Filter Test Facility
Report On The Testing of HEPA Filters for the DOE
FY 2010 – FY 2\textsuperscript{nd} Quarter 2012

Nuclear Air Cleaning Conference

June 2012
Air Techniques International established an independent Filter Test Laboratory in Baltimore, Maryland

DOE performs a ASME/ANSI NQA-1 Quality Audit

DOE issued contract to ATI Filter Test Laboratory (ATITL) to perform tasks of the former DOE Filter Test Facility

Secretary of Energy Memo, June 4, 2001, the Filter Test Lab is to be utilized by DOE Site Contractors

Testing service is provided to the DOE complex

Inspection and testing is performed in accordance with what DOE contractors specify

As a minimum, inspection and testing is performed in accordance with the DOE Standards and/or ASME AG-1 and additional site specific requirements.

DOE work has top priority
DOE SITES & CONTRACTORS

• Argonne National Laboratory
• B&W Y-12
• Brookhaven National Laboratory
• Hanford Site
  – Pacific Northwest National Laboratory Battelle Northwest
  – CH2M Hill PRC
  – Washington River Protection Solutions
• Idaho Site
  – Idaho National Laboratory/Battelle Energy Alliance
  – Bechtel BWXT Idaho
  – Idaho Treatment Group
• Jefferson Laboratory
• Los Alamos National Laboratory
• Lawrence Livermore National Laboratory
• New Brunswick Laboratory
DOE SITES & CONTRACTORS

- Mississippi State University
- Nevada Test Site
- Oak Ridge National Laboratory UT Battelle
  - Isotek Systems LLC
  - WAI Tru Project
- Pantex B&W
- Paducah
- Portsmouth B&W Conversion Services
- Sandia National Laboratory
- Savannah River Nuclear Solutions
- West Valley Environmental Services
## Summary Of Filter Rejections

<table>
<thead>
<tr>
<th>Fiscal Year (Oct 1 – Sept 30)</th>
<th>Number Tested</th>
<th>Number Rejected</th>
<th>Percent Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3597</td>
<td>354</td>
<td>9.8%</td>
</tr>
<tr>
<td>2001</td>
<td>2722</td>
<td>217</td>
<td>8.0%</td>
</tr>
<tr>
<td>2002</td>
<td>2127</td>
<td>102</td>
<td>4.8%</td>
</tr>
<tr>
<td>2003</td>
<td>2772</td>
<td>151</td>
<td>5.4%</td>
</tr>
<tr>
<td>2004</td>
<td>3441</td>
<td>215</td>
<td>6.3%</td>
</tr>
<tr>
<td>2005*</td>
<td>2331</td>
<td>168</td>
<td>7.2%</td>
</tr>
<tr>
<td>2006</td>
<td>2044</td>
<td>213</td>
<td>10.4%</td>
</tr>
<tr>
<td>2007</td>
<td>2472</td>
<td>485</td>
<td>19.6%</td>
</tr>
<tr>
<td>2008</td>
<td>2012</td>
<td>220</td>
<td>10.9%</td>
</tr>
<tr>
<td>2009</td>
<td>2175</td>
<td>217</td>
<td>10.0%</td>
</tr>
<tr>
<td>2010</td>
<td>4025</td>
<td>299</td>
<td>7.4%</td>
</tr>
<tr>
<td>2011</td>
<td>4636</td>
<td>477</td>
<td>10.9%</td>
</tr>
<tr>
<td>2012 (thru 2nd Quarter)</td>
<td>1460</td>
<td>281</td>
<td>19.3%</td>
</tr>
</tbody>
</table>

*Test facility closed 5 months for relocation and audit
HEPA FILTERS TESTED / REJECTED

# Filters Tested and % Failure by Fiscal Year

- Total Tested
- Percent Rejected
HEPA FILTER REJECTION BY NUMBER

Total Filters Rejected by Fiscal Year

- Fiscal Year 2000: 340 filters rejected
- Fiscal Year 2001: 220 filters rejected
- Fiscal Year 2002: 100 filters rejected
- Fiscal Year 2003: 120 filters rejected
- Fiscal Year 2004: 180 filters rejected
- Fiscal Year 2005: 160 filters rejected
- Fiscal Year 2006: 200 filters rejected
- Fiscal Year 2007: 500 filters rejected
- Fiscal Year 2008: 250 filters rejected
- Fiscal Year 2009: 200 filters rejected
- Fiscal Year 2010: 300 filters rejected
- Fiscal Year 2011: 500 filters rejected (thru Q2)
- Fiscal Year 2012: 300 filters rejected (thru Q2)
Rejection Categories

**Resistance:** Criteria of $\leq 1.0 \text{ \, w.g.}$ for filters rated $\geq 500\text{-}1250 \text{ cfm}$ and $1.3'' \text{ w.g.}$ for filters rated $\leq 125\text{-}\geq 2000 \text{ cfm}$

**Penetration:** $\leq 0.03\%$

**Manufacturing Defects:**
- Filter Frame/Case Defective
- Gaskets
- Faceguard installation
- Filter pack installation
- Defective media
- Sealant problems
- Separators
- Missing rivets or bolts
- Dimensional tolerance
- Out of square measurements
Rejection Categories

**P.O/ Specification Discrepancy:**
- Missing UL labels
- Labeled incorrectly
- Filters rated incorrectly
- Wrong model number
- Packaging

**Shipping Damage:**
- (Inspect Damage to Shipping Crates, Pallets & Filter Cartons)
- Reject Filter when Damaged
# Summary Of Filter Rejections

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Resistance</th>
<th>Penetration</th>
<th>Mfg. Defects</th>
<th>P.O. /Spec.</th>
<th>Shipping Damage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0</td>
<td>43</td>
<td>36</td>
<td>270</td>
<td>5</td>
<td>354</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td>30</td>
<td>174</td>
<td>9</td>
<td>4</td>
<td>217</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
<td>20</td>
<td>42</td>
<td>32</td>
<td>8</td>
<td>102</td>
</tr>
<tr>
<td>2003</td>
<td>0</td>
<td>26</td>
<td>93</td>
<td>27</td>
<td>5</td>
<td>151</td>
</tr>
<tr>
<td>2004</td>
<td>3</td>
<td>36</td>
<td>86</td>
<td>86</td>
<td>4</td>
<td>215</td>
</tr>
<tr>
<td>2005*</td>
<td>8</td>
<td>19</td>
<td>56</td>
<td>81</td>
<td>2</td>
<td>168</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
<td>47</td>
<td>81</td>
<td>84</td>
<td>1</td>
<td>213</td>
</tr>
<tr>
<td>2007</td>
<td>6</td>
<td>19</td>
<td>237</td>
<td>214</td>
<td>0</td>
<td>485</td>
</tr>
<tr>
<td>2008</td>
<td>0</td>
<td>59</td>
<td>104</td>
<td>55</td>
<td>2</td>
<td>220</td>
</tr>
<tr>
<td>2009</td>
<td>1</td>
<td>29</td>
<td>133</td>
<td>52</td>
<td>2</td>
<td>217</td>
</tr>
<tr>
<td>2010</td>
<td>21</td>
<td>25</td>
<td>228</td>
<td>23</td>
<td>2</td>
<td>299</td>
</tr>
<tr>
<td>2011</td>
<td>1</td>
<td>23</td>
<td>477</td>
<td>4</td>
<td>0</td>
<td>505</td>
</tr>
<tr>
<td>2012 (thru 2nd Quarter)</td>
<td>0</td>
<td>23</td>
<td>256</td>
<td>2</td>
<td>0</td>
<td>281</td>
</tr>
</tbody>
</table>

*Test facility closed 5 months for relocation and audit
HEPA FAILURES BY TYPE

% Failures (Type) by Fiscal Year

Fiscal Year

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 (thru Q2)

% Failure

0.0% 1.0% 2.0% 3.0% 4.0% 5.0% 6.0% 7.0% 8.0% 9.0% 10.0% 11.0% 12.0% 13.0% 14.0% 15.0% 16.0% 17.0% 18.0% 19.0% 20.0%

PO/Spec Discreps

Manufacturing

Shipping Damage

Resistance

Penetration
## Summary Of Manufacturing Defects

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter Case Defective</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0.5%</td>
</tr>
<tr>
<td>Gaskets</td>
<td>7</td>
<td>72</td>
<td>325</td>
<td>0</td>
<td>185</td>
<td>61.4%</td>
</tr>
<tr>
<td>Faceguard Installation</td>
<td>7</td>
<td>33</td>
<td>32</td>
<td>7</td>
<td>3</td>
<td>8.5%</td>
</tr>
<tr>
<td>Filter Pack Installation</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.6%</td>
</tr>
<tr>
<td>Defective Media</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>1.5%</td>
</tr>
<tr>
<td>Sealant Problems</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Missing or Loose Rivets/Bolts</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.1%</td>
</tr>
<tr>
<td>Out of Square</td>
<td>32</td>
<td>46</td>
<td>29</td>
<td>31</td>
<td>40</td>
<td>18.5%</td>
</tr>
<tr>
<td>Dimensional Tolerances</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Workmanship</td>
<td>3</td>
<td>0</td>
<td>23</td>
<td>17</td>
<td>2</td>
<td>4.7%</td>
</tr>
<tr>
<td>Fluid Seal</td>
<td>4</td>
<td>13</td>
<td>7</td>
<td>0</td>
<td>12</td>
<td>4.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>63</strong></td>
<td><strong>165</strong></td>
<td><strong>420</strong></td>
<td><strong>57</strong></td>
<td><strong>256</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

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*Air Techniques International*

**ATI TEST LABORATORY**

ISO 9001, NQA-1, & DOE CERTIFIED
REJECT EXAMPLES
BENT CASE- REJECT
GASKET - REJECT
GASKET - REJECT
LOOSE GASKET - CASE - REJECT
FLUID SEAL - REJECT
FACEGUARD – EXPOSED STAPLE - REJECT
WORKMANSHIP - MISSING BOLT - REJECT
WORKMANSHIP – MISSING CLIP - REJECT
WORKMANSHIP – EXPOSED NAIL REJECT
FILTER CRATE – CONCEALED DAMAGE
FILTER CRATE – CONCEALED DAMAGE
Summary

• ALL MANUFACTURERS’ FILTER QUALITY HAS VARIED DURING LAST TWELVE YEARS AS SHOWN BY THE FILTER TEST FACILITY (FTF) REPORTS

• THE MAIN CAUSE FOR FILTER REJECTION CONTINUES TO BE MANUFACTURING DEFECTS

• A NEED FOR CLARIFICATION OF METHODS FOR INSPECTION FOR FTF, MANUFACTURER’S AND DOE CONTRACTOR

• A NEED FOR QUALITY CONTROL INSPECTIONS OF MANUFACTURERS IN ADDITION TO AUDITS
Any Questions?

- Eric Hanson, ATI President
- Christopher Hart, Lab Manager
- Julie Stormo, Technician
- Jose Rivera, Technician
- David Crosby, Consultant
- Jan Fretthold, Consultant

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