

Perma-Fix Environmental Services, Inc. (Perma-Fix)

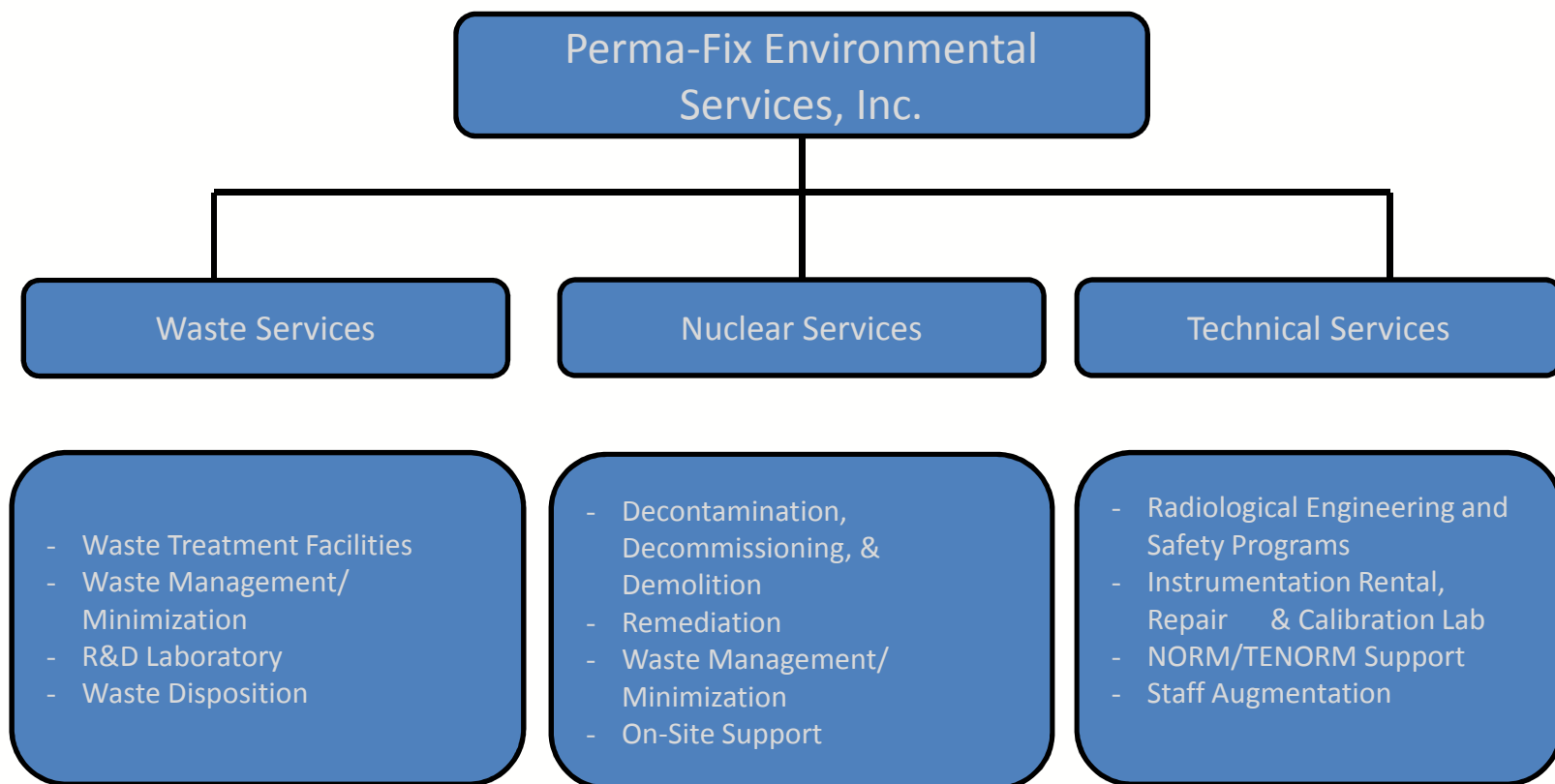


A Global Provider of Nuclear Services & Waste Management

Presented by:

Tammy Monday, Vice President of Waste Services, Sales and Business Development

Perma-Fix Organization



Nuclear services company and leading provider of nuclear waste management services

Customers

- Perma-Fix Customers
 - U.S. Department of Energy
 - U.S. Department of Defense
 - Commercial Nuclear Industry
 - Research Labs & Educational Institutions
 - Hospitals and Pharmaceuticals
- Perma-Fix recognized as:
 - Leader in development of innovative treatment technologies for complex waste streams
 - Leader in providing the most comprehensive waste management services at both client sites and at our fully licensed / permitted facilities

Waste Services - Overview

- Perma-Fix is a major provider of Mixed Low-Level Waste (MLLW) and Low-Level Waste (LLW) management services and has built our company around solving complex waste management challenges.
- Own and operate 4 MLLW/LLW including U-235 Treatment Facilities:
 - Materials & Energy Corporation – Oak Ridge, TN
 - Diversified Scientific Services, Inc. – Kingston, TN
 - Perma-Fix of Florida, Inc. – Gainesville, FL
 - Perma-Fix Northwest Richland, Inc. – Richland, WA
- Nevada National Security Site (NNSS) certified for disposal of DOE generated wastes.
- Member of the team at Hanford for clean-up of the Central Plateau (~160 employees on site). As a member, Perma-Fix operates the largest Pu waste Packaging facility in the U.S. and a radioactive material burial site for the DOE at Hanford.

Waste Services - Perma-Fix Facilities



Perma-Fix Northwest - Richland, WA

DSSI - Kingston, TN



M&EC - Oak Ridge, TN

Perma-Fix Headquarters
Atlanta, Georgia

- Other Office Locations:
- Knoxville, TN
 - Beaver, PA
 - St. Louis, MO (Schreiber, Yonley & Assoc. (Env. Engrs.))
 - Project sites across U.S. & U.K.



Perma-Fix Florida - Gainesville, FL

Waste Services – Facilities Treatment Capabilities

Process		M&EC Facility	DSSI Facility	Perma-Fix of Florida	Perma-Fix of Northwest Richland
Neutralization and/or Stabilization of MLLW Liquids/Solids		✓	✓	✓	✓
Thermal Treatment of both TSCA and non-TSCA Regulated MLLW Liquids/Solids		✓	✓		
Thermal Treatment of high-special nuclear material (SNM) MLLW Liquids		✓	✓		
Macroencapsulation of MLLW Debris		✓		✓	✓
Deactivation of MLLW (D003 wastes)		✓	✓	✓	✓
Non-TSCA Regulated MLLW Labpacks		✓	✓	✓	✓
TSCA Regulated MLLW Labpacks		✓			
MLLW Aerosols		✓	✓		
High Activity/Dose waste streams		✓	✓	✓	✓
TRU waste processing					✓
Treatment of radiologically contaminated Mercury (Hg)	Elemental Hg (Amalgamation)	✓		✓	
	Hg<260ppm	✓	✓	✓	✓
	Hg>260ppm	✓	✓		

Waste Services - Research & Development



- Perma-Fix of FL has a R&D laboratory that is used to develop new treatment technologies for solving complex waste treatment challenges.

Waste Services -Applicable Waste Streams

- **EDTA solutions**
- **Debris and dry active waste (paper, plastics, trash)**
- **Blast media from paint removal**
- Chromium and cadmium plating sludge
- Hazardous and non-hazardous wastewater
- TSCA regulated PCBs for storage and treatment
- Listed Waste Codes including F, P, and U
- Mercury (soluble form) contaminated wastes <260 ppm
- Elemental mercury and mercury contaminated wastes >260 ppm
- Characteristic Waste Codes:
 - D001 ignitability
 - D002 corrosivity
 - D003 reactivity
 - D004 through D043 toxic metals and organic compounds
- High organic wastes such as spent activated carbon, oily sludge, still bottoms, etc...
- **Radioactive aqueous wastes**
- Radioactive corrosives, reactives, oxidizers, and metal bearing waste
- Caustic cleaners
- Solvents
- Chlorinated and nitrated wastes
- **Water insoluble oils and greases**
- Incinerator chars and graphite
- Spent acid sludge
- Lead bearing wastes
- Beryllium waste
- **Freon (Still Bottoms)**
- Liquid scintillation vials
- **Radioactive oils and sludges**

Waste Services -Tritium Processing

Successful Treatment Campaigns of high-tritium (thousands of curies) waste streams

Los Alamos National Laboratory
Savannah River Nuclear Solutions

- Designed and built Tritium Treatment enclosure in March 2010
- Tritium Capture System, a closed loop system that ensures no release of Tritium
- Captured Tritium can then be shipped as LLW to NNSS for disposal
- Challenges M&EC addressed with these waste streams:
 - Containment of Tritium
 - Capture of Tritium
 - Deactivation of reactive metals
 - Collection of Mercury (in some cases)
 - Stabilization/Solidification
 - Shipment for disposal



Tritium Treatment Enclosure

Waste Services -High Dose Waste Management



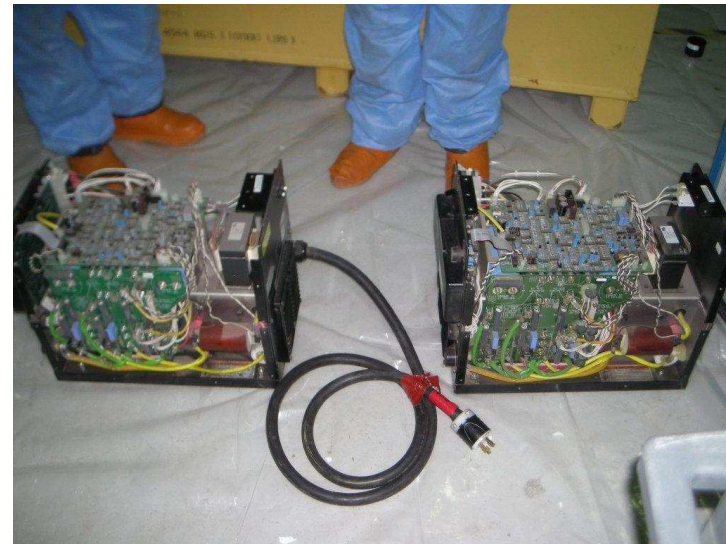
Waste Services – Large Components



- PFNW recently upgraded it's LLW Processing Facility for receipt and treatment of large components from nuclear utilities. This new capability facilitated our first large component project.
 - Condenser tube replacement project at Energy Northwest Columbia Generating Station
 - Cost effectively decontaminated and recycled and/or disposed of ~3 million pounds (1500 MT) of condenser tubes from the BWR;
 - Large components – 11' x 50' x 14' (15 meters) weighing ~225,000 pounds (100,000 kg) requiring specialty transport and large cranes.

Waste Services - Decon and Free Release

- Condenser Tubes and Plant Components
- Electrical Components and Equipment



Nuclear Services – Experience Highlights

- Leading provider of Decontamination, Decommissioning and Demolition of facilities containing hazardous and radiological materials.
- Successfully completed over 200 complex projects for U.S. Government, Commercial entities and International government agencies.
- Capabilities include complete measurement, characterization and monitoring prior to, during and post remedial action activities.
- Demonstrated experience with waste management and waste minimization with over a million pounds of waste management and disposition.
- Our experience covers a wide range of radiological hazards from nuclear reactor containment to contaminated vessels and structures as well as soils, debris, surface and groundwater.

Nuclear Services – Onsite Service Offerings

- Decontamination of hazardous or radiological contaminated surfaces, equipment, & piping
 - Conventional tooling
 - Chemical
 - Hydro-Lasing
 - Large area floor scarification



Nuclear Services – Onsite Service Offerings

- Equipment / Component removal, decontamination, transport, & disposal
 - Dismantling
 - Heavy lift removal
 - Waste stabilization / management



Nuclear Services – Onsite Service Offerings

- Nuclear & hazardous waste management
 - Characterization
 - Planning
 - Sorting
 - Certification
 - Processing & Shipping
- Onsite engineered solutions for waste over-packing, down blending, batching or repackaging



Nuclear Services – Onsite Service Offerings

- Environmental Engineering, Consulting & Remediation
 - Waste management /minimization
 - Sorting
 - Segregation
 - Treatment & Disposal Options
 - Licensing and permitting
 - Regulatory compliance
 - Environmental monitoring / compliance

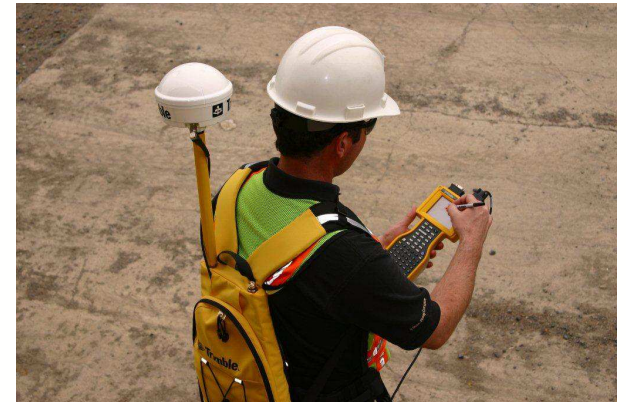


Technical Services – Overview

- One of the largest turnkey radiological support services contractor in the U.S.
 - Extensive in-house expertise in all aspects of radiological protection (CHP's, CSP's, and Radiological Engineers / Technicians)
 - Owns / Operates commercial Radiological and Industrial Hygiene Instrumentation Laboratory (rental, repair, and calibration)
- Specialize in utilization of extensive in-house health physics expertise to define waste treatment technologies and advanced engineering techniques to minimize sampling requirements while reducing waste quantities.

Technical Services – Overview

- Currently managing one of the world's largest Nuclear Radiological Controls Program (Oak Ridge RADCON)
- Specializes in the development of new technologies to provide integrated solutions for specific project applications (partner with instrumentation manufactures to modify commercial “off-the-shelf” equipment).
 - Gamma Walkover Survey Systems
 - Real Time Radiological Mapping System (GPS)
 - Global Environmental Material Management System (GEMMS)
 - tool to manage life-cycle data for complex hazardous & radioactive materials and waste operations



Technical Services – Service Offerings

- Radiological Engineering & Safety Programs
 - Radiological Risk Assessments (multiple codes) including DBA Analysis of Radiological Consequences
 - Radiation Safety Programs
 - Dose Reconstruction
 - ALARA Shielding Design
 - Radiological Monitoring and Control
 - NUREG-1575 MARSSIM Final Status Survey
 - NUREG-1757 Decommissioning Plan Development
 - NORM / TENORM Support
 - Emergency Response Plan Updates

Technical Services – Instrumentation Services

- Radiological & Industrial Hygiene Instrumentation (Rental, Repair, & Calibration)
 - Lab Location – Knoxville, TN
 - Over 6,000 instruments
 - Long-term or short-term lease options
 - Calibration & repair of all makes & models
 - Professional consultation for custom instrumentation application & development

Types of Instruments

Industrial Hygiene

Multi-Gas
PID
Noise
Air Velocity
Indoor Air Quality
Water Quality

Air Sampler

Low / High Volume
Lapel Samplers

Radiological

Scintillator
Geiger-Muller Tube
Gas Proportional
Low Background Counters
Personal Contamination Counters
Portable MCAs

Dose Rate

Ion Chambers
Micro R Meters
Stretch Scopes
SRD
Solid State

Technical Services – Service Offerings

- Staff Augmentation Services
 - Certified Health Physicists (CHP)
 - Radiological Engineers
 - Radiological Technician Coordinator / Supervisor
 - HP / RP Technicians (350)
 - Certified Safety Professionals (CSP)
 - Safety Engineers
 - FME Attendants
 - QA Engineers / Inspectors
 - Engineers (mechanical, electrical, civil, environmental, etc.)
 - Primavera Schedulers / Planners

Reactor D&D - Overview

- Perma-Fix provides cost effective/efficient waste management solutions/programs.
- Key elements include:
 - Characterization
 - Dismantling
 - Recycling
 - Decontamination/Strippable Coating
 - Sorting/Segregation
 - Volume reduction (Supercompaction/Thermal Treatment)
 - 12 proprietary technologies

Reactor D&D – Proprietary Peelable Coating for Cesium

- Enhanced with agents to bind and remove Cs from surfaces
- Tested at DF >9 (90++% removal) on concrete
 - Proven by independent US federal laboratory testing
 - Decrease dose: 100 mSv/year to <10
- Computer code analyzes weathering patterns, orientation, location of structure, etc.
 - Cesium is soluble salt in cement, brick, tile, etc.
 - Moisture location in material determines optimum removal
- Agents can be used in water filters and soil binders
 - Peelable coating is subject to thermal volume reduction and stabilization
 - Radiation dose to workers is minimized

Reactor D&D - Mobile Waste Volume Reduction

- Thermal Waste Volume Reduction
 - 30:1 up to 100:1
 - Rubber, plastic, personal protection wastes, etc.
 - Liquids
- Supercompaction (10:1)
- Stabilization/solidification
- Packaging for interim storage
- Engineering and Science
 - Disposal site planning
 - Design/Operate interim storage facility
 - Research and development



Reactor D&D - Decontamination Offerings

- Peelable coating, cesium specific
 - No water, **minimum waste volume**
 - Horizontal or vertical surfaces
 - Not toxic or flammable
 - Works on cement, brick, tile, metal, wood, plastic or painted surfaces
 - **Minimum dose to worker**
- Decontamination of surfaces & equipment
 - Chemical
 - Hydroblasting
 - Surface cutting
- Dismantlement, removal or decontamination



Reactor D&D - Soil Sorting Reduces Waste Volume

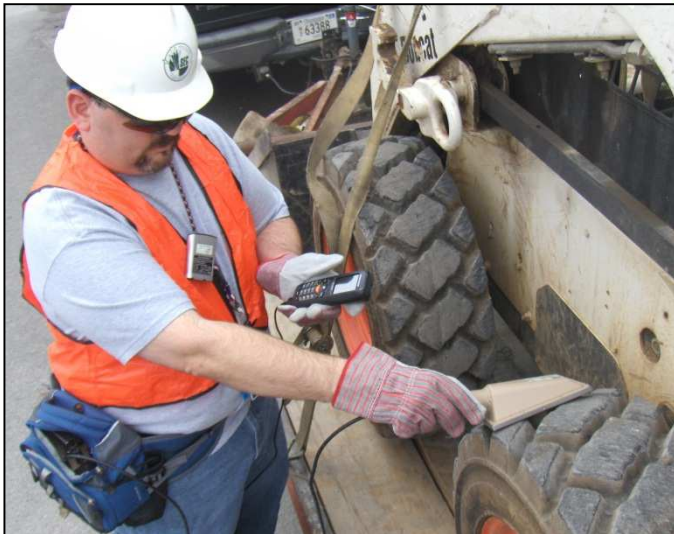


Reactor D&D - Soil Sorting Reduces Volume and Cost

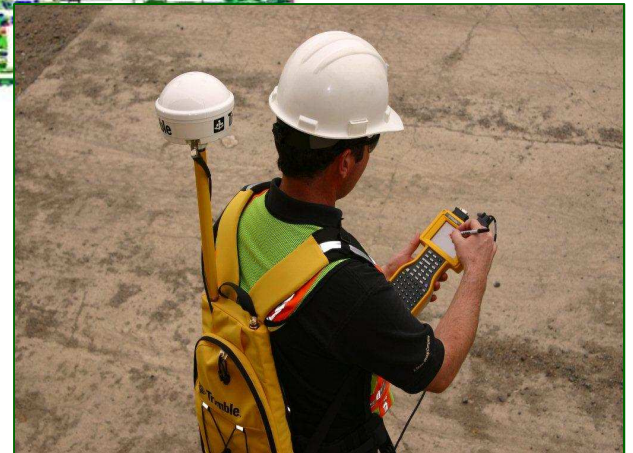
Three example projects:

- 1) Wrote innovative plan for private facility cleanup in Tulsa, Oklahoma.
 - \$98 Million reduction in transport and disposal costs
 - No residual radioactivity left in surface soil
 - Residential use approved by USNRC
- 2) Managed cleanup of soil in local community near U.S. Government (NASA) reactor site (Sandusky, Ohio).
 - \$40 Million cost savings documented
- 3) Managing remediation of U.S. Government cleanup of industrial site (Painesville, Ohio).
 - Former military program site in Painesville, Ohio
 - \$7 to 14 Million cost savings estimated (work in progress)

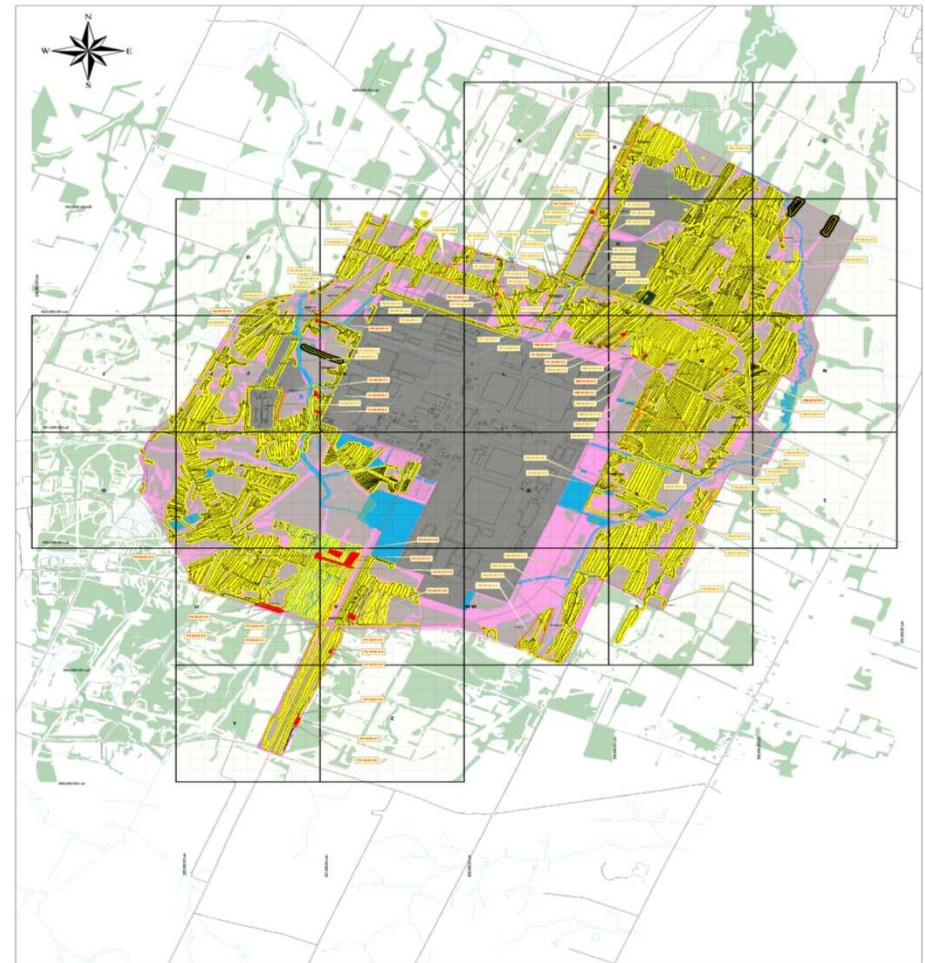
Reactor D&D - Digital Capture of Radiological Survey Data for Open Land and Surface Surveys



Data kept in
Japanese
and
American
formats



Digital gamma radiation survey of 1000 hectare site



"SEC Visual Walkdown"
Progress map thru 3-9-2009

- SEC visual walkover areas covered
- Anomaly areas completed
- Anomaly areas to be cleared