A Comprehensive Approach To Solid Waste and Recycling At Sandia National Laboratories

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INTRODUCTION

The abrupt closure of a nearby, and historically utilized, Air Force Base landfill imposed a multitude of solid waste management problems for the Sandia National Laboratories/New Mexico (SNL) research and development facilities operated by Lockheed Martin Company.

Our rapid resolution of unique regulatory issues; our aggressive accomplishment of reviewing options and implementing transport, screening, recycling and disposal procedures; and our construction and operation of a model, on-site Solid Waste Transfer Facility (SWTF) can serve as a case study for servicing DOE solid waste management and recycling needs in a safe, compliant, and timely manor.

Sandia is a research and development facility operated by Lockheed Martin Corp., located on Kirtland Air Force Base (KAFB) property bounded by the city of Albuquerque to the north and Indian land to the south. SNL is spread out over ~8400 acres and is divided into 5 main technical areas.

Due to the close proximity of KAFB, SNL historically used KAFB's landfill for disposal of solid waste. Under this arrangement SNL paid little or no cost for disposal of its solid waste stream. The disadvantage was that KAFB personnel did not track waste volumes entering the landfill from SNL. On August 1, 1994 this all came to an end. KAFB, without advance notice, closed the sanitary waste and asbestos cells of the landfill.

Immediate Problems and Regulatory Concerns

The abrupt closure of the landfill left SNL in a difficult position. Sandia did not have accurate estimates of waste volumes and had many regulatory concerns regarding management of solid waste. Sandia had a safety net in using the KAFB landfill. If SNL prohibited materials were tipped in the landfill, KAFB personnel would notify SNL and the material would be removed and properly disposed. With the closure of the landfill that safety net was gone. SNL's Legal Department was insistent that routine waste inspections be conducted to ensure that Sandia was in compliance with solid waste regulations.

DISCLAIMER

Sandia is in a unique regulatory setting with a heightened community awareness of DOE activities and ever tighter regulatory oversight. SNL is a fenced, restricted access facility, without residential households. New Mexico Solid Waste Regulations (20 NMAC 9.1) have previsions for "Household Waste" which may include small amounts of hazardous waste generated by residential households. Sandia does not have households to take advantage of this exemption; therefore, all "household" type wastes is considered RCRA (both listed and characteristic) waste at Sandia. These wastes includes such simple items as aerosol spray paint cans, photographic chemicals, paints, many battery types, epoxies, and cleaning solutions. Through procedures in its *Environmental Safety &Health Manual* and postings on dumpsters SNL had good administrative controls for dumpster waste but did not have a check & balance system to ensure that hazardous or prohibited materials not end up in the landfill.

SNL's legal department made the determination that the liability of prohibited or hazardous materials ending up a privately owned landfill was unacceptable (both from a liability and public relation perspective). We were then tasked to come up with a solution to screen SNL's solid waste for hazardous or prohibited materials before it is landfilled.

METHODOLOGY

Many options were reviewed for solid waste management including direct haul, compacting roll-off's, direct dump/haul and balers. The long term solution was to construct a transfer facility for the inspection, storage and shipping of SNL's solid waste stream. The SWTF was designed primarily for the screening of solid waste. Because this facility has a design capacity of <120 cubic yards/day and does not serve the general public it is not required to be registered or permitted.

SWTF Design

The SWTF is a RCRA subtitle D facility, ~2.5 acres in size, centrally located to waste producing technical areas, and has 7500 square feet of operational floor space. Design features of the SWTF include:

- Perforated 30' high roll-up doors. The perforated doors allow for increased ventilation, light transmission, and reduced weight.
- The tipping floor of the facility is sloped to aid in daily wash down of the facility.
- Drain lines from the tipping floor run into one intercept line which can be easily closed if an emergency occurs at the facility.
- The tipping floor is also designed to retain 1200 gallons of water (20 minute discharge of the fire sprinklers).
- The ventilation system moves 50,000 cubic feet of air/minute keeping offensive odors and dust to a minimum.
- Sky lights are built in and in combination with the perforated doors provides ample natural lighting. The facility is also equipped with lights for short winter days.
- High pressure washers are used in the daily wash down of the facility. This system uses high pressures and low volumes of water, reducing the amount of wastewater generated.

After careful consideration the decision was made to have the facility designed to incorporate a baler. The baler would be used for baling waste and recyclable materials for handling and transportation. Although a slightly higher initial cost the baler proved to have numerous long term economic benefits:

- Our landfill charges by volume not weight. Because of the high compaction ratios we are able to save substantial landfill disposal fees.
- The baler allows SNL to send one load/week of waste to the landfill instead of five. This saves fuel, vehicle maintenance costs, time, and reduces liability.
- The baler enables SNL to develop, in earnest, a recycling program. The amount of revenue received for baled paper and cardboard is substantially higher than for non baled recyclable material.
- The baler also allows SNL to stay under the regulatory limit (<120 cu yd/day) which also saves ~$20,000.00 in permitting and registration fees.

Equipment used at the SWTF include:

- Front end loader; used for moving waste has solid rubber tires. This helps with compaction of waste and eliminates costly flats. The bucket of the front end loader is also fitted with a 6"rubber edge. This edge is designed to wear instead of the expensive tipping floor.
- Forklift has solid core tires to eliminate flats and long forks for maneuvering bales of waste or recyclable material.
- Both the front end loader and forklift are diesel powered to simplify fueling.
- The baler & conveyor is a new dual ram 20ton/hr auto tie system that produces uniform 2 cubic yard bales.

Safety Considerations

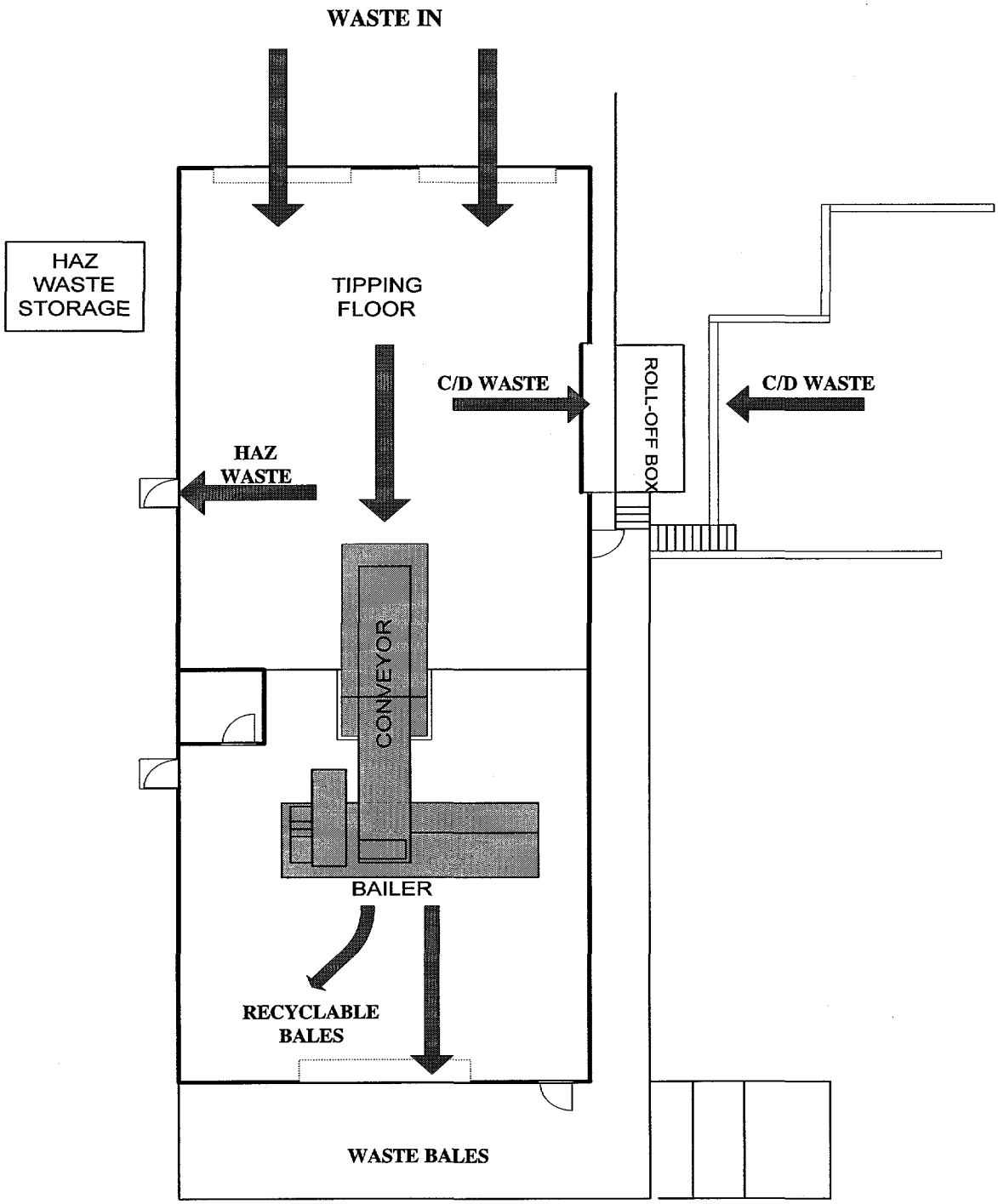
Safety is of primary importance to SNL and numerous safety features have been installed at the SWTF. Safety shower, eyewash, first aid station, lock-out/tag-out station, spill kits, centralized fire alarm system, fire suppression system, fire extinguishers, telephones, and complete MSDS files are essential to facility operation. All mobile equipment (forklift & loader) have back-up alarms, fire extinguishers and strobe warning lights. The baler is equipped with guards, lock-out/tag-out devices, alarms (visual and audible) and emergency shut-off's. Personal protective equipment used at the facility consists of steel toe & shank safety boots, leather gloves, work uniform, safety glasses, high visibility "traffic" vests, and hard hats. SWTF personnel have not had a loss time accident to date, 370 operational days and counting.

Processing Solid Waste

Waste is picked up by front end loading trucks from ~230 dumpsters placed around SNL. When the load is brought into the facility (Monday, Wednesday & Friday) a quick inspection is completed looking for hot loads, liquids, etc. The load is then tipped on the floor. A preliminary screen is conducted for easily identifiable hazardous or prohibited materials. The waste is then ready for sorting. Waste is taken (one bucket at a time) to the front of the conveyor. Each bag of waste is inspected for hazardous or prohibited materials before being placed on the conveyor belt. SNL's custodial department uses clear plastic bags for all waste collection. The use of clear bags is essential for the waste screening process. Waste that is processed through the

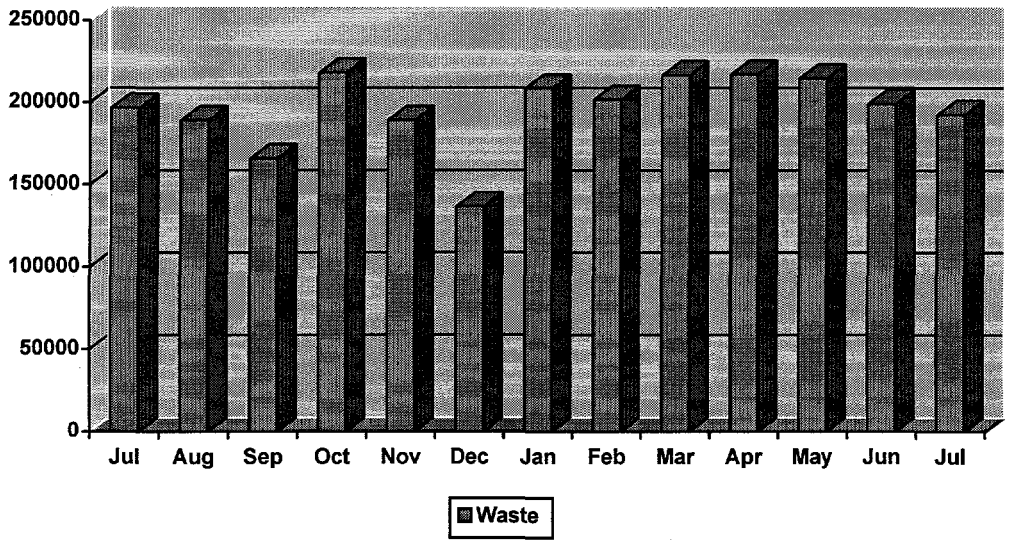
facility that is not in clear bags is automatically set aside for a close screen. If hazardous or prohibited materials are found, they are segregated form the solid waste stream. If materials are found in the waste stream that should not be processed through the baler (cement, rebar, pallets, etc,) they are placed in a roll-off container located adjacent to the SWTF. The remainder of the waste is placed on the conveyor and processed through the baler. Figure 1 is a diagram of how waste flows through the facility.

Figure 1



The baler automatically compresses (122 tons/square inch) waste into bales. Bales are automatically tied off and ejected out of the baler. Each bale of waste is ~two cubic yards (about the size of an office desk) and weighs ~ 1600 -2000 pounds. Bales are given a unique number weighed and loaded on a flatbed truck for disposal at the designated landfill. Information from the bales are downloaded into the database where it is tracked, figure 2.

Volume of Solid Waste Processed At The SWTF
Figure 2



All material segregated out of the waste stream is managed through the appropriate SNL facility (asbestos, explosives, hazardous waste, PCB's, liquid waste, radioactive, etc.). This ensures that all SNL waste is managed properly.

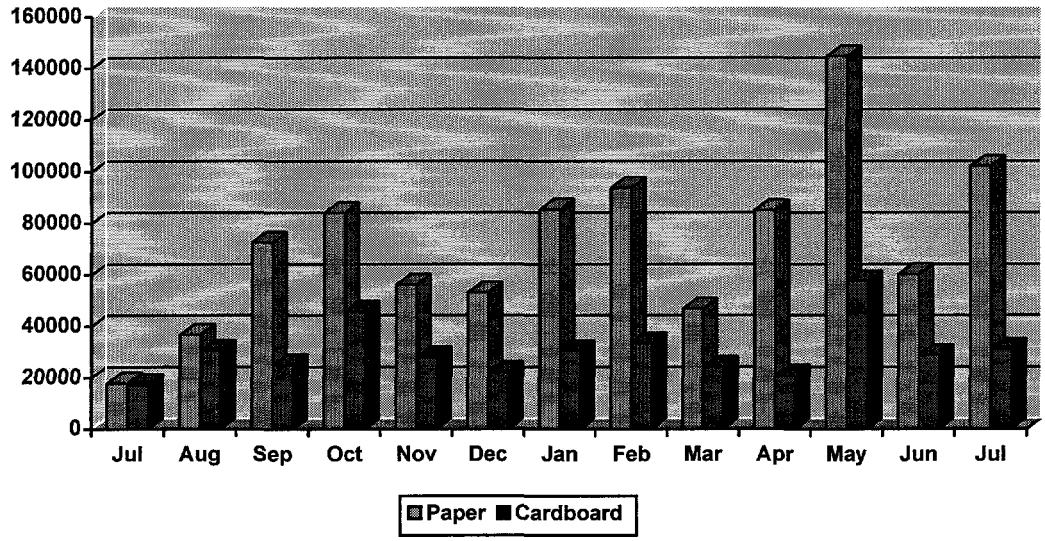
Because of the volumes of prohibited materials being found in SNL's waste stream a RCRA <90 day accumulation area was established. On average ~200 lbs. of prohibited materials are pulled from the solid waste stream every month. If information can be gathered identifying an individual improperly disposing of household or prohibited waste, a photograph is taken and a memo is sent to the individual and his/her manager (with the photo attached) requesting that the improper disposal of hazardous or prohibited materials stop. Guidance is then given on proper disposal options and relevant points of contact. This has proven to be a very effective tool in reducing the volume of prohibited materials through the SWTF.

The screening and operations of the facility have been audited by numerous State, DOE, internal, and corporate agencies. In all audits, not one significant finding has been noted. This along with an unblemished safety record is something SNL is proud of.

Recyclable Materials Processing

The recycling process is similar to waste management. Recyclable material are brought into the facility on Tuesday and Thursday's. These recycle days ensure that the recyclable material is not commingled with waste, decreasing its value. After the source segregated material is dumped on the tipping floor it is inspected for prohibited materials and contaminants. SNL is currently handling four recyclable materials white ledger, office pack, mixed, and cardboard. The material is then pushed onto the conveyor and processed through the baler. Each bale is tagged with the facility (SNL, DOE, LANL) weight and paper type. This information is then downloaded into the database, figure 3.

Recyclable Material Processed At The SWTF
Figure 3

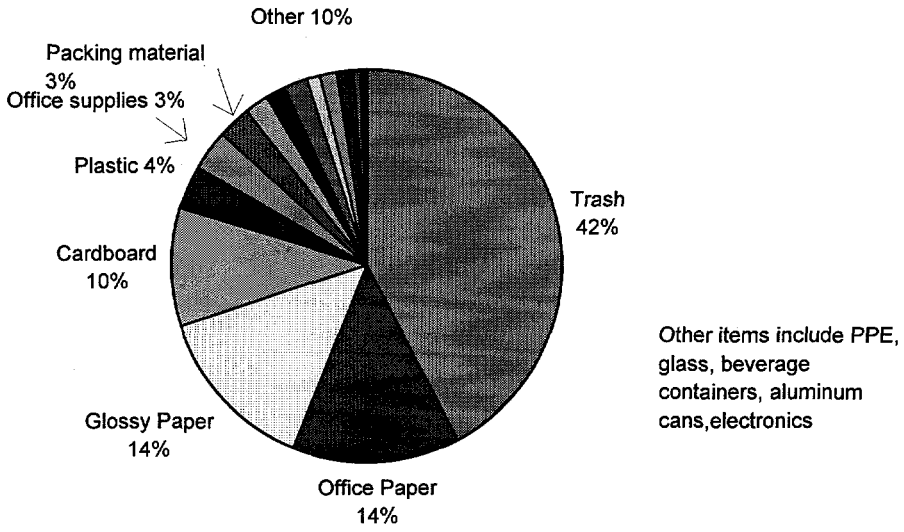


For security reasons all paper recycled at SNL must be recycled within the continental United States. Because of the market value increase of baled paper vs. loose SNL has been able to enter a joint recycling program with Los Alamos National Laboratories (LANL), located ~110 miles NW of SNL. This program brings in unbaled paper from LANL to the SWTF the loose recyclable material is screened, baled, and sent off site for recycling. Revenue is shared between SNL & LANL. SNL is also processing DOE/AL paper and cardboard.

Solid Waste Survey

In August 1996, a survey of SNL's waste stream was conducted by the Pollution Prevention Department. This survey was designed look at SNL's solid waste stream to see if other recycling opportunities exist. The survey involved dissecting an average load of waste and breaking it down into identifiable groups. This information, figure 4, will act as a baseline for solid waste recycling efforts. Similar surveys will be conducted, in the future, to look at the effectiveness of new programs and policies.

Composition of Solid Waste at SNL/NM August 1996



CONCLUSIONS

Originally the SWTF was designed for processing SNL solid waste to ensure that SNL maintains compliance with environmental regulations and for proper management of SNL's solid waste steam. Due to the flexible design of the facility and the installation of a baler the SWTF has now become the recycling center for SNL.

The future growth possibilities for the SWTF are expanding. New recycling programs for metals, plastics, packing material, are all in the initial planning stages. SNL is also working on a joint waste/recycling program with KAFB. This has the potential to triple the volume of waste processed through the SWTF while granting KAFB the same liability protection and waste economies that SNL maintains.

The SWTF is a proven success. From the initial identification of a problem (closure of the KAFB landfill) to design, construction, contract award, funding, and facility start-up in the short time frame of 18 months is unusual, even in the private sector. Screening of SNL waste is providing opportunities to ensure regulatory compliance, reduce liability, and increase public support. Joint recycling agreements with other DOE laboratories for centralized sorting, baling, and transportation of recyclable materials yields economies of scale and cost efficiencies that can benefit a multitude of government agencies.