

Safety Codes Council Summit 2023

Fire Investigator Scene Safety



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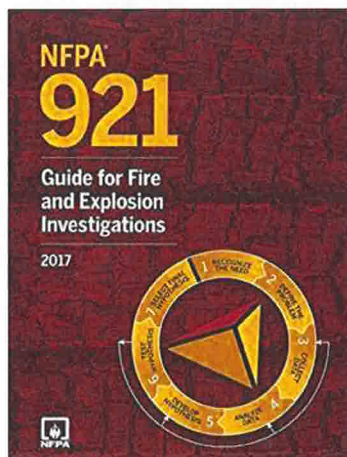
1

Fire Investigator Scene Safety

Chapter 13 Safety

This Chapter will help provide the investigator with:

- What is needed for safe on scene investigation
- Identify various types of hazards – hazard risk assessment
- Identify various PPE and their appropriate use
- Understand types of personal health and safety



2

Fire Investigator Scene Safety

Learning Objectives

- Identify and interpret scene hazards by always completing a “Hazard Assessment Form” prior to investigating.
- Identify and understand types of physical, Structural, Electrical, biological, chemical, mechanical, and toxic hazards present at fire scenes.
- Identify the various types of safety equipment and respiratory protection to be used by fire investigators
- Identify the need for Post Fire Investigation Decontamination

3

Fire Investigator Scene Safety

Scene Basic Safety

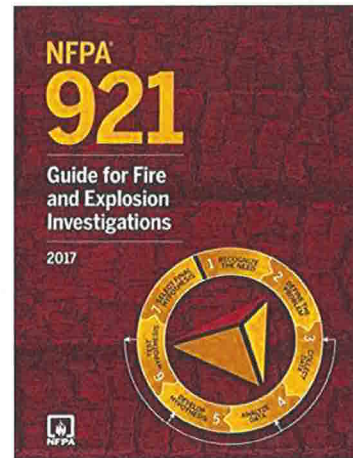
- Safety is a behavior and an attitude
 - Complacency is our #1 threat!
- Always assume the scene to be hazardous until proven otherwise
- Always complete a Hazard Assessment Form before taking action
- Never use equipment, including PPE if not properly trained
- Remember never a need to rush, investigation is a slow methodical process

4

Fire Investigator Scene Safety

NFPA 921 recommends a minimum of 2 investigators to investigate a fire scene.

- However, that is not always the case with many Alberta Departments.
- If you investigate alone then there must be communications with off-site personnel at all times
- Set up through dispatch regular check-in times
- A "Working Alone" SOG should be created to provide member safety during those times



5

Fire Investigator Scene Safety

Working Alone SOG

City of Medicine Hat Fire Service		SOG # 4.2.3												
Title: Working Alone														
Purpose: To provide for member safety when working at higher risk fire investigations or inspections.														
Scope: Members responsible for fire investigation and inspections and those who supervise Fire Prevention Officers.														
Policy: Members will not work alone when performing higher risk inspections or investigations and for medium risk investigations provisions will be in place to reduce the risks.														
Procedures: <p>A hazard/risk assessment must be completed prior to Fire Prevention Officers working at a site.</p> <p>Based on the hazard/risk assessment, a Fire Prevention Officer will determine if the site and working conditions present a low or high risk.</p> <p>If, in the opinion of the FPO, a safety concern exists, inspections/inspections will not be performed alone. Fire Prevention Officers will be provided assistance from another Fire Prevention Officer or Fire Investigation Officer.</p> <p>For high risk incidents or sites where structural integrity is questionable, Fire Investigation members should not work alone.</p> <p>The use of inspection staff or security contractors on site can assist the requirement of not working alone at high risk sites.</p> <p>For high risk sites or if difficult working conditions exist the investigator may call in another Fire Investigator with approval from a Chief Officer.</p> <p>Fire investigators may secure the site with a security company to facilitate completing the investigation during day light hours.</p>														
Document History: <table border="1"> <thead> <tr> <th>Date</th> <th>Author</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Nov. 21, 2013</td> <td>MAJ. [Name]</td> <td>Original</td> </tr> <tr> <td>Feb. 9, 2017</td> <td>MAJ. [Name]</td> <td>Revised</td> </tr> <tr> <td>Oct. 28, 2018</td> <td>MAJ. [Name]</td> <td>Revised, reformatting</td> </tr> </tbody> </table>			Date	Author	Description	Nov. 21, 2013	MAJ. [Name]	Original	Feb. 9, 2017	MAJ. [Name]	Revised	Oct. 28, 2018	MAJ. [Name]	Revised, reformatting
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6

Fire Investigator Scene Safety

Hazard & Risk Assessment

- Identifies potential hazards at the scene
- Identifies and determines proper PPE
- Helps to Identify & determine Post Fire Investigation Decontamination
- Helps to determine training needs

HAZARD ASSESSMENT FORM			
Date: _____		File: _____	
Address: _____		Investigator: _____	
Hazard	Y/N	Type	Control
Natural Gas			
Electrical			
Power Lines			
Vapours			
Dusts			
Gases			
Liquids			
Structural Integrity			
Confined Spaces			
Ventilation			
Falls			
Sharp Objects			
Explosives			
Entrapment			
Reckless			
Communications			
Others on Site			
Machinery			
Heights			
Biological Hazards			
Fungus/Molds			
Human/Animal Feces			
Lighting			
Animals			
Limited Access/Egress			
Overhead Hazards			
Hazardous Materials			
Access to First Aid			

7

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Physical Hazards

- Responding to scene
- Slip's, trip's, and fall's
- Sharps
- Weather conditions (heat exhaustion, extreme cold)
- Investigator's health and physical conditioning

8

Fire Investigator Scene Safety

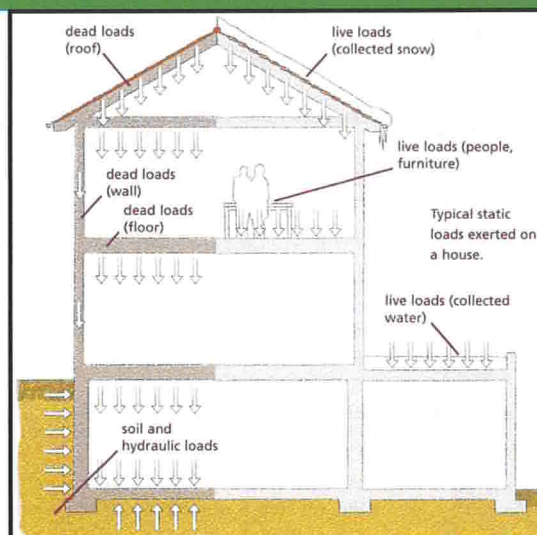
Structural Hazards

- Thermal effects on structure from fire event
- Building collapse (Cantilever, Pancake, V-shape, Lean-To)
- Holes in floors
- Live and Dead Loads (Dead loads are constant such as the structure itself which is calculated into the design, Live loads are loads that act on the structure in addition to the self weight or dead weight of the structure)
- Unsecured chimney
- Water weight from suppression activities

9

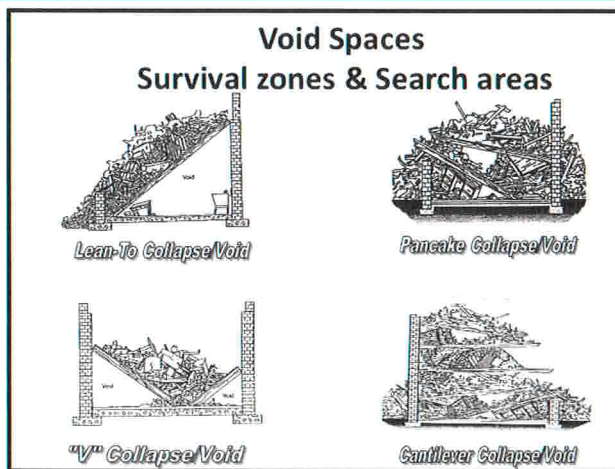
Fire Investigator Scene Safety

Live and Dead Loads acting
on a Structure



10

Fire Investigator Scene Safety



11

Fire Investigator Scene Safety

Electrical Hazards

- Electric Shocks and Burns from:
 - Electrical utility services
 - Improvised power sources or diversions
 - Emergency or standby power
 - Improper use of electrical equipment
 - Amateur electric installations or repairs
 - Intentionally caused electric fires

Never Trust or think that there's no power, always confirm yourself that the structure is de-energized

12

Fire Investigator Scene Safety

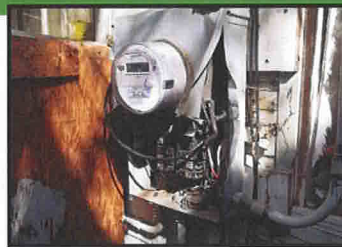
- Be safe use your own observations and testing equipment to ensure the structure is de-energized.
- Remember there may be multiple ways that energy can be brought into the structure.
- Never attempt to disconnect power by yourself, bring in a professional
- Voltage Detector, AC Hot-Stick, multi-meter
- DC Current?



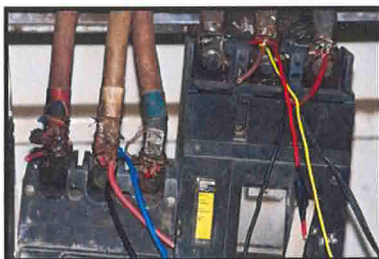
13

Fire Investigator Scene Safety

Bypass of electric meter



Illegal power connections



Backup power through Standby Generators



14

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Biological Hazards

- Biological/Infectious Disease exposure may be present at any fire scene/investigation. (Human and /or animal bodies, animal feces, poisonous plants, and animal bites)
- Selection of proper PPE (Tyvek, Kleenguard coveralls)
- Proper method of Decon for grossly contaminated PPE
- Be cognizant of scene/evidence preservation



15

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Chemical Hazards

- Every residential home, commercial building, and industrial building contain chemicals
- Most chemicals likely can be identified by trained personal, but many may not.
- Role of a proper PIP (Pre-Incident Planning)
- WHEN DOES A FIRE SCENE BECOME A HAZMAT SCENE?
 - When fires occur at certain occupancies?
 - When Hazmat show's up?
 - Or is it a Hazmat call at every fire scene (Chemical decomposition)?

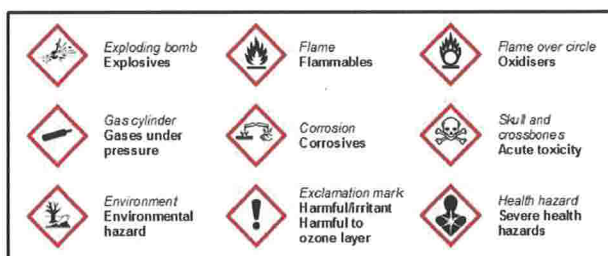
16

Fire Investigator Scene Safety

Hazard Class



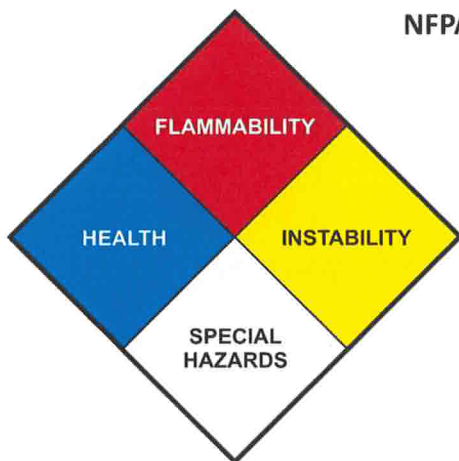
Globally Harmonized System



17

Fire Investigator Scene Safety

NFPA 704 Signage



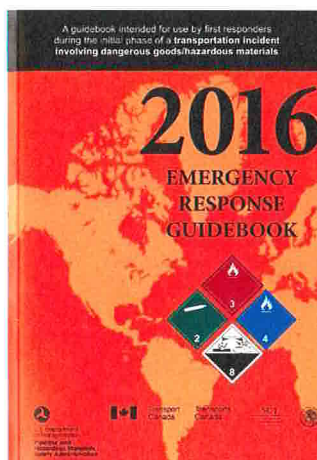
NFPA Rating Explanation Guide					
RATING NUMBER	HEALTH HAZARD	FLAMMABILITY HAZARD	INSTABILITY HAZARD	RATING SYMBOL	SPECIAL HAZARD
4	Can be lethal	Will vaporize and readily burn at normal temperatures	May explode at normal temperatures and pressures	OX	Oxidizing
3	Can cause serious or permanent injury	Can be ignited under almost all ambient temperatures	May explode at high temperature or shock		
2	Can cause temporary incapacitation or residual injury	Must be heated or high ambient temperature to burn	Violent chemical change at high temperatures or pressures	SA	Simple asphyxiants
1	Can cause significant irritation	Must be preheated before ignition can occur	Normally stable. High temperatures make unstable		
0	No hazard	Will not burn	Stable	W	Reacts violently or explosively with water

18

Fire Investigator Scene Safety

NOTE: If you are not sure about any chemical look it up. Every Fire Unit should carry an Emergency Response Guidebook.

The **ERG2016** is primarily a guide to aid first responders in quickly identifying the specific or generic hazards of the material(s) involved in the incident and protecting themselves and the public during the initial response phase of the incident.



19

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Mechanical Hazards

- Watch out for stored mechanical energy!
- Make sure you understand if machinery is zeroed out or still functioning and operational.
- Is it still energized?
- If unsure do not attempt to control stored energy, you may need assistance from owner or technical resource.

20

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Toxic Hazards

- Toxic hazards are present at every fire scene and are from the many gases contained in both fire smoke and debris.
- Fire smoke consists of invisible vapors and visible particulates.
- Fire debris contains many different chemicals, gases and particulates that are hazardous and toxic. Most common to us is CO and HCN.
- After the fire, cold particulates, vapors and gases remain present and during excavating the scene can be re-aerosolized.

21

Fire Investigator Scene Safety

Investigator Risk of Hazards

- Always identify risks prior (Hazard Assessment Form)
- Determine Risk vs. Benefit
- Determine if Cool Down is necessary
- Remember as investigators **Time** is on our side.
- Always wear the appropriate Level of PPE, remember much of what we deal with may not be visible.

22

Fire Investigator Scene Safety

Today's fire is NOT yesterday's fire!

- Over the last many decades how we build homes and how we furnish those homes is constantly changing.
- The number of synthetic materials used has skyrocketed, and as a result the hazardous and toxic by-products produced has made every fire scene a hazmat incident as well.
- The hydrocarbon based synthetic material when burning produces heavy, thick black particulate which radiates faster in a compartment and increases time to flashover. Approximate 17 min = 3 min.

23

Fire Investigator Scene Safety

Detection Measures / Types

- Single and Multi-Gas meters
- Should be simple and easy to use
- But use the right tool for the job!
- HCN can pocket and pool, investigators excavating a fire scene can stir it up and be exposed even if you cleared a room with a detector or are monitoring the room. A personal HCN detector should as ways be worn.

24

Fire Investigator Scene Safety

- **HCN** is among the most rapidly acting of all known poisons.
- Absorption occurs by all entry routes; the mechanism of action is inhibition of cellular respiration.
- The respiratory, central nervous, and cardiovascular systems are the primary targets of an acute exposure.

• **HCN = IDLH 50 ppm, PEL 4.7 ppm**

Compare that to

CO = IDLH 1500 ppm, PEL 35 ppm

IDLH Immediately Dangerous to Life and Health

PEL Permissible Exposure Limit

25

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26

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Necessary PPE

- Respiratory
- Head protection
- Eye protection
- Hand protection
- Body protection
- Feet Protection



27

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Respiratory Protection

- SCBA (Hot Scenes & IDLH)
- PAPR (CBRN Filter)
- APR (P100 Filter)
 - Half-face
 - Full-face
 - Fit Test



28

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Body Protection

- Turn Out Gear (Tri-certified, NFPA 1951 USAR, NFPA 1999 EMS, NFPA 1992 Liquid Splash HazMat by Morning Pride)
- Coveralls (Winter vs Summer)
- Tyvek and Kleenguard coveralls
- Pyrolon CRFR Chemical Resistant disposable Hazmat coveralls
- Nitrile Gloves, chemical resistive



29

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PPE Considerations

- Suitability for Hot vs Warm vs Cold Response
- Comfort and Ease of Use for Long Duration Investigations
- Protection Offered by Each Ensemble

Target Ensembles

- Base Layer
- Disposable Coveralls
- Rescue/Wildland Ensembles
- Structural Ensembles

30

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Separation of Contaminated Gear

- Separation of contaminated gear from the passenger compartment.
- Contaminated turn out gear and/or equipment needs to be stored separately so as to not breathe in those contaminants while driving around.



31

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Post Fire Investigation Decontamination

- SOG should be created whereby it applies to all emergency personnel
- All personnel and gear who were exposed to products of combustion or other contaminants should go through Post Fire Decon.
- Dry and then wet decon as deemed appropriate to the contaminants involved and the situation, should be done at scene and before removal of any PPE, especially respiratory protection.
- “Fire Wipes” or “Baby Wipes” shall be carried on all units, and should be used on the hands, face, neck, and any other exposed areas.

32



Fire Wipes

33

Fire Investigator Scene Safety

Post Fire Investigation Decontamination

- The Fire Investigator's duties places them in a "Post Fire", chemical laden hazardous environment.
- The Fire Investigator should undergo the same gross decon process as any firefighter.
- After proper doffing, grossly contaminated gear and equipment should be kept separate and placed in at least a 4ml thick plastic bag and sealed with duct tape.
- All contaminated personnel shall shower within the hour of getting back to the station, never bring anything home.

34

Fire Investigator Scene Safety

Summary-What does this all mean?

Fire Investigators should approach every fire investigation scene with the same level of caution and respect as they would with any HazMat incident, because that is really what they are.

- Know your abilities and your equipment
- Know the conditions before you enter (360, Hazard Assessment Form, face to face with IC)
- Never assume anything if unsure ask and test (verify status of utilities)
- Wear appropriate PPE
- Know and understand warning signs
- Follow departmental SOG's
- Remember time is always on your side
- NOTE The International Association of Arson Investigators (IAAI) has a "Fire Investigator Health and Safety Best Practices" which is a very good document to help with written policies and/or SOG's

<https://www.fireapparatusmagazine.com/wp-content/uploads/content/dam/ffn/download/Fire%20Investigator%20Health%20and%20Safety%20Best%20Practices.pdf>

35

SCC Con-ed "30 Credits over 3 year's"

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| <ul style="list-style-type: none"> • <u>Formal Learning Category</u> (the following are free courses. The only cost is your time) • Free on-line NFPA webinar on NFPA 13 – 1 hour (5 credits) • https://www.nfpa.org/Training-and-Events/By-type/Webinars • On line webinars with CFI Trainer – 1+ hours (5 credits) • On line webinars or in house training with IAAI – 1+ (5 credits) • On line webinars with OHS – 1+ hours (5 credits) • On line webinars with RMA and AUMA – 1+ hours (5 credits) • On line leadership webinars with institutions (any university or institution) – 1+ hours (5 credits) • On line learning through industry partners – 1+ hours (5 credits) • https://www.tycoimplexgrinnell.com/insights-and-opinions/videos/webinars • https://www.fssa.net/webinars • https://www.usfa.fema.gov/prevention/outreach/fief/fief_webinars.html • https://www.ccohs.ca/products/webinars/ • Cross training activities with other organizations (i.e. Firesmart with Agriculture and Forestry or Development session with your local Planning and Development department) | <ul style="list-style-type: none"> • <u>Informal learning Category</u> • Attendance at a Regional Meeting with Municipal Affairs and Safety Codes Council – 1 day (5 credits) • Presenting at a Regional Meeting (including preparation time) – 1 day (5 credits) • Attendance at the SCOTTI meeting – 1 day (5 credits) • Attendance at the Alberta Fire Marshal's Guild – 1 day (5 credits) • Attendance at the AFCA meeting – 1 day (5 credits) • Attendance at the Safety Codes Council Conference discipline specific day (5 credits) • Attendance at the 3-day Safety Codes Council Conference (5 credits) • Any training provided by employer for leadership, mentorship, safety, etc. – 1+ hours (5 credits) |
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36

Questions?

