Sustainable Construction Practices at Sandia National Laboratories

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Sandia National Laboratories

- Multi-program Security Laboratory
  - NM & CA Sites, about 6M GSF
  - Non-proliferation of nuclear, chemical and biological weapons
  - Critical energy infrastructures
  - Homeland security
- Collaborates with industry, universities & other government agencies to commercialize new technologies

What Is Sustainable Design?

- Sustainable Design: Designing into the Facility’s construction and operation, resource productivity and pollution prevention, for life cycle cost savings.

Five Categories:
- Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality

http://www.sandia.gov/LEED
**SD Requirements for DOE Sites**

- Executive Order 13101
- Executive Order 13123
- Executive Order 13148
- DOE Order 450.1
- DOE Order 413.3
- DOE Order 430.2A

**SNL/NM Sustainable Design Requirements**

- Based on LEED™ criteria, Labs21 approach and DOE O 430A.2 CRD
- Green Construction Specifications require SD
- Chapter 2 of Design Manual presents SD philosophy (Goals, Objectives, Life-cycle Analysis and Value Engineering, LEED Certification, Whole Building Design Approach, Commissioning)
- Included in Program documents, design criteria and contractor selection
- Graded Approach: Requirements for Small Office buildings are less than those for Large Line Item projects

**LEED Registered Buildings At SNL/NM**
SD in GPP Buildings at SNL/NM

Based on 01000S Spec for IGPPs
SD Report required
Employed at six buildings

15% or more better than ASHRAE 90.1
Construction Waste Management (13 50% recycled)
Emphasis on daylighting
Environmentally preferable materials

SD - Remodels and Existing Buildings

- SD Guidelines for Conference Room remodels
- Specifications guide material purchases
- Conducting LEED-EB evaluation of Building 823, as pilot for incorporation lab-wide
- Energy Management program seeks better efficiency in buildings
- EMS can serve as a driver to increase energy and water conservation, promote better indoor environmental quality and promote recycling and a preference for environmentally friendly materials.

Demolition Projects

- Work with Facilities to establish standard practices for deconstruction activities
- Continue to recycle and track waste diversion through contracted "salvage rights"
- Solve the big issue - Concrete
**SNL/NM C&D Waste Recycling Strategy**

- C/D is 80% of SNL/NM solid waste
- SNL/NM P2 Goal:
  - Recycle > 50% of all waste generated.
- STRATEGY:
  - Focus on Construction Projects
  - Expand Internal Capabilities
  - Issue Specification 01505
  - Simple, Cost Effective, and Resource Efficient

**SNL Internal Recycling Capabilities**

<table>
<thead>
<tr>
<th>Material</th>
<th>Recycle Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardboard</td>
<td>Dumpster from SWTF</td>
</tr>
<tr>
<td>Carpet</td>
<td>Deliver to CONEX</td>
</tr>
<tr>
<td>Concrete</td>
<td>KAFB Landfill</td>
</tr>
<tr>
<td>Metal</td>
<td>SNL Property Reapplication</td>
</tr>
<tr>
<td>Soil</td>
<td>SNL Borrow Area</td>
</tr>
<tr>
<td>White Paper</td>
<td>Container from SWTF</td>
</tr>
</tbody>
</table>

**External Recycling Capabilities**

<table>
<thead>
<tr>
<th>Material</th>
<th>Recycle Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling Tiles</td>
<td>Armstrong Recycling Program</td>
</tr>
<tr>
<td>Metal</td>
<td>Ace Metal</td>
</tr>
<tr>
<td>Wall Board</td>
<td>American Gypsum Pilot Project</td>
</tr>
<tr>
<td>Wood</td>
<td>Soilutions</td>
</tr>
</tbody>
</table>
Divert It….
And Weigh It….It’s Easy

Recycling Infrastructure for Small Projects
- One-Stop Location for Disposition of Construction Waste
- Intended for Small Volume Waste Generation Projects (T&M Contractors)

SWTF C/D Recycling Center
SNL Project Case Study - JCEL

- JCEL - Joint Computational Engineering Laboratory
- 55,000 ft² facility to support Weapons Program
- Registered with USGBC for LEED Silver Certification
Successful Recycling
It CAN Be Done

JCEL

Containers are clearly labeled and color coded with large signs.
RESULTS: ~85% recycled

Building 805 D&D Project

- 75,000 Sq. Ft.
- 3 Story
- Basement Mech. Room
- Primarily a Chemical Laboratory Facility
- Limited Radiological Use
- Largest D&D Project at SNL/NM

Building 805 – Salvaged Material
### Bldg 805 Material Disposition Summary

<table>
<thead>
<tr>
<th>Item/Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpet</td>
<td>~ 5,500 sq ft</td>
</tr>
<tr>
<td>Ceiling Tile</td>
<td>~ 40,600 lbs.</td>
</tr>
<tr>
<td>Lab Furnishings (good condition)</td>
<td>~ 59,000 lbs.</td>
</tr>
<tr>
<td>Lab Furnishings (fair condition)</td>
<td>~ 20,000 lbs.</td>
</tr>
<tr>
<td>Lab Furnishings (poor condition)</td>
<td>~ 6,000 lbs.</td>
</tr>
<tr>
<td>Modular Wall Panels</td>
<td>~ 2,800 linear ft.</td>
</tr>
<tr>
<td>Scrap Metal (incl. poor condition lab furnishings, wall panels, etc.)</td>
<td>~ 292,000 lbs.</td>
</tr>
</tbody>
</table>

### Concrete - the Problem Child

Prior to 2003, concrete debris used for erosion control and at KAFB landfill.

Embodied energy of concrete estimated at 1-3 kWh/lb; 90% attributable to the production of Portland cement.

### The Solution

- Generate Asphalt and Concrete debris
- Crush to Specifications
- Use on Sandia Projects
Environmentally Preferable Materials

- Construction Specifications require EPP
- Required reporting for all AP (Affirmative Procurement) CPG (Comprehensive Procurement Guideline) materials
- LEED, recycled content, locally manufactured and non-toxic requirements for all construction projects (line and GPP)
  - Reported in SD Reports

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Materials Purchased ($)</th>
<th>Recycled Content Material ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete/Cement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexable Fill</td>
<td></td>
<td></td>
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<tr>
<td>Building Insulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic or Rubber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor Tiles</td>
<td></td>
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<tr>
<td>Latex Paint</td>
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</tbody>
</table>
Marmoleum is a natural product made from linseed oil, woodflour, pine rosin, jute, and limestone. Once installed, Marmoleum is hygienic and anti-static. After its long life, it is completely biologically degradable.

Higher initial first costs
Lower maintenance costs
No waxing or stripping required
Clean by damp mopping

THANK YOU
QUESTIONS?