



FIU
Applied Research
Center

solution driven

Radiological Shielding Foams

Initial Results of Fire Testing

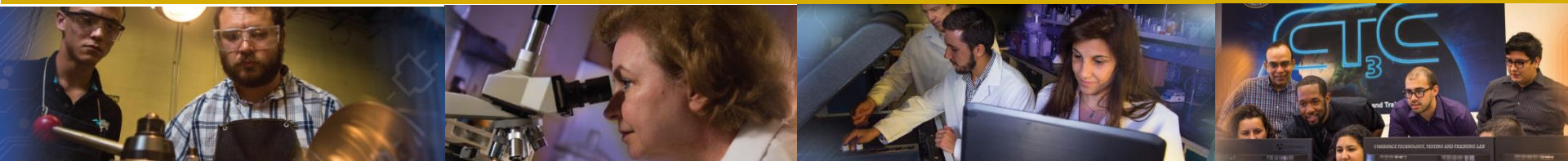
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ARC Staff: Joseph Sinicrope, Jesse Viera, Peggy Shoffner, Leo Lagos

SRNL Collaborators: Connor Nicholson, Brent Peters, Aaron Washington,
Michael Serrato

Presenter: Joshua Nuñez

FLORIDA INTERNATIONAL UNIVERSITY





Purpose



D&D Challenge Area: Fixating residual contamination in large void areas.

Technical Requirement: Fixatives capable of filling large void areas without excessive heat generation and are fire resistant while offering shielding capabilities.

Potential Solution: SRNL is currently in the development of radiological shielding foams.

FIU's Role: Test and evaluate fire resistance of potential foams.



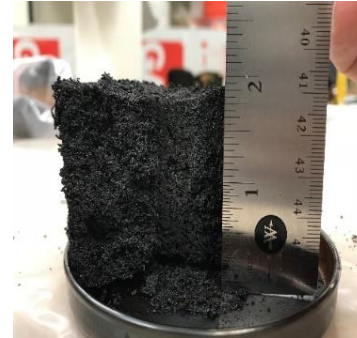
Radiological Shielding Foams Testing Executive Findings



- **Intumescent Foams**
 - Best in class and met fire safety requirements
 - Maintained structural integrity
 - Excellent thermal insulation
 - No flame or smoke propagation

- **Fire Rated Foams**
 - Failed to meet fire safety requirements
 - Loss of structural integrity
 - Poor thermal insulation
 - Flame and smoke propagation

- **Non-Fire Rated Foams**
 - Failed to meet fire safety requirements
 - Loss of structural integrity
 - Poor thermal insulation
 - Flame and smoke propagation



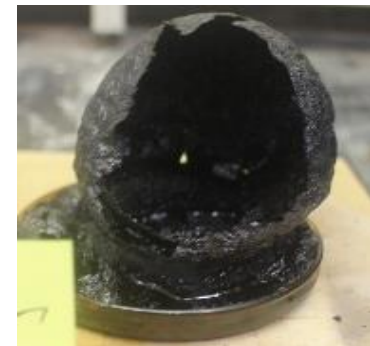
Intumescent Foam Sample
Post Mass Loss Test



Intumescent Foam Sample
cut in half
Post Direct Flame Test



Fire Rated Foam Sample
Post Direct Flame Test



Non-Fire Rated Foam Sample
Post Mass Loss Test



Radiological Shielding Foams Testing

Best in Class Direct Flame Test



Hilti

- Duration: 2 hours
- Flame and smoke propagation: ●
- Structural integrity: ●
- Thermal insulation: ●

3M

- Duration: 2 hours
- Flame and smoke propagation: ●
- Structural integrity: ●
- Thermal insulation: ●

Hilti



3M



*Overall, Hilti was the clear front runner for best in class samples



Radiological Shielding Foams Testing Post-Testing Observation of Intumescent Sample



Intumescent Sample Cut in Half



Radiological Shielding Foams Testing Fire Rated Foam Direct Flame Test



23 Fr

- Duration: **13 min & 25 seconds**
- Flame and smoke propagation: ●
- Structural Integrity: ●
- Thermal Insulation: ●

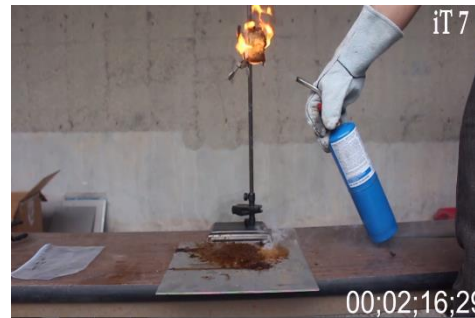
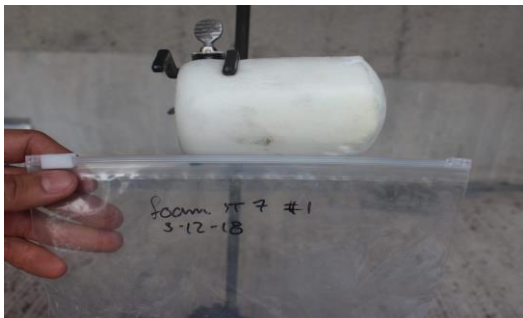
7 Fr

- Duration: **2 min & 37 seconds**
- Flame and smoke propagation: ●
- Structural Integrity: ●
- Thermal Insulation: ●

23 FR



7 FR





Radiological Shielding Foams Testing Post Testing Observations of Fire Rated Sample



Fire Rated Sample



Radiological Shielding Foams Testing

Non-Fire Rated Foam Direct Flame Test



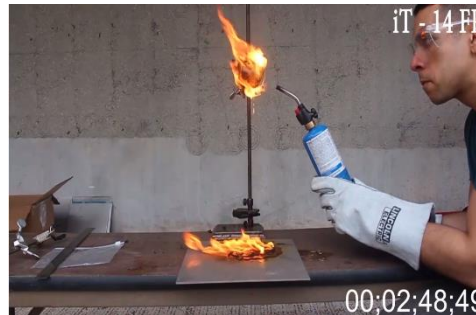
iT-14

- Duration: **3 min & 3 seconds**
- Flame and smoke propagation: ●
- Structural integrity: ●
- Thermal insulation: ●

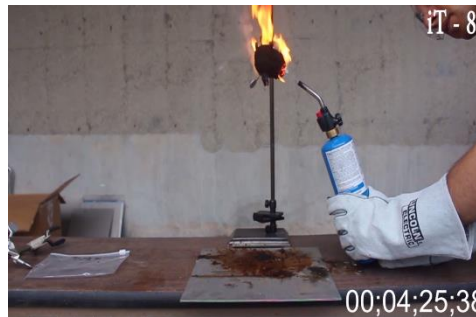
iT-8

- Duration: **14 min & 45 seconds**
- Flame and smoke propagation: ●
- Structural integrity: ●
- Thermal insulation: ●

iT-14



iT-8





Radiological Shielding Foams Testing Post Testing Observations of Non-Fire Rated Sample



Non-Fire Rated Sample



Conclusion

- **Intumescent Foams are best suited in terms of fire resiliency**
- **Continuing activity into Performance Year 9**
 - **Cold demos in glovebox and pipes**
- **Serving as the basis for my Master's Thesis**