Decontamination & Decommissioning Technology
From TMI to Fukushima Daiichi............

........... and many places in between!
US Commercial D&D Projects

Major decontamination and decommissioning works

- TMI-2 (Pennsylvania)
- Saxton (Pennsylvania)
- Waltz Mill (Pennsylvania)
- Connecticut Yankee (Connecticut)
- Big Rock Point (Michigan)
- Fort St. Vrain (Colorado)
- Yankee Rowe (Massachusetts)
- Maine Yankee (Maine)
- Trojan (Oregon)
- Rancho Seco (California)
- San Onofre Unit 1 (California)
- Humboldt Bay (California)
- Zion (Illinois)
- Indian Point Unit 1 (New York)
US DOE & Defense D&D Projects

Pentek equipment is present at of US DOE sites

- Hanford (Washington)
- INL (Idaho)
- Savannah River (South Carolina)
- Los Alamos NL (New Mexico)
- Lawrence Livermore NL (California)
- Argonne National Lab (Illinois)
- Brook Air Force Base (Texas)
- Midway Island
- Kwajalien (Marshall Islands)
- Knolls Atomic Power Lab (New York)
- Bettis Atomic Lab (Pennsylvania)
- Plum Brook (Ohio)
- Rocky Flats (Colorado)
- Fernald (Ohio)
- Oak Ridge (Tennessee)
- Mound Laboratory (Ohio)
- Elmendorf AFB (Alaska)
- Kansas City Plant (Missouri)
International D&D Projects
Reactors, defense and commercial facilities

- Sellafield (UK)
- BR-3 (Belgium)
- Latina (Italy)
- ARE Project, LTSF D&D (Malaysia)
- TRR (Taiwan)
- Chalk River (Canada)
- Whiteshell (Canada)
- Al Tuwaitha (Iraq)
Commercial Applications

Operating Nuclear Facilities & Lead Paint Remediation

- Routine decontamination
- Coating maintenance
- Repair and repainting of civil works

Oconee NPP (South Carolina, US)  
Pedestrian Bridge, (City of Saitama, Japan)
Fukushima-Related Supply

Pentek first visited Japan in October, 2011

• JAEA: standard decontamination system
• IHI: custom vacuum head for integration with specialized forest remediation system
• TEPCO: Unit 3, 5FL decontamination robots

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
Fukushima Unit 3, 5FL MOOSE®

(REF) Main Apparatuses Used in Decontamination Work

- Decontamination and debris removal work is conducted by hoisting remotely-controlled devices using a 600t crane.

<table>
<thead>
<tr>
<th>Debris collection device</th>
<th>Small debris vacuum</th>
<th>Cutting &amp; vacuuming device</th>
<th>High-pressure water cutting &amp; vacuuming device</th>
<th>Debris collection</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Debris collection device" /></td>
<td><img src="image2" alt="Small debris vacuum" /></td>
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<td><img src="image4" alt="High-pressure water cutting &amp; vacuuming device" /></td>
<td><img src="image5" alt="Debris collection" /></td>
</tr>
</tbody>
</table>

- Work of collecting small debris
- Work of vacuuming and removing small debris, dust, etc.
- Work of cutting, vacuuming and removing concrete surface
- Cutting and removal of floor surface layer using high-pressure water, and cleaning metal parts
- Work of collecting and cutting debris

*The exhaust on the vacuum removes dust by means of a filter to curb any dust dispersion.*

*As may be necessary, the above devices may be converted and new devices introduced.*

Source: TEPCO

March 11th, 2015
Fukushima Unit 3, 5FL MOOSE®
First aerial delivery of decontamination capability

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
Fukushima Unit 3, 5FL MOOSE®

Delivery of 3 independent, remotely operated machines

Blade MOOSE®  Vacuum MOOSE®  Scabbling MOOSE®

Pentek Decontamination Technology, 33 years of service to the nuclear industry.
Fukushima Unit 3, 5FL MOOSE®

Delivery included 100% independent utility skids
Fukushima Unit 3, 5FL MOOSE®

Nov. 2013 deployment of Blade MOOSE® to 5FL

Source: TEPCO
Nov. 22nd, 2013

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
Fukushima Unit 3, 5FL MOOSE®

(REF) Condition of Refueling Level (Photo Taken: December 8, 2014)

Source: TEPCO
March 11th, 2015

*Survey photographs have been combined to present an overall view
Products for D&D Contractors

Pentek products are for professionals; not consumers

• 1-step mechanical surface decontamination tools cut and remove contaminated surfaces:
  – Structural concrete and steel surfaces
  – Painted surfaces
  – Sensitive architectural surfaces
• Integrated vacuum collection and packaging
• Weatherproof and decontaminable construction
Decontamination Tools

Dustless, effective control of airborne emissions

Roto Peen® Cushioned Abrasive Wheel

Squirrel® II Crack Chaser

Squirrel® III Floor Scabbler

Corner Cutter®

Squirrel® I Scabbler

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
Diamond Cutting Media

5X Improved decontamination productivity

Roto Peen® Cushioned Abrasive Wheel

Diamond Coated Abrasive Belts

Diamond Drum Scabbler

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
VAC-PAC® Collection Systems

HEPA filtered, high flow, low maintenance

Standard VAC-PAC®  Custom VAC-PAC®  Self-Disposing VAC-PAC®  Module

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
Remote Deployment Schemes
Floors and walls, or new aerial deployment

Standard MOOSE®
WallWalker®
Aerial MOOSE®

WORK HEADS
Rad Survey
Scabbling
Scarifying
- Abrasive
- UHP @3kBar
- Mechanical
Painting
Underwater

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
Demolition Equipment

Modifications for hazardous work locations

WallSaw®  
Modified Cat® 350  
Modified 900mm Shear

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
Waste Management

Automation of Hazardous Processes

Plasma Treatment of Radwaste

Self-Disposing HEPA Filtration Module

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
Innovative Technology

Process Improvements for Nuclear Plants Operations
Fire Barriers, Cable Life Management, Communications

WiFi Mesh Networks for Open Air & Submerged Environments

Fire Barriers for Cable Tray Isolation

Instrumentation Cable Aging Diagnostics

Pentek Decontamination Technology, 34 years of service to the nuclear industry.
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@Chiba, 11 & 12 April

– Trade Exhibition Demonstration for Lead Paint Removal
– Web site: http://www.maru-t.co.jp/topics/
– Location: Makuhari Messe, Chiba
  » http://www.m-messe.co.jp/en/event/list

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