## EPA Testing of Commercial RDD Cleanup Decontamination Technologies

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February 27, 2008

#### Last year at WM07:

- Defined dirty bomb and effects (urban)
- Defined role of EPA & NHSRC in cleanup
- Compared scenarios RDD vs Legacy cleanup
- Identified decon technology gaps
- Introduced EPA project to identify and test commercial decon technologies



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#### *Review: RDD scenario vs Legacy cleanups*

- RDD cleanup for *re-use* vs legacy primarily destructive
- Many legacy technologies exist, most have limited application to RDD (see Demmer presentation)
- RDD cleanup emphasis is fast, low cost, simple, available, effective
- Tremendous political and economic pressure to reoccupy
- State & local government, private owners will have even greater influence over cleanup



Fernald Environmental Management Project



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#### How EPA does clean-up

- Recovery will be executed under the direction of an EPA On-Scene Coordinator (OSC) using contract labor and materials. (*similar to anthrax events in DC area*)
- The OSC will select the most appropriate cleanup methods and technologies, and will select the contractor(s).
- Methods and technologies will be selected based on:
  - Availability (can be deployed quickly, sufficient to decon many city blocks)
  - Effectiveness (decon factor for particular urban substrate)
  - Speed
  - Cost (material/equipment, waste disposal, labor hours, etc)

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# Assumptions



- No single technology will be suitable for all urban substrates and all potential radionuclides (see Demmer presentation)
- Most likely radionuclides are Cs, Co, Sr
- Less likely radionuclides are Am, Pu, Ir, Ra, Cf
- Substrates: concrete, granite, marble, limestone, brick, asphalt, steel, stainless, aluminum, glass, plastic, wood

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#### What performance is desirable?

- Application simple, rapid, single pass vs multiple application
- High decontamination factor
- Minimally destructive to surfaces (especially historic or culturally significant)
- Irregular surfaces, multi-story buildings
- Low cost per treated area
- Low secondary waste (*will be radwaste*)
- Low hazard category/toxicity

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#### **Testing of commercial products**

- We expect a variety of commercial products will be offered for use in the cleanup, but which ones really work in this scenario?
- NHSRC is utilizing the EPA Technology Testing and Evaluation Program (TTEP) to provide scientifically sound recommendations to OSCs.
- Current testing is being conducted by INL under contract to Battelle (TTEP prime contractor).



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#### FY07-08 TTEP testing

- Initial test program is looking at Cesium on concrete which is one of the most probable and difficult scenarios
- Cesium tends to chemically bond with the concrete over time making it more difficult to remove
- Indications that bonding strength is time dependant and exhibits a threshold behavior such that after a period of 1-3 weeks the difficulty of removal becomes significantly greater
- The presence of moisture may exacerbate this problem



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#### First round of testing: strippable coatings

- Strippable coatings selected as the first technology to be tested
- Two commercial coatings were selected
  - Mechanical: traps removable contamination (particulates)
  - Chemical: also includes a chelating agent to chemically draw contamination from the substrate



Strippable Coating Removal US Department of Energy image



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#### Test design

- Concrete coupons
  6x6 inches
- Mounted in 2x3 ft arrays
- Crevices, uneven surfaces



- Material and surface finish representative of a typical urban environment.
- Orientation both horizontal and vertical to mimic an actual urban environment.

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#### Test procedure

- Deposition of aqueous Cs-137 (CsCl 53 µCi/coupon)
- Measure initial activity of each coupon
- Apply the strippable coatings 7 days after deposition of the Cesium
- According to the manufacturer's recommended procedures, using a commercial sprayer
- Measure activity after removal of coating
- 28-day test: same procedure.





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#### **Performance Evaluation**

 Decontamination Factor (DF) achieved is expressed in terms of percent removed: DF = 1-Cf/Ci

Ci = contamination before application of the technology Cf = residual contamination after application

- Subjective performance parameters are also evaluated: elapsed time, ease of use, shelf life, skills required, degree of surface degradation
- Operational constraints such as: toxicity and hazard category, etc.

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#### **Current Status**

- Lab testing was completed in late January
- Data is currently being analyzed
- Final Report Mar 2008
- Next steps in TTEP program will include testing of technologies other than coatings and may include a larger scale test platform to accommodate these technologies



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### Questions?

#### Please contact me if you

- have additional questions...
- know of projects, programs, products or technologies which could help meet these needs...

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