Department of Energy Y-12 National Security Complex

Oak Ridge, TN
• 811 acres
• 343 buildings
• >5,000 employees
Secure and Sustainable Paper Disposition

- Decision to process all paper on-site at Destruction and Recycle (DAR) Facility

- Challenges:
  - Increased volume
  - Condition of existing equipment
  - Impact on Employees
  - Change management: collection, processing and disposition
  - Negative impact to landfill diversion
Functional and Operational Requirements

• Meet security specifications
• Reliably meet expanding demand
• Fit in existing footprint
• Increase efficiency and capabilities (i.e. books, manuals)
• Sustainable disposition options
• Benchmarking activities
Site Paper Usage

• Even though the Site has reduced paper usage by ~52% since 2008, Y-12 still purchased 15.3 million sheets of paper in Fiscal Year 2018

• Reduce paper usage by:
  • Only printing and copying what is needed
  • Duplex print and copy
  • Utilizing electronic methods when possible such as SharePoint, electronic signatures, online review system

Y-12 Paper Purchases

<table>
<thead>
<tr>
<th>Year</th>
<th>Millions of Sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>31.6</td>
</tr>
<tr>
<td>2011</td>
<td>28</td>
</tr>
<tr>
<td>2012</td>
<td>26</td>
</tr>
<tr>
<td>2013</td>
<td>25.3</td>
</tr>
<tr>
<td>2014</td>
<td>24</td>
</tr>
<tr>
<td>2015</td>
<td>18.7</td>
</tr>
<tr>
<td>2016</td>
<td>17.4</td>
</tr>
<tr>
<td>2017</td>
<td>15.9</td>
</tr>
<tr>
<td>2018</td>
<td>15.3</td>
</tr>
</tbody>
</table>
Employee Awareness

- Project Communications Partner
- Communications Plan developed
- Plant Services support
- Announcements/Website
- Posters and Meetings
- Earth Day
DAR Modernization Communication Example

SORTING IT ALL OUT

WHERE DOES Y-12 OFFICE PAPER GO?

FY 2017
134,000 lb
Sent to off-site recycling vendor (blue recycle bin paper)

FY 2019
198,000 lb
Processed through DAR facility and sent to landfill

FY 2019
300,000 lb
Recycled into new paper products

FAST-FOOD BAGS, CUPS, PLATES AND OTHER SOILED PAPER PRODUCTS GO IN THE TRASH

DAR FACILITY A LOOK BACK, A LOOK AHEAD

FY 2018 & PRIOR

100% of disintegrated paper to landfill

Only sensitive paper disintegrated

Old, unreliable paper disintegrator

Blue recycle bins for nonsensitive paper that goes to off-site recycler

FY 2019 & BEYOND

100% reused to create industrial fiber additives

100% of all office paper to be disintegrated

New paper disintegrator produces recyclable briquettes

Blue recycle bin paper and all work-related paper go into large, rolling carts

WHERE DO PAPERMAKING MATERIALS COME FROM?

33% Wood chips & scraps from sawmills
33% Whole trees & other plants
33% Recycled paper

Source: Technical Association of the Pulp and Paper Industry (TAPPI)

HOW MUCH PAPER DO WE USE IN THE U.S.A. EACH YEAR?

69,000,000 TONS OF PAPER & PAPERBOARD

2 BILLION BOOKS
350 MILLION MAGAZINES
24 BILLION PUBLISHED NEWSPAPERS


Ensure all paper is properly destroyed!
Paper Collection, Processing and Disposition

- Determined facility collection container needs
- Eliminated deskside containers and facility paper dumpsters
- Distributed locked carts for collection of all paper
  - Increased efficiency
  - Reduced anomalies
- Developed collection schedule
Reuse/Recycle Market Identification

• Not eligible for traditional paper recycle

• Evaluated feasibility of reuse/recycle options for disintegrated paper
  • Direct to mill – intact paper
  • Disintegrated paper
    • Loose
    • Briquettes

• Samples

• Reuse/Recycle options impact on equipment selection
New Equipment Selection

- Dual-stage Disintegrator with in-line briquettor
5S for Optimum Facility Layout and Material Flow

5S: Sort, Set in Order, Shine, Standardize & Sustain
Material Packaging and Transportation

• Increased transportation efficiency with briquettes
  • ~34,000 lbs. per load

• Expanded market opportunities

• Vendor provides:
  • Used Gaylord boxes for collection
  • Semi-trailer
  • Transportation to end user

• Reuse excess pallets
Paper Disposition

- Disintegrated paper transitioned from a waste to a commodity
- Briquettes reused to make an industrial cellulose fiber additive for construction products such as asphalt sealants, roofing cement, driveway coatings, etc.

Briquettor results in a 90% volume reduction
DAR Modernization Benefits

• ~300,000 lbs. of paper will be securely diverted from landfill disposal each year
• New LED lighting installed
• Obsolete equipment- reused or recycled
• Improved processing efficiency
• Reduced potential security risks posed by direct off-site recycling
Keys to Success

• Team
• Security and Sustainability are not mutually exclusive
• Employee engagement
• Relationships with recycle vendors
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