

Responding to the Sustainability Challenge – Firefighter Tactics & Training Perspective

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Sustainable Fire Service in a Sustainable Environment

- ❖ **A select few infrastructure sustainability issues...**
 - ◆ New building materials & systems
 - ◆ Water conservation
- ❖ **A select few Fire Service sustainability issues...**
 - ◆ Protecting our membership
 - ◆ Extending the life of our equipment
- ❖ **Challenges and opportunities...**
 - ◆ Tactics
 - ◆ Training



Our Changing Fireground

❖ Building designs more energy efficient and sustainable

- ◆ New insulation materials and techniques
- ◆ Engineered structural members and building systems
- ◆ “Tight building syndrome”

❖ Fuel loads in/on structures have changed

- ◆ Resulting in fuel rich fire conditions within homes
- ◆ Combustibility of exterior is changing

❖ Results in...

- ◆ Rapid changes in fire dynamics
- ◆ New and evolving byproducts of combustion
- ◆ Shorter escape times

Kerber, S. (2012). Analysis of changing residential fire dynamics and its implications on firefighter operational timeframes. *Fire Technology*, 48(4), 865-891.



Water Conservation

❖ How can we be most effective with minimal application?

◆ Get water to the seat of the fire

- Automatic sprinklers
- Robotic systems
- Tactics

❖ Control of fire water run-off

◆ Obvious in many commercial incidents with stored Haz Mat

- Does each structure fire have to be treated as a potential Haz Mat?

◆ Ecotoxicity study in New Zealand 2000-2001

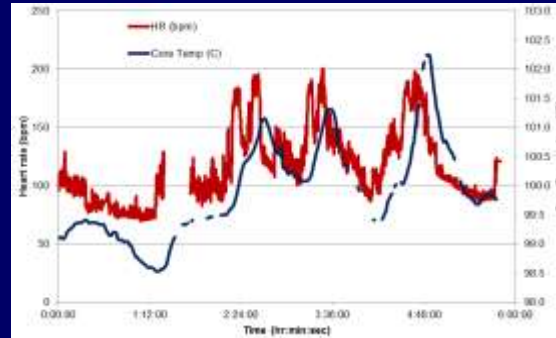
◆ Expand our concept of "Salvage"



Sustainable Firefighters?

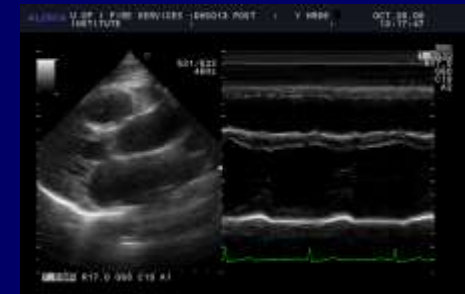
❖ Firefighting increases

- ◆ Heart rate
- ◆ Core temperature
- ◆ Dehydration



❖ Overwhelming evidence suggests increased risk for

- ◆ Cardiovascular events
- ◆ Biomechanics disruptions
- ◆ Cognitive/psychological impairments



❖ Fireground exposures

- ◆ Toxic & carcinogenic byproducts
- ◆ Particulate – sub-micron
- ◆ Airborne & dermal concerns





Sustainable Equipment/Tools?

❖ Primary protection

- ◆ SCBA
- ◆ Bunker gear

❖ Response to PPE “failures”

- ◆ Choosing higher TPP
- ◆ SCBA face piece changes
- ◆ Extended duration SCBA

❖ Increasing utilization of electronics

- ◆ PASS devices
- ◆ Thermal imaging cameras
- ◆ Tracking, physiological monitoring
- ◆ Collaboration with ‘Smart Buildings’
 - Inverse Modeling based predictions!



**Use Model?
Operational Timeframe?
Collaboration?**



Firefighting Tactics

❖ Study our approach to suppression

- ◆ Safer
- ◆ More effective
- ◆ More sustainable

❖ Ongoing work to evaluate tactics in the sustainable environment ... for example ...

- ◆ Ventilation effects in well sealed buildings
 - Energy efficiency
- ◆ Roof operations
 - Lightweight construction
 - PV systems
 - Green roofs



Firefighting Tactics

❖ Limited study of tactics effects on

- ◆ Reduced contamination of PPE
- ◆ Physiological & biomechanical responses
- ◆ Water usage and efficiency

❖ Example –

◆ Current debate regarding “Transitional attack”

■ Potential positive

- Reduced water usage
- Reduce exposure to firefighter, equipment

■ Potential negative

- Disrupt/change fire flow path and dynamics
- Increase risk for trapped victims

❖ Need to continue to scientifically study fire tactics



Training

❖ How can we adapt our FF training?

- ◆ Traditional fuels do not simulate modern furnishings
- ◆ Traditional burn structure do not incorporate many “Green” or sustainable features

❖ New opportunities for students

- ◆ Multimedia classroom
- ◆ Combine simulated building system response within live burn structure
- ◆ Partnerships with outside expertise

❖ SFPE Fire Service Committee





Summary

❖ Fire service sustainability concerns

- ◆ How to respond in varied and evolving environments?
- ◆ How to protect ourselves?
- ◆ How to collaborate with new systems?
- ◆ How to train?

❖ Collaboration with sustainable environment must begin at as early as possible

- ◆ Operational timeframe
- ◆ Use model
- ◆ Human factors

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