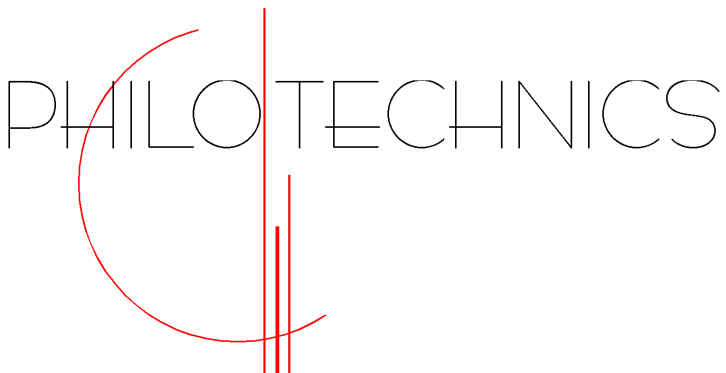




# ***Disaster Preparedness and Recovery for R&D Facilities – Lessons Learned***

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# Overview

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- Facility fire overview
- Relevant factors
- Who has similar facility risks?
- What can be done to mitigate liabilities?
  - Licensees
  - Insurance Companies
- Coming Changes



# Facility Fire Facts

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- 1900 vintage building
- More than 45,000 square feet of restricted laboratory space impacted
- Active in production of custom isotopic products
- 200 fume hoods impacted
- 130 refrigerators/freezers



# Isotopes and Quantities Present

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- Low Energy Beta and Gamma Emitters
  - Carbon ( $^{14}\text{C}$ )
  - Tritium ( $^3\text{H}$ )
- Facility License Limits
  - 500 Curies ( $^{14}\text{C}$ )
  - 100,000 Curies ( $^3\text{H}$ )
- Estimated that only a minor amounts of radioactivity was released initially



# Fire Captured on Discovery Channel Firehouse Boston Series Film Crew

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- Engine 37/Ladder 26 Huntington Avenue Fire Department
- Estimated that 60,000 gallons of fire suppression water introduced into the building envelop



# Immediate Health and Safety Issues

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- Structural Integrity of the Building Roof
- No Electrical Services
- In-Process Radioactive Material Production
- Thousands of containers of Hazardous Chemicals
- Water Damage



# Secondary Contamination Issues

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- Fire Department Protocol
  - Broke out all windows and pumped in as much water as possible
- Building Fire Sprinkler System Activated
- Building Structure
  - Main Laboratory Area
  - Adjacent Office Areas



# Water Proliferation In the Building

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- Fire suppression water introduced on the top floor of the structure
- Water pathways
  - Flooring
  - Door ways
  - Stairways
  - Into adjacent structures



# Contamination Migration Scenario

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- Only small quantities of radioactive materials were initially involved at the point of origin
- Water entered fume hoods on each floor
- Contaminated water spilled out into the laboratory
- C-14 and H-3 contamination released on all floors of the building



# Contaminated Chemical Materials

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- Common laboratory chemicals and reagents
- High hazard materials
  - Toxics
  - Corrosives
  - Reactive
  - flammable
- Compressed Gases



# Chemical Removal

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- Centralized staging area
- Segregated based on hazard and compatibility
- Surveyed for external and internal contamination
- Repacking operations
- Decontamination Operations



# Insurance Audit Team

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- Audit Team
  - Accounting Firms
  - Loss Claims Specialists
  - Customer Representatives
  - Insurance Representatives
- Daily checks from multiple sources
- All materials removed from the site had to be tracked in sufficient detail to assign a replacement cost



# Insurance Coverage Categories

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- Restore facilities to pre-event conditions
- Replace damaged structures
- Replace damaged inventories
- Replace damaged equipment
- Pay for business interruption



# Special Issues for RAM Licensees

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- What is the pre-event condition of the facility
- What equipment is a loss and what can be repaired
- Inventory losses
- What laboratory structures need to be replaced

# What is the pre-event condition?

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- License Limits for Contamination
  - Restricted/Unrestricted
  - Units Used
- Routine Surveys
  - Backup information
  - Use of <R values
- Comprehensiveness of surveys
  - Compliance with license conditions
  - Documenting radiological conditions of structures not typically surveyed



# The Real Issue – Radioactive Waste

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- GMP and pharmaceutical grade production facilities
- Most materials damaged become radioactive wastes
- Disposal cost for non-rad claims are typically a fraction for the overall costs
- Replacement of large components and systems result in significant replacement and disposal costs
- What materials will require removal to restore the facility to a pre-fire condition



# The Financial Stakes Are High

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- Radioactive characterization, waste removal and disposal cost for large structures can equate to millions
- Surface and volumetric contamination issues
- Dose based limits vs license limits
- Overall approach for managing contamination levels through operational controls



# RAM Facility Recommendations

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- Use RAM in steel and concrete structures
- Laboratory benches and cabinetry should be made of non-porous materials
- Used seamless floor coverings
- Fume hoods
  - Limit quantities of removable contamination present
  - Evaluate potential for fire protection water infiltration
  - Use of point source fire protection



# RAM Facility Recommendations

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## Chemical Storage and Use

- Use protected storage cabinets
- Limit chemical container use in contaminated hoods
- Limit cross contamination issues
- Remove and dispose of radioactive wastes regularly
- Label in-process and facility generated chemicals



# Radiation Protection/Emergency Response Recommendations

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- Location of Radiation Protection and Safety Operations
- Radiation Detection Instrumentation
  - Portable detection equipment
  - Fixed laboratory equipment
  - Real-time monitoring



# Emergency Response Recommendations

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- Fire Department's Role
- HAZWOPER trained personnel
- Emergency response drills
- Industrial hygiene and safety coordination
- Control/recovery/cleanup equipment
- Established relationship with response contractor(s)



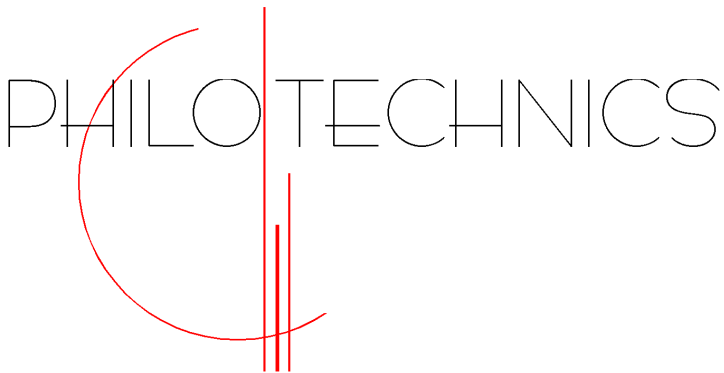
# Lessons Learned - Key Points

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- This event is expected to be the single largest radiological laboratory insurance loss in US history
- Every insured licensee will be effected
- Review use areas and potential disaster scenarios
- Update license
- Perform comprehensive radiological evaluations and document routine surveys completely

# Questions and Experiences???

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