ATLANTIC COMPACT COMMISSION
OCTOBER 25, 2007
COMPACT UTILITY GENERATORS
PRESENTATION
Atlantic Compact Utility Generators
6 Utilities
13 Reactors

**Progress Energy**
  - Robinson

**Duke Energy**
  - Oconee (3 units)
  - Catawba (2 units)

**PSEG**
  - Salem (2 units)
  - Hope Creek

**Dominion**
  - Millstone (2 units)

**SCE&G**
  - VC Summer

**Exelon**
  - Oyster Creek
Commitment to working in partnership to achieve a long-term solution
THREE FUNDAMENTAL CHANGES IN THE INDUSTRY

1. Deregulation of electric power in NJ and CT
   Increased costs will tend to make nuclear units less competitive.

2. License extensions of existing units will delay the shipment of decommissioning waste.

3. More efficient operations and waste minimization programs have driven waste volumes down thus resulting in decreased revenues to Barnwell.
Conclusions:
1. Projected waste volumes too low to sustain Barnwell, at its current mode of operation.
2. Operating costs remain high.
PRIORITIES FOR THE OPERATION OF
BARNWELL

1. Least Cost Operating Plan
2. Intermittent operating mode
3. Break-even operation
4. Reasonable Fees
5. Extended Care Fund used for maintenance costs associated with the retired portion of the site.
6. Reserve funded by excess revenue in FY 2008
By working collaboratively, a solution will be found that will be fair to the site operator while meeting the operational and economic needs of the generators.
Atlantic Compact Commission Meeting
Columbia, South Carolina; October 25, 2007

BARNWELL LOW-VOLUME OPERATIONS:
PRE-PLACED VAULTS WITH PART-TIME OPERATIONS

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Pre-Placed Vaults with Part-Time Operations

DISCLAIMERS

- Conceptual Design: Key Issues Are Addressed
- Conceptual Design: Not All Questions Can Be Answered **TODAY** – Significant Additional Design, Analyses, and Development Are Yet Required
- Generic Proposal – No Schedule Implied
Pre-Placed Vaults with Part-Time Operations

LIMITED SCOPE OF WORK

- Project Maximum Number of Vaults Required Annually
- Provide Conceptual Facility Design
- Consider Radiation Exposure Implications
- Consult with DHEC Representatives
- Estimate Operating Costs
Pre-Placed Vaults with Part-Time Operations

CONSTRAINTS

- No Consideration of Large Components or Slit Trench Operations
- No Account Made for Utilizing Remaining Disposal Capacity in Existing Trenches
Pre-Placed Vaults with Part-Time Operations

CONCEPT OBJECTIVES

- Comply with Applicable Regulatory Requirements
- Reduce Operating Costs
- Minimize Infiltration into Disposal Unit
- Stimulate Productive Discussion about Operating Changes that Will Meet All Objectives
Pre-Placed Vaults with Part-Time Operations

PROMINENT CHARACTERISTICS

- Shallow Excavation with Leachate Collection and Removal system
- One Layer of Vaults Placed during Construction with Tops at Local Grade
- Vaults Provided with Weather Shields
- Voids Backfilled Immediately and Provided with Low-Permeability Cover Layer
Pre-Placed Vaults with Part-Time Operations
Pre-Placed Vaults

Diagram showing a layout with labeled dimensions: 250' and 1,300'.
Pre-Placed Vaults

- Low Permeability Soil
- Vault Lid
- Structural Backfill
- Drainage Layer
- Existing Soil
- Slope
Pre-Placed Vaults
Pre-Placed Vault

PART-TIME OPERATIONS

- One Day Every Other Week
- Shipping Vehicles Drive to Active Disposal Area
- Crane Transfers Containers from Shipping Vehicles into Pre-Placed Vaults
- Structural and Interim Cover Layers Extended as Needed
Pre-Placed Vaults with Part-Time Operations
Part-Time Operations

Can that Much Waste Be Received in a Day?

Barnwell Historical Daily Volume

Dependence of Daily Volume on Receiving Days per Year at 12,000 cf/yr
# Pre-Placed Vaults

## MAJOR CONSTRUCTION COSTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit Cost</th>
<th>Cost</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylindrical Vaults</td>
<td>335</td>
<td>ea</td>
<td>$5,280</td>
<td>$1,768,800</td>
<td>54%</td>
</tr>
<tr>
<td>Rectangular Vaults</td>
<td>45</td>
<td>ea</td>
<td>$11,440</td>
<td>$514,800</td>
<td>16%</td>
</tr>
<tr>
<td>Vault Placement</td>
<td>380</td>
<td>ea</td>
<td>$997</td>
<td>$378,708</td>
<td>12%</td>
</tr>
<tr>
<td>Vault Temporary Cover</td>
<td>380</td>
<td>ea</td>
<td>$500</td>
<td>$190,000</td>
<td>6%</td>
</tr>
<tr>
<td>Structural Backfill</td>
<td>9,977</td>
<td>cy</td>
<td>$15</td>
<td>$144,861</td>
<td>4%</td>
</tr>
<tr>
<td>Disposal Unit Excavation</td>
<td>22,222</td>
<td>cy</td>
<td>$6</td>
<td>$124,667</td>
<td>4%</td>
</tr>
<tr>
<td>Drainage Layer</td>
<td>1,852</td>
<td>cy</td>
<td>$28</td>
<td>$50,926</td>
<td>2%</td>
</tr>
</tbody>
</table>
Pre-Placed Vaults

Percent of Construction Costs

- Cylindrical Vaults: 54%
- Rectangular Vaults: 16%
- Vault Placement: 12%
- Vault Temporary Covers: 6%
Pre-Placed Vaults

CONSTRUCTION COSTS

- Estimated Total: $4.3 million
- Capacity Provided: 60,000 cubic feet
- Effective Cost: <$75 per cubic foot
- Duration: 5 to 12 years
Part-Time Operations

OPERATING COSTS

Table 5.  Support Staffing Requirements

<table>
<thead>
<tr>
<th>Position/Function</th>
<th>Basis for Time Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Guard</td>
<td>10 percent, lump sum</td>
</tr>
<tr>
<td>Program Coordinator</td>
<td>Bi-weekly: 1 day in 10; 28 of 100 employees</td>
</tr>
<tr>
<td></td>
<td>Annually: 7 of 52 weeks; 28 of 100 employees</td>
</tr>
<tr>
<td>Administrative</td>
<td>Bi-weekly: 1 day in 10; 28 of 100 employees</td>
</tr>
<tr>
<td></td>
<td>Annually: 7 of 52 weeks; 28 of 100 employees</td>
</tr>
<tr>
<td>Radiation Safety Officer</td>
<td>50 percent during disposal operations</td>
</tr>
<tr>
<td></td>
<td>10 percent during balance of the year.</td>
</tr>
</tbody>
</table>
# Part-Time Operations

## OPERATING COSTS

### Table 4. Operational Staffing Requirements

<table>
<thead>
<tr>
<th>Position/Function</th>
<th>Crew Size</th>
<th>Position/Function</th>
<th>Crew Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>1</td>
<td>Accounting Manager</td>
<td>2</td>
</tr>
<tr>
<td>Secretary/Clerk</td>
<td>2</td>
<td>Health and Safety Manager</td>
<td>1</td>
</tr>
<tr>
<td>Engineer</td>
<td>2</td>
<td>Operations Manager</td>
<td>1</td>
</tr>
<tr>
<td>Technician (Health Physicist, Radiation Worker, Laboratory)</td>
<td>2</td>
<td>Field Technician (Environmental monitoring, Quality Assurance)</td>
<td>2</td>
</tr>
<tr>
<td>Equipment Operator</td>
<td>6</td>
<td>General Laborer</td>
<td>2</td>
</tr>
<tr>
<td>Mechanic</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Estimated Total Crew Size**: 22
Part-Time Operations

- No allowance was made for extending the final cover system.
- Workman’s comp and fixed overhead costs are estimated to be 32.5 percent of labor, travel, equipment, and materials costs.
- Overhead costs are estimated to be 10 percent of labor, travel, equipment, materials and workman’s comp/fixed overhead costs.
- Margin payable to the facility operator was estimated to be 29 percent of all direct and indirect operating costs.
- Contingency allowance of 15 percent of all direct and indirect operating costs plus margin was provided.
# Part-Time Operations

## OPERATING COSTS

<table>
<thead>
<tr>
<th></th>
<th>Part-Time Year-Round Operations</th>
<th>Part-Time Annual Campaign Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor Cost</td>
<td>$262,000</td>
<td>$289,000</td>
</tr>
<tr>
<td>Travel</td>
<td>$10,000</td>
<td>$210,000</td>
</tr>
<tr>
<td>Equipment and Materials</td>
<td>$267,000</td>
<td>$210,000</td>
</tr>
<tr>
<td>Markups</td>
<td>$626,000</td>
<td>$724,000</td>
</tr>
<tr>
<td><strong>Total Annual Operating Cost</strong></td>
<td><strong>$1,165,000</strong></td>
<td><strong>$1,483,000</strong></td>
</tr>
</tbody>
</table>
Pre-Placed Vaults with Part-Time Operations

Dependence of Cost per Cubic Foot on Annual Receipt Rate

Cost per Cubic Foot of Waste Disposed of ($/cf)

Annual Receipt Rate (cf/yr)

- Total
- Operations
- Construction
Pre-Placed Vaults with Part-Time Operations

SUMMARY

- Concept Can Be Designed to Address All Technical and Regulatory Considerations
- Construction Costs for Capacity of 60,000 Cubic Feet Total Less Than $5 Million
- Operating Costs Total Between $1.2 and $1.5 Million per Year, Depending on Part-Time Operating Mode
- Effective Cost Ranges from $200 to $800 per Cubic Foot, Depending on Annual Receipt Rate.
Barnwell LLRW Disposal Site Presentation Summary

- Barnwell LLRW Disposal Site Status
- In-Region Operations / Phase I Closure Transition Planning
- Small Volume Trench Options
- Operational Scenarios Considered
- Post 2008 Operating Costs
Barnwell LLRW Disposal Site Status

- **License Status**
  - Timely Renewal status since 2000
  - In Appeal Process since 2004

- **Current Operating Scenario**
  - Three trench designs
  - Full time receipt of Class A, B, & C wastes
  - Acceptance of routine waste forms plus irradiated hardware and large components

- **Closure Activities Completed**
  - 96 acres of Enhanced Cap installed
  - West Pond storm water management system completed
Barnwell LLRW Disposal Site Transition / Closure Activities

- Capping project for 7 acres scheduled for Spring 2008
- Phase I closure starts July, 2008
  - D&D several onsite buildings
  - Cap remaining completed trenches
  - Grade site to final topography
  - Eliminate unnecessary equipment
  - Verify performance objectives
Trench Design / Construction Options Considered for In-Region Operations

- Pre-staged Vault Array
- Class A, B, C Progressive Trench
- Existing Class B/C Trench
Pre-Staged Vault Array
Class A/B/C Trench
Phased Trench Construction

Plan View

Unexcavated trench area

Water management area

Figure 4.4-1
Class B/C Trench
# Trench Option Comparisons

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre-Staged</th>
<th>Class A,B,C</th>
<th>Class B/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licensing Effort</td>
<td>High</td>
<td>Medium</td>
<td>Complete</td>
</tr>
<tr>
<td>Constructability</td>
<td>Potentially Difficult</td>
<td>Moderately Difficult</td>
<td>Already Established</td>
</tr>
<tr>
<td>Personnel Exposures</td>
<td>Potentially Low</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Stormwater Management</td>
<td>Potentially Difficult</td>
<td>Potentially Low</td>
<td>Low</td>
</tr>
<tr>
<td>Enhanced Cap Costs</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Cost Comparisons for 300 Vaults

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre-Staged</th>
<th>Class A,B,C</th>
<th>Class B/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Prep.</td>
<td>$42,000</td>
<td>Completed</td>
<td>Completed</td>
</tr>
<tr>
<td>Trench Walls</td>
<td>$30,046</td>
<td>$19,206</td>
<td>$37,308</td>
</tr>
<tr>
<td>Excavation</td>
<td>$29,444</td>
<td>$34,891</td>
<td>$43,600</td>
</tr>
<tr>
<td>Sand Install.</td>
<td>$72,685</td>
<td>$78,756</td>
<td>$129,968</td>
</tr>
<tr>
<td>Low Perm. Lay.</td>
<td>$10,000</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Initial Cover</td>
<td>$18,617</td>
<td>$8,704</td>
<td>$7,243</td>
</tr>
<tr>
<td>Vault Costs</td>
<td>$1,820,100</td>
<td>$1,820,100</td>
<td>$1,820,100</td>
</tr>
<tr>
<td>Capping Costs</td>
<td>$116,000</td>
<td>$59,706</td>
<td>$81,882</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$2,138,892</td>
<td>$2,021,363</td>
<td>$2,120,101</td>
</tr>
</tbody>
</table>
Atlantic Compact Volume Projections

- **High-end waste volume**
  - 11,344 cubic feet A/B/C 2008/2009
  - 7,500 cubic feet held waste 2008/2009
  - Large components
  - Hardware

- **Low-end waste volume**
  - Less than 4,000 cubic feet B/C only
Cost Scenarios Estimated

- **Institutional Costs for Completed Site Areas**
  - Site maintenance and monitoring

- **Operating Costs with No Waste Acceptance**
  - Disposal operating license maintenance

- **4,000 Cubic Feet Class B, C Only**
  - One trench, no hardware or components

- **11,000 Cubic Feet Class A, B, C**
  - One trench, no hardware or components
General Cost Estimating Assumptions

- Existing regulatory and license requirements
- Cost structure for all scenarios except institutional costs based on PSC application structure
- Labor and material costs based on FY 06-07 rates
- License fees and other reimbursable costs outside the control of site operator based on FY 06-07 rates
- Waste volume scenarios include costs of trench construction, disposal vaults, and license maintenance
Institutional Costs
(Completed Portion of Site)

- Environmental monitoring
- Basic Site Maintenance
- Security
- Insurance
- Utilities and support
- License fees
## Institutional Costs
(Completed Portion of Site)

<table>
<thead>
<tr>
<th>Category of Costs</th>
<th>Annual Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Monitoring</td>
<td>$577,804</td>
</tr>
<tr>
<td>Site Maintenance</td>
<td>$192,917</td>
</tr>
<tr>
<td>Site Security</td>
<td>$176,936</td>
</tr>
<tr>
<td>Insurance</td>
<td>$477,443</td>
</tr>
<tr>
<td>Utilities, Accounting, etc.</td>
<td>$446,691</td>
</tr>
<tr>
<td>Site Operator Costs Total</td>
<td>$1,871,791</td>
</tr>
<tr>
<td>G&amp;A and Margin (14%)</td>
<td>$530,137</td>
</tr>
<tr>
<td>License Fees</td>
<td>$215,362</td>
</tr>
<tr>
<td>Total Institutional Costs</td>
<td>$2,617,290</td>
</tr>
</tbody>
</table>
Operating License Costs
(No Waste Accepted)

- Includes Institutional Costs
- Fixed Costs: building maintenance, additional license maintenance, limited equipment
- Variable Costs: none in this scenario
- Irregular Costs: monitoring well management
- Reimbursable Costs: Taxes and fees (pass-through costs)
- Statutory margin: allowed margin on fixed, variable, and irregular costs only
## Operating License Costs
(No Waste Accepted)

<table>
<thead>
<tr>
<th>Category of Costs</th>
<th>Annual Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Costs</td>
<td>$2,548,427</td>
</tr>
<tr>
<td>Variable Costs</td>
<td>$0</td>
</tr>
<tr>
<td>Irregular Costs</td>
<td>$49,000</td>
</tr>
<tr>
<td>Site Operator Costs Total</td>
<td>$2,597,427</td>
</tr>
<tr>
<td>Reimbursable Costs</td>
<td>$353,466</td>
</tr>
<tr>
<td>Statutory Margin</td>
<td>$753,254</td>
</tr>
<tr>
<td>Total Operating Costs</td>
<td>$3,704,147</td>
</tr>
</tbody>
</table>
In-Region Class B,C Only Scenario

- 4,000 cubic feet Class B,C waste
- Waste acceptance and active disposal operations two to three months per year
- One trench design for routine wastes
- Disposal of irradiated hardware and large components not included in cost estimates
4,000 Cubic Feet Class B,C Costs

- Includes institutional costs and other costs described for no waste scenario
- Fixed costs increased to support amount of waste received
- Variable costs proportional to amount of waste received including vault costs
- Irregular costs includes trench construction
- Increased reimbursable costs proportional to amount of waste received
## 4,000 Cubic Feet Class B,C Costs

<table>
<thead>
<tr>
<th>Category of Costs</th>
<th>Annual Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Costs</td>
<td>$3,862,618</td>
</tr>
<tr>
<td>Variable Costs</td>
<td>$215,858</td>
</tr>
<tr>
<td>Irregular Costs</td>
<td>$77,000</td>
</tr>
<tr>
<td>Site Operator Costs Total</td>
<td>$4,155,476</td>
</tr>
<tr>
<td>Statutory Margin</td>
<td>$1,205,088</td>
</tr>
<tr>
<td>Reimbursable Costs</td>
<td>$595,466</td>
</tr>
<tr>
<td>Total Operating Costs</td>
<td>$5,956,030</td>
</tr>
</tbody>
</table>
In-Region Class A,B,C Scenario

- 11,000 cubic feet Class A,B,C waste
- Waste acceptance throughout the year
- Disposal of waste when it is received
- One trench design for routine wastes
- Disposal of irradiated hardware and large components not included in cost estimates
11,000 Cubic Feet Class A,B,C Costs

- Includes institutional costs and other costs described for no waste scenario
- Fixed costs increased to support amount of waste received
- Increased variable costs proportional to amount of waste received
- Additional irregular costs for trench construction and backfill
- Additional reimbursable costs proportional to amount of waste received
# 11,000 Cubic Feet Class A,B,C Costs

<table>
<thead>
<tr>
<th>Category of Costs</th>
<th>Annual Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Costs</td>
<td>$4,376,967</td>
</tr>
<tr>
<td>Variable Costs</td>
<td>$592,456</td>
</tr>
<tr>
<td>Irregular Costs</td>
<td>$126,000</td>
</tr>
<tr>
<td>Site Operator Costs Total</td>
<td>$5,095,423</td>
</tr>
<tr>
<td>Statutory Margin</td>
<td>$1,477,673</td>
</tr>
<tr>
<td>Reimbursable Costs</td>
<td>$1,018,966</td>
</tr>
<tr>
<td>Total Operating Costs</td>
<td>$7,592,062</td>
</tr>
</tbody>
</table>
Total Operating Cost Comparison

- Institutional Costs
- No Waste
- 4000 cu.ft.
- 11000 cu.ft.

Cost Categories:
- Margin
- Reimbursables
- Irregular Costs
- Variable Costs
- Fixed costs
# Summary Costs Table
(in $000s)

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Institutional Costs</th>
<th>No Waste</th>
<th>4,000 Cu. Ft.</th>
<th>11,000 Cu. Ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>$2,081</td>
<td>$2,548</td>
<td>$3,863</td>
<td>$4,377</td>
</tr>
<tr>
<td>Variable</td>
<td>0</td>
<td>0</td>
<td>$216</td>
<td>$592</td>
</tr>
<tr>
<td>Irregular</td>
<td>0</td>
<td>$49</td>
<td>$77</td>
<td>$126</td>
</tr>
<tr>
<td>Site Operator Costs</td>
<td>$2,081</td>
<td>$2,597</td>
<td>$4,156</td>
<td>$5,095</td>
</tr>
<tr>
<td>Costs Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Margin</td>
<td>$321</td>
<td>$753</td>
<td>$1,205</td>
<td>$1,478</td>
</tr>
<tr>
<td>Reimbursable</td>
<td>$215</td>
<td>$353</td>
<td>$595</td>
<td>$1,019</td>
</tr>
<tr>
<td>Total Op Costs</td>
<td>$2,617</td>
<td>$3,704</td>
<td>$5,956</td>
<td>$7,592</td>
</tr>
</tbody>
</table>
# Approximate Labor Resource Requirements

*(FTE’s – full time equivalents – not staffing levels)*

<table>
<thead>
<tr>
<th>Labor Categories</th>
<th>Institutional</th>
<th>No Waste</th>
<th>4,000 cu. ft.</th>
<th>11,000 cu. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management/Accounting/Support Staff</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Security</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Environmental</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Compliance &amp; HP</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Operations</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>19</td>
<td>24</td>
<td>29</td>
</tr>
</tbody>
</table>
Costs do not include license amendment, initial construction, vault procurement

No allowance for training

Appears most of the costs we call “Institutional Costs” are not included

Part time, year-round operations appear impractical
Conclusions

- Low volumes will require significant changes in waste acceptance and operating approach.
- Completed Site Activities must continue, but should not be the burden of Atlantic Compact generators.
- Transition Period to In-Region Operations
  - 2 – 3 year time frame
  - Phase I closure activities and acceptance
  - Continued use of existing trenches
  - Held waste receipt and disposal
  - Procedure revisions and approvals
- It appears that existing disposal pricing with sufficient waste volume could cover the direct costs of In-Region Operations disposal.