were being landfilled.

Half of the vehicle tires received by the Fleet Services vendor are able to be retread. Approximate a quarter of the scrap tires unable to be retread are sent for recycle to Utah. The other quarter of scrap tires unable to be retread, mostly passenger vehicle tires, are sent to the City of Albuquerque landfill.

Action 1:

Investigate the City of Albuquerque's Tire Recycling Program for opportunities to increase diversion.

Action 2:

Work with Construction Managers, Procurement, Fleet Services, and the tire vendor to direct all scrap tires unable to be retread for recycle.



2.2 Non-Routine Solid Waste Materials

Table 2: FY13 Prioritization of Non-Routine Materials for Diversion

| Material | Priority | Status |
|--------------------------------|-----------------|---|
| Asphalt & Concrete | High | Perform crushing event |
| Carpet Tiles | Medium | Need covered receiving area at C&D Recycle Center |
| Ceiling Tiles | Medium | Need covered receiving area at C&D Recycle Center |
| Fiber Optic Cable | Medium | Need vendor |
| Green Waste | Low | Process refinement needed |
| Plywood | Low | Functioning |
| Polyisocyanurate | Low | As needed |
| PVC Roofing Membrane | Low | As needed |
| Wallboard / Gypsum / Sheetrock | Low | Functioning |
| Wood / Dimensional Lumber | Low | Functioning |

Asphalt & Concrete

– Priority: High

Since FY07, the Concrete and Asphalt Recycle Area (CARA) in Tech Area 3 has produced over 36 million pounds of crushed concrete base course, rip rap, crushed asphalt, and a unique product called “conphalt” for use across the DOE leased portions of Kirtland Air Force Base (KAFB). Millions of more pounds have been diverted from the landfill and are currently staged at the CARA waiting to be crushed.

Action 1:

Identify future users of CARA products.

Action 2:

Utilize the solar tower glass staged at the CARA.

Carpet Tiles

– Priority: Medium

In FY09, the vendor Interface changed their cost structure from charging \$1,100 per shipment to \$2,900 per shipment, and charged an incineration fee (\$0.11/lb) for any non-vinyl backed carpet. A credit of \$0.03/lb. was to be provided for shipments of vinyl backed carpet or \$0.01/lb. if sent in a mixed load.

In FY11, a new company was identified in Colorado that will accept most carpet, assess it for reuse purposes, and recycle any portion that is not reusable. From an accumulation and shipping point of view, the new vendor is an improvement. The distance and cost is much less, and the vendor is able to coordinate with other carpet generators in the region to do a combined shipment

so we do not have to accumulate a full truck load before shipping. More frequent partial shipments provide consistent data for tracking and reporting. In FY11, we shipped over 14,000 pounds and in FY12, we increased to 19,000 pounds. The two years combined would not have equated to a full truckload shipment and we would still be accumulating aging carpet.

Small quantities of carpet tiles continue to be disposed in the C&D Waste rolloff at the C&D Recycle Center.

Action 1:

Pursue a covered awning drop-off area at the C&D Recycle Center for small quantities of carpet to be delivered by Facilities and contractors.

Ceiling Tiles

– Priority: Medium

Ceiling tiles from renovation and demolition projects are stacked neatly on a pallet and have typically been delivered to the MSP2 Tent at Reutilization. That process transitioned to utilize to STENT11 near the SWCRC. 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.

The FY12 shipment to Armstrong included fiberglass-backed ceiling tiles for the first time, totaling nearly a quarter of the load.

Small quantities of ceiling tiles continue to be disposed in the C&D Waste rolloff at the C&D Recycle Center.

Action 1:

Pursue a covered awning drop-off area at the C&D Recycle Center for small quantities of ceiling tiles to be delivered by Facilities and contractors.

Fiber Optic Cable

– Priority: Medium

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. The plastics broker evaluated a sample, but will not be able to use the material. ECS Refining has been shipped a sample in hopes of identifying a vendor that may be interested in the germanium. A vendor was identified at the end of FY10 that required a minimum of 30,000 pounds per load to recycle, but they no longer accept material.

During a material surge in FY12, a rolloff to collect fiber optic cable was established and partially filled. The rolloff and a drop-off tilt hopper are now located at the C&D Recycle Center.

Action 1:

Seek vendors interested in fiber optic cable recycling. The germanium is the priority constituent of interest, but any recycling would be a step forward.

Action 2:

Advertised the fiber optic cable recycling to generators, such as the time and material contractors and Verizon.

Green Waste

– Priority: Low

Green waste is generated by the Facilities landscaping crews, part of Grounds and Road Services. They have dump trucks and trailers to collect branches, weeds, debris, leaves and grass clippings. Trunks and branches they deliver to the KAFB Landfill to be mulched. Mulch is available for free from the landfill to Sandia anytime it is needed.

A mulching lawnmower was procured in FY10 to reduce the quantity of bagged grass clippings. Except for the impressive golf course-like grass outside of building 800, the mulching lawnmower was a success. Grounds and Roads has three teams of landscapers, so two more mulching lawnmowers were procured in FY11, which also helped retire some inefficient aging equipment.

Also in FY11, two rolloffs for the collection of Green Waste were established. One is permanently sited at the C&D Recycle Center drive-through. The elevated driving dock allows the trucks and trailers to back up and dump directly into the rolloff, and the SWCRC front end loader can compress the material to allow heavier loads. The other rolloff can be relocated by the SWCRC to where large clean-up projects are occurring as identified by the Landscapers.

The landscapers vacuum and grind leaves in a trailer rather than raking into bags. The mulching lawnmowers use plastic bags when the grass clippings have to be picked up. The plastic bags are then hand dumped into a rolloff, and the team lead wants the bags reused when possible. Compostable bags were tested in the lawnmowers to allow the bag to be thrown in without needing to be dumped, but ripped too easily.

Identifying a vendor to compost the green waste led to changing vendors for the pulverized paper composting as well. The distance to the new vendor is roughly the same, but driving time is reduced. There is now no material tipping fee, and relatively inexpensive loads of compost can be backhauled as needed. The vendor provides one free load of finished compost for the Landscapers per four loads of material diverted.

Action 1:

Seek a new compostable bag to test in the mulching lawn mowers.

Action 2:

Research onsite composting.

Plywood

– Priority: Low

In FY13, the wood recycler asked to have the volume of plywood reduced in the loads being delivered. The green waste composter though is willing to take loads of plywood separate from the usual green waste deliveries. So a new rolloff was established at the C&D Recycle Center just for plywood and crates.

Action 1:

Continue to advertise the plywood rolloff at the C&D Recycle Center.

Polyisocyanurate

– Priority: Low

Polyisocyanurate (ISO) is a thermoset plastic typically produced as rigid foam used as thermal insulation. ISO is used on numerous building roofs throughout Sandia. Nationwide Foam Recycling was identified to recycle ISO roofing materials that could previously only be landfilled. In FY12, 48,960 pounds of ISO were recycled.

Action 1:

Identify additional reroofing projects to continue ISO insulation recycling.

PVC Roofing Membrane

– Priority: Low

PVC membrane roofing is strong, flexible, and used on numerous Sandia building roofs, frequently in conjunction with ISO. In FY12, 13,820 pounds of PVC roofing membrane were recycled through Nationwide Foam Recycling.

Action 1:

Identify additional reroofing projects to continue PVC roofing membrane recycling.

Scrap Metals at C&D Recycle Center

– Priority: n/a

The C&D Recycle Center is a construction recycling drive through for light trucks performing small projects. Scrap metal recycling is a significant component of the drive through. A roll-off is designated for scrap steel, and tilt hoppers are designated for higher value metals, including copper wire #1, copper wire #2, copper (not wire), aluminum (not cans), and brass. Other metal types can be separately collected on an as needed basis, such as stainless steel.

Wallboard / Gypsum / Sheetrock

– Priority: Low

Although wallboard recycling was able to occur through a local wallboard manufacturer from FY03 through FY06, the vendor’s requirement for “zero” contamination led to the cancelation of the recycle stream.

In FY12, a local composting facility was found to be able to accept clean wallboard cuttings and scrap from construction projects. Just over a ton of gypsum was able to be diverted from a large construction project. Building 704 constructed in FY13 was able to divert five rolloffs of wallboard for recycle.

Action 1:

Identify and work with new construction projects to divert wallboard for recycle.

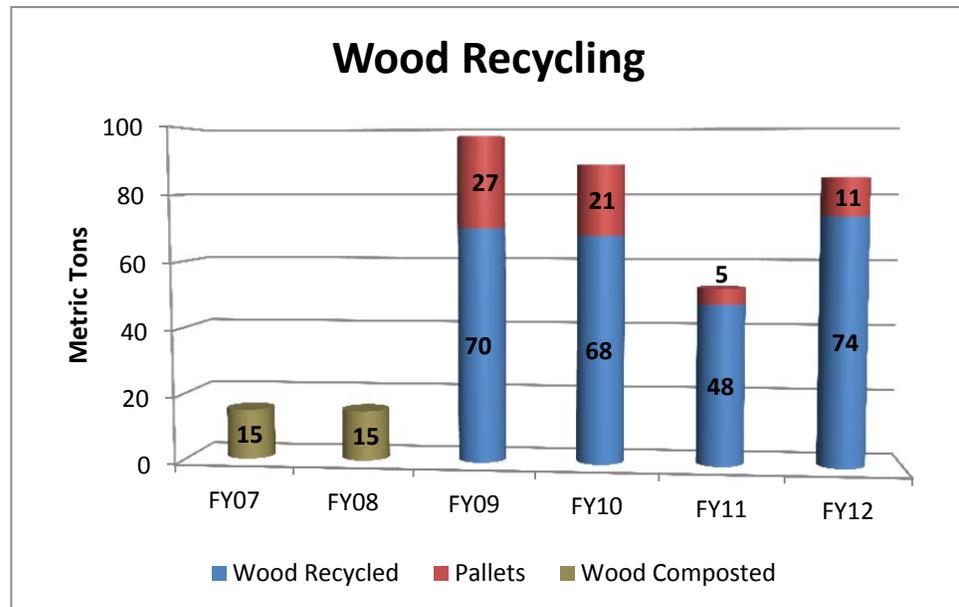
Wood / Dimensional Lumber

– Priority: Low

Scrap wood for recycle continues to be significantly higher in volume than when the wood was sent for composting at a less contaminant-tolerant facility.

Diverting pallets for refurbishment or recycle has been an ongoing effort that continues to stumble. Pallets

are available for reuse at the C&D Recycle Center, but tracking data is not available. When too many are on hand at the Recycle Center, they are sold to a local pallet refurbishing vendor. One shipment of pallets for refurbishment and reuse was completed in FY13 to date.



Action 1:

Seek to divert additional pallets for refurbishment from the pallet recycle stream. Increase number of yearly shipments of pallets for refurbishment.

2.3 Hazardous Waste Materials

Table 3: FY13 Prioritization of Hazardous Waste for Diversion

| Material | Priority | Status |
|------------------|-----------------|------------------------------------|
| Antifreeze | High | Seek to expand |
| Batteries | Medium | Seek to expand |
| Calcium Fluoride | Low | Diversion in progress |
| Hydraulic Fluids | Medium | Reduce potential for contamination |
| Lead Bank | Medium | Seek to expand |
| Lead Solder | High | Process evaluation needed |
| Light Ballasts | Medium | Functioning |
| Light Bulbs | Low | Functioning |
| Mercury | High | Increase awareness |
| PRS-1000/3000 | High | Conceptual Only |
| Used Oil | Medium | Reduce potential for contamination |

The FY14 MSP2 Program Plan includes working with the HWMF to evaluate the downstream recyclers of hazardous materials to assure proper handling and treatment, while minimizing material exporting and maximizing potential revenue.

Antifreeze

– Priority: High

Starting in FY07, antifreeze or coolant collected in drums at Fleet Services is taken by a vendor 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. Based on a review of FY10 waste data, diverting the coolants from the HWMF would double this recycle stream.

Action 1:

Work with the HWMF to establish recycling of the propylene glycol and ethylene glycol submitted for disposal.

Batteries

– Priority: Medium

Alkaline and carbon-zinc batteries are discussed in section 2.1, 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 and Custodial Services through their respective JIT contracts, and from the rest of the site at the HWMF. All other batteries generated onsite are considered hazardous, must be processed through the HWMF, and almost all of them are eventually recycled anyway. This includes lithium, lithium-ion, nickel-cadmium, nickel-metal-hydride, mercury, and non-alkaline button cell batteries. Rechargeable batteries could be recycled more economically at the HWMF, if they were willing to use a different vendor.

An area of concern is button cell batteries and rechargeable batteries that look confusingly like alkaline batteries, may be thrown away in the bagged trash, and go undetected in the solid waste.

Thermal batteries are able to be recycled from DOE's Pantex facility in Amarillo, Texas. The HWMF processes a significant number of these batteries, and it would be an excellent hazardous waste reduction to begin their diversion.

Action 1:

Help the HWMF to implement a less costly means of recycling rechargeable batteries.

Action 2:

Work with the HWMF to recycle thermal batteries.

Calcium Fluoride

– Priority: Low

This waste stream is a result of a chemical precipitation extensively used in the semiconductor industry. Hydrofluoric acid is used in large quantities in the MicroFab and SiFab and the fluoride effluent is strictly controlled by local waste water regulations. Therefore, with the appropriate approval, the acid waste streams are converted to an industrial solid waste, calcium fluoride. A pollution prevention opportunity assessment was performed on this waste stream, and ideas for diversion were pursued. The calcium fluoride could possibly be a constituent in crushed concrete base course produced at the CARA. Calcium fluoride diversion has begun.

Action 1:

Accumulate a sufficient quantity to inject into the FY15 concrete crushing event.

Action 2:

Investigate if Intel would be willing to combine our calcium fluoride with their much larger recycle stream.

Fuels

– Priority: n/a

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. MSP2 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 being done.

Now that the fuels are no longer cross-contaminated, the diesel is filtered onsite and placed back into the vehicle of origin once repair work is complete. Drained gasoline is still sent to the HWMF.

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. All other hydraulic fluid from around the site is sent to the HWMF for recycle.

Action 1:

Identify other biobased hydraulic fluid users, and verify the biobased product is being recycled back to Renewable Lubricants, and not contaminating the petroleum recycle stream.

Lead Bank

– Priority: Medium

The Lead Bank has been in operation since at least 1995, and is managed according to Corporate Procedure ESH100.2.ENV.8 *Manage Excess Metallic Lead*. An operating procedure is also maintained. The mission of the Lead Bank, part of the Regulated Waste and Pollution Prevention Department, is to receive and distribute excess metallic lead shielding for other Sandia departments, minimizing expenses associated with both waste disposal and new purchases. Radiological clearance is required for each submission of lead to the Lead Bank before it is received. If an excessive surplus of lead is accumulated at the Lead Bank, it is shipped for recycle and the revenue used to support the Lead Bank. In FY12, the paper-based lead transfer request process was revised to become electronic web application. The final workflow of this application continues to be worked out in FY13.

FY13's scrap lead shipped for recycle was traded for epoxy powder coated lead bricks, with the purpose of cycling out exposed, oxidizing lead for improved industrial hygiene. Over 750 of the new bricks have been requested, and older lead bricks and scrap are being submitted in return.

Action 1:

Complete the conversion of the Lead Bank workflow to a web-based electronic process.

Action 2:

Support the ongoing distribution of epoxy powder coated lead bricks, and seek to draw down excess lead scrap from across the campus.

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). A CIS search in at the end of FY09 found 136 containers of lead solder, and a repeated search in FY13 found 102 containers.

Solder is not believed to be well represented in CIS. As an unused product, it has the potential to be a material with no reasonable outlet, driving individuals to put it away in drawers and closets, forgotten for years, or to mismanage it. Solder scrap is routinely submitted to the HWMF.

The Lead Bank does not currently accept unused solder or used solder scrap. While the Lead Bank's original mission was to provide lead shielding within Sandia, as part of the Regulated Waste and Pollution Prevention Department, the scope of the Lead Bank should be reviewed for broader implications and service.

Action 1:

Review the Lead Bank's mission with regards to unused solder and solder scrap.

Action 2:

Work with CIS to improve inventory accuracy of solder.

Light Ballasts

– Priority: Medium

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. In FY12 there were 2,197kg of non-PCB ballasts, and 489kg of potentially PCB-containing ballasts. Both of these numbers are up from FY11, significantly the potentially PCB-containing ballasts.

Action 1:

Evaluate the potential to divert non-PCB light ballasts as mixed electronics.

Light Bulbs

– Priority: Low

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 an 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 toxic release inventory (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, MSP2 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.

Action 2:

Investigate the usage of mercury in equipment and potential alternatives.

Oil Filters

– Priority: n/a

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. Fuel filters have been determined to be too administratively burdensome to include with the used oil filters and are sent to the HWMF.

Oil Mixed with Water

– Priority: n/a

Oil mixed with water is recycled as used oil by the HWMF, unless it fails the halogen test.

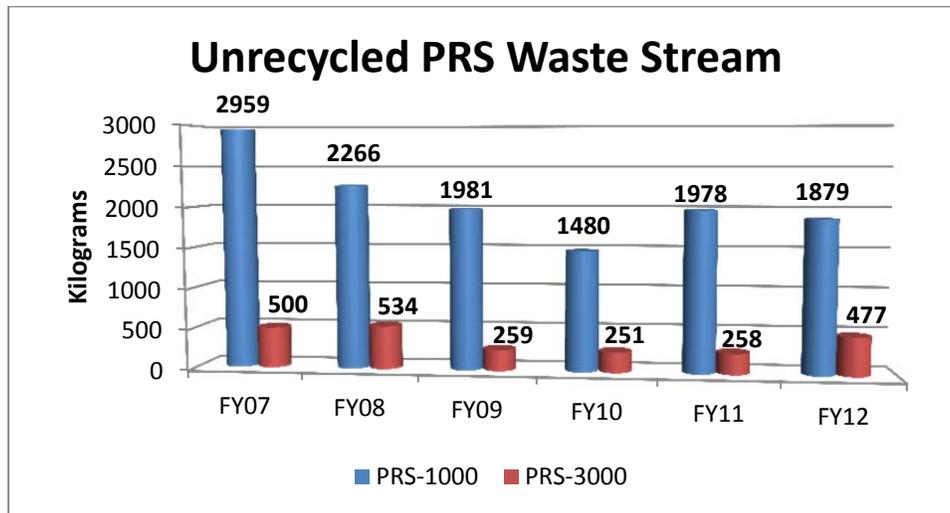
PRS-1000 / PRS-3000

– Priority: High

PRS is a positive photoresist stripper of the JT Baker brand line, owned and manufactured by Avantor Performance Materials. PRS-1000 is a bulk photoresist stripper and PRS-3000 has additional residue removal properties, both used 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.



Shop Rags (Fleet Services)

– Priority: n/a

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 heaps of wrapped-up grease, but this practice was stopped and a grease container established for periodic submission to the HWMF.

Soil Contaminated with Oil

– Priority: n/a

Oil discharges to the ground result in contaminated soil being cleaned up and handled as a state regulated waste. The soil is sent to the Rio Rancho landfill. If delivered by rolloff and the oil is above a certain parts per million (ppm), the landfill has a soil farm where it is remediated. Below the ppm threshold, the soil is used for daily cover. If the soil is in small quantities and packaged, than it is treated as waste to go into the landfill.

Used Oil

– Priority: Medium

Used petroleum based oil is recycled by 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.

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.

3.0 Conclusion

The writing of this ROA took place at the end of FY13. 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 after two years. 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.

4.0 Appendices

Summary of FY13 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 integrated into the annual MSP2 Program Plan based on time and labor available, balanced with the potential for success.

4.1 Table of high priority materials and associated action items

| Material | Action Items |
|---|---|
| Antifreeze | 1. Work with the HWMF to establish recycling of the propylene glycol and ethylene glycol submitted for disposal. |
| Asphalt & Concrete | 1. Identify future users of CARA products. 2. Utilize the solar tower glass staged at the CARA. |
| Electronics: Circuit Boards | 1. Identify and compare competing vendors. Consider a procurement action to establish an annual contract. |
| Electronics: High Performance Computers | 1. Based on the approved contract for common computer equipment, customize a new contract that covers HPCs. |
| Lead Solder | 1. Review the Lead Bank's mission with regards to unused solder and solder scrap. 2. Work with CIS to improve inventory accuracy of solder. |
| Mercury | 1. Create a mercury awareness program. 2. Investigate the usage of mercury in equipment and potential alternatives. |
| Metal: Scrap | 1. Complete mapping and labeling of existing tilt hoppers. 2. Work with identifiable generators to correctly label existing tilt hoppers, and increase or decrease tilt hopper deployments as needed. 3. Post signs on tilt hoppers without identifiable generators and advertise their intended removal. Then remove the hoppers that are not in apparent use. 4. Remove the magnesium "parking space" sign from the Reutilization west wall. |
| Paper: Mixed | 1. Work with Custodial Services to distribute the yellow carts, and match mixed paper dumpsters to new locations as needed. 2. Implement customer-side magazine and newspaper diversion at the Thunderbird Café. 3. 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. |
| PRS-1000/3000 | 1. Contact the manufacturer and other resources to investigate restarting the recycle process for PRS-1000 and the smaller waste stream of PRS-3000. |

4.2 Table of medium priority materials and associated action items

| Material | Action Items |
|---------------------------------------|--|
| Batteries | <ol style="list-style-type: none"> 1. Help the HWMF to implement a less costly means of recycling rechargeable batteries. 2. Work with the HWMF to recycle thermal batteries. |
| Carpet Tiles & Ceiling Tiles | <ol style="list-style-type: none"> 1. Pursue a covered awning drop-off area at the C&D Recycle Center for small quantities of carpet to be delivered by Facilities and contractors. |
| Electronics: ISDN Telephones | <ol style="list-style-type: none"> 1. Pursue a downstream audit of this vendor. |
| Electronics: Printers and Peripherals | <ol style="list-style-type: none"> 1. Seek to broaden what equipment Reutilization will provide to the MSP2 Tent, possibly even after the 90 day browsing period, such as worn and broken printers, peripherals, keyboards and mice. 2. Require that Sandia take back all electronics sent to auction that do not sell. Otherwise the electronics will be managed by others in a less cautious manner. |
| Fiber Optic Cable | <ol style="list-style-type: none"> 1. Seek vendors interested in fiber optic cable recycling. The germanium is the priority constituent of interest, but any recycling would be a step forward. 2. Advertised the fiber optic cable recycling to generators, such as the time and material contractors and Verizon. |
| Hydraulic Fluids | <ol style="list-style-type: none"> 1. Identify other biobased hydraulic fluid users, and verify the biobased product is being recycled back to Renewable Lubricants, and not contaminating the petroleum recycle stream. |
| Lead Bank | <ol style="list-style-type: none"> 1. Complete the conversion of the Lead Bank workflow to a web-based electronic process. 2. Support the ongoing distribution of epoxy powder coated lead bricks, and seek to draw down excess lead scrap from across the campus. |
| Light Ballasts | <ol style="list-style-type: none"> 1. Evaluate the potential to divert non-PCB light ballasts as mixed electronics. |
| Metal: Precious | <ol style="list-style-type: none"> 1. Work with Property Management to gain access to recycling data. 2. Develop ideas for teaming between Property Management and Waste Management on precious metals to reduce disposal burden and maximize recovery. |
| Paper: Restroom Paper Towels | <ol style="list-style-type: none"> 1. Implement paper towel composting at the Thunderbird Café. |

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|-----------------|--|
| Paper: White | <ol style="list-style-type: none"> 1. Using the Recycling GIS, analyze the SWCRC white paper collection data spatially for gaps or over-saturation in cart distribution, and white paper pick-up requests for process improvements. 2. Analyze the SWCRC white paper pick-up requests for process improvements. Consider a Lean/Six Sigma (LSS) kaizen on this process. 3. Participate in the screening of materials during bale creation to reduce contamination, and learn where additional awareness efforts should be focused. 4. Become involved in the office/personnel moves process to minimize purges of outdated paper, supplies, and other materials. |
| Plastics: Mixed | <ol style="list-style-type: none"> 1. Conduct a test shipment to the City of Albuquerque vendor. |
| Tires | <ol style="list-style-type: none"> 1. Investigate the City of Albuquerque's Tire Recycling Program for opportunities to increase diversion. 2. Work with Construction Managers, Procurement, Fleet Services, and the tire vendor to direct all scrap tires unable to be retread for recycle. |
| Used Oil | <ol style="list-style-type: none"> 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. 2. Obtain or assist in the creation of a Fleet Services procedure to document maintaining clean, separate waste streams. |

4.3 Table of low priority materials and associated action items

| Material | Action Items |
|--------------------------------------|---|
| Batteries: Alkaline & Carbon Zinc | <ol style="list-style-type: none"> 1. A draft procedure for alkaline and carbon zinc batteries has been written, but needs to be converted to TWD format. 2. After the Logistics scrap metal contract is awarded, MSP2 should evaluate the new vendor for bulk battery recycling feasibility and environmental implications. Calculate the financial impact, and consider bulking batteries in a 55 gallon drum at STENT11. 3. Implement an initiative to expand the distribution of current battery recycle bins. There are approximately 150 spare bins in STENT11. 4. Follow up on the request to revise Corporate Procedure ESH100.2.ENV.22 Manage Hazardous Waste at SNL/NM to remove lantern sized batteries as an example of waste required to go to the HWMF. |
| Calcium Fluoride | <ol style="list-style-type: none"> 1. Accumulate a sufficient quantity to inject into the FY15 concrete crushing event. 2. Investigate if Intel would be willing to combine our calcium fluoride with their much larger recycle stream. |
| Electronics: Printing Supplies | <ol style="list-style-type: none"> 1. Complete Toner Exchange online inventory transition to new method of posting, or else implement spreadsheet improvements for an easier customer experience. 2. Periodically advertise the Toner Exchange to keep it fresh on purchasers' minds. 3. Create a procedure for the Toner Exchange to include specific ongoing maintenance expectations. 4. Identify if auditing toner cartridge recyclers and remanufacturers is practical, and if they participate in the electronics certification community. |
| Electronics: Removable Media | <ol style="list-style-type: none"> 1. After confirming a successful test shredding event of optical media with Logistics, evaluate collection processes to eliminate duplication of effort. 2. Support needed relabeling of disposal boxes, and the acquisition and redistribution of disposal boxes for even campus coverage. |

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|--------------------------|--|
| Food Waste – Compost | <ol style="list-style-type: none"> 1. Implement remaining 2012 Zero Waste Lunch Event process improvements. 2. Establish new multi-bins for trash, recycle and composting at the TA4 Café, and replace common utensils and plates at the TA4 Café to allow direct composting by customers that dine there. 3. Encourage workers to establish home compost bins and to take their office food waste home each day. |
| Glass | <ol style="list-style-type: none"> 1. Utilize the Solar Tower glass in the next concrete crushing event. 2. Identify other process generators of glass for diversion, and deploy additional drop-off locations. 3. Implement customer-side glass bottle diversion at the Thunderbird Café. 4. Promote personal glass bottle recycling. |
| Green Waste | <ol style="list-style-type: none"> 1. Seek a new compostable bag to test in the mulching lawn mowers. 2. Research onsite composting. |
| Light Bulbs | <ol style="list-style-type: none"> 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. 2. Work with the HWMF to evaluate the use of a fluorescent lamp crusher to minimize void space and save on shipping expenses. |
| Metal: Aluminum Cans | <ol style="list-style-type: none"> 1. Assure adequate recycle bin distribution in buildings. Special focus should be placed on conference rooms, break rooms, and open meeting areas. 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. |
| Metal: Exotic | <ol style="list-style-type: none"> 1. Raise awareness for the availability of this service to prevent the inadvertent loss of high value metals to the common scrap metal stream. |
| Metal: Neodymium Magnets | <ol style="list-style-type: none"> 1. Identify and test an entity to recycle the magnets. |

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|--|---|
| Paper: Cardboard | <ol style="list-style-type: none"> 1. Identify stand-alone solid waste dumpsters, and prioritize pairing them with a cardboard dumpster. 2. Identify aging or undersized cardboard dumpsters for replacement. 3. Work with JIT furniture vendors to assure continued recycling of cardboard and other packaging materials. Propose SWCRC support of large furniture replacement projects by delivering a rolloff for cardboard as requested, which would reduce an identified cause of dumpster overflows. 4. Identify a new use for the derelict cardboard compacting rolloff or send it to Reutilization. |
| Paper: Pulverized | <ol style="list-style-type: none"> 1. Continue to pursue a method to divert pulverized fines for compost. |
| Paper: Shredded | <ol style="list-style-type: none"> 1. Advertise and encourage generators to seek for their shred to be recycled. |
| Plastics: #1 & #2 Mixed Bottles | <ol style="list-style-type: none"> 1. Coordinate a brainstorming session to identify methods for improving diversion. |
| Plastics: #2 Bottles & Containers | <ol style="list-style-type: none"> 1. Seek and initiate additional sources of laboratory HDPE #2. |
| Plastics: #2 Tyvek® | <ol style="list-style-type: none"> 1. Expand garment recycling to other generators at Sandia such as clean rooms occupants. 2. Publicize the Tyvek® envelope and sheet recycle stream. |
| Plastics: #3 PVC | <ol style="list-style-type: none"> 1. Continue to monitor the quantity and sources of scrap PVC for opportunities. |
| Plastics: #4 Shrink Wrap | <ol style="list-style-type: none"> 1. Identify other medium-to-large quantity shrink wrap generators. |
| Plastics: #5 Rigid Containers | <ol style="list-style-type: none"> 1. Follow up with the SWCRC periodically to assure the rigid PP #5 is being set aside. 2. Seek additional natural rigid PP #5 sources. |
| Plastics: ABS | <ol style="list-style-type: none"> 1. Seek additional 3D printer ABS sources. |
| Plastics: Foams (#4, #6, Polyurethane) | <ol style="list-style-type: none"> 1. Increase the number of mixed paper dumpsters available to receive foams. 2. Maintain communication Custodial Services and monitoring of foam cup collection, and provide addition foam cup recycle bins as needed. 3. Advertise and raise awareness of the recyclability of foam via the mixed paper dumpsters. |
| Plastics: Lucite®, Plexiglas®, and Teflon® | <ol style="list-style-type: none"> 1. Be available to collect and store these miscellaneous plastics between shipments. |
| Plywood | <ol style="list-style-type: none"> 1. Continue to advertise the plywood rolloff at the C&D Recycle Center. |
| Polyisocyanurate | <ol style="list-style-type: none"> 1. Identify additional reroofing projects to continue ISO insulation recycling. |

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|--------------------------------|--|
| PVC Roofing Membrane | 1. Identify additional reroofing projects to continue PVC roofing membrane recycling. |
| Wallboard / Gypsum / Sheetrock | 1. Identify and work with new construction projects to divert wallboard for recycle. |
| Wood / Dimensional Lumber | 1. Seek to divert additional pallets for refurbishment from the pallet recycle stream. Increase number of yearly shipments of pallets for refurbishment. |

ELECTRONIC DISTRIBUTION:

Carolyn Holloway, DOE SFO
Technical Library, 9536
Waste Management and Pollution Prevention, 4144