

Fighting Fire

*(on your boat, at sea, far far from land, with
no 911!)*

2012

Safety at Sea Seminar

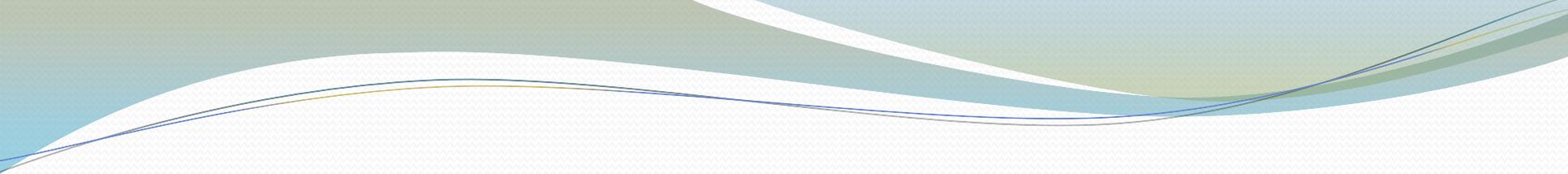
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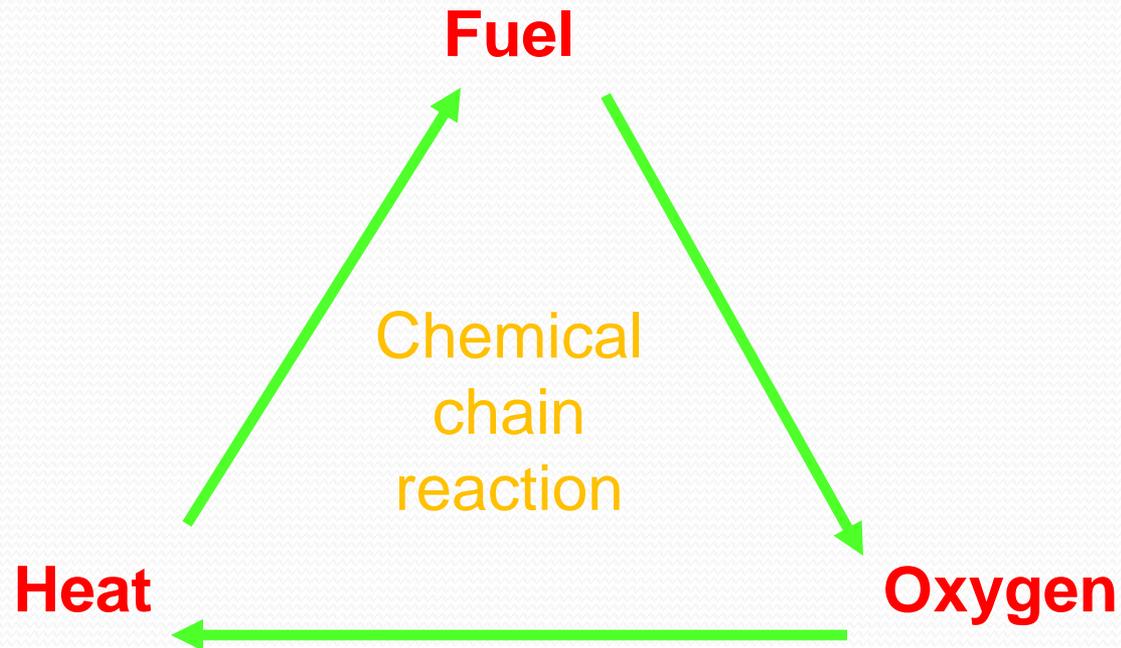
Why me? I set my boat on fire! REALLY!

If this happened on the Bay or at sea, could you put this fire out? How would you call for help – no radio? Do you have a second source of communications to call for help? Also, if you can't be on the boat, where will you go?



- 
- Video Clip 1 and 2

For a fire to exist, it has to have 4 parts:



Remove one of these, and you can put out a fire! **Oh yeah, REMEMBER items in red for later today!**

Fire Development

- **Stages of Fire:**

- ❖ Ignition

- ❖ Growth

- ❖ Hot smoldering

- ❖ **Flashover**

- ❖ Fully developed: Steady and clear burning

- ❖ Decay



Products of Combustion

- **Products of Combustion:**

- ❖ **Light:** Flame (luminous body of burning gas)
- ❖ **Heat:** Form of kinetic energy (energy in motion)
- ❖ **Fire gases:** Highly toxic and flammable
- ❖ **Smoke:** Visible obscuration (density and color depends on materials involved and rate of incomplete combustion)

Temperature and Heat Transmission

- **Conduction:** Point-to-point transmission of heat from one body to another
- **Convection:** Transfer of heat by the movement of heated air or liquid
- **Radiation:** Transfer of heat through open space in the form of electromagnetic waves

Fire Extinguishment Theory

- **Removing one or more of the essential elements of combustion:**
 - ❖ Temperature reduction
 - ❖ Fuel removal
 - ❖ Oxygen exclusion
 - ❖ Chemical flame inhibition

Types of Fires: **Class A**

- Materials which leave an Ash:
 - **Wood**, cotton, fiber materials
- Effective extinguishers:
 - **Water** (*Caution – load limits!*)
 - Dry Chemical
 - Carbon Dioxide
- Concerns:
 - Fire may be deeply embedded in materials and require “overhaul.” Ok, what is overhaul?



Types of Fires: Class B

- Flammable liquids (things that boil):
 - Oil, gasoline, resin, paint, kerosene, diesel
- Effective extinguishers:
 - Sodium Bicarbonate (baking soda, NOT flour!)
 - Dry Chemical
 - Carbon Dioxide
 - Halon replacements
- Concerns:
 - Water may spread the fire!
 - Liquids with high flashpoint may re-ignite (keep covered to avoid vapor release)



BoatU.S. Insurance



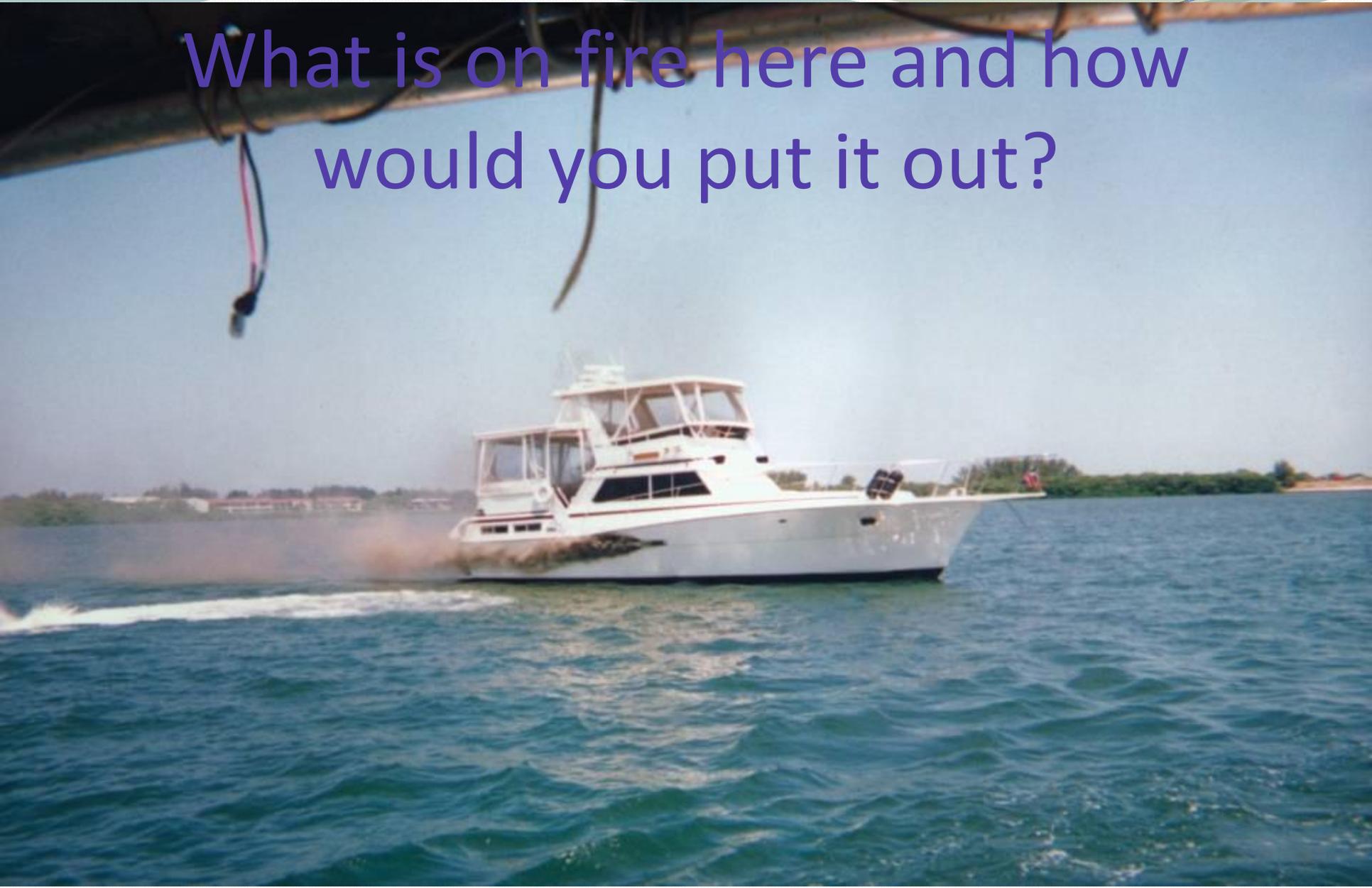


Types of Fires: Class C

- Electrical Fires (shorts):
 - Wire insulation and adjacent materials
- Tactics:
 - Break circuit, **turn off main switch (first step!)**, have circuit protection
 - Then extinguish according to what materials are involved
 - **Water is not a choice on Class C fires**
- Concerns:
 - Shock hazard (is the power off – are you sure?)



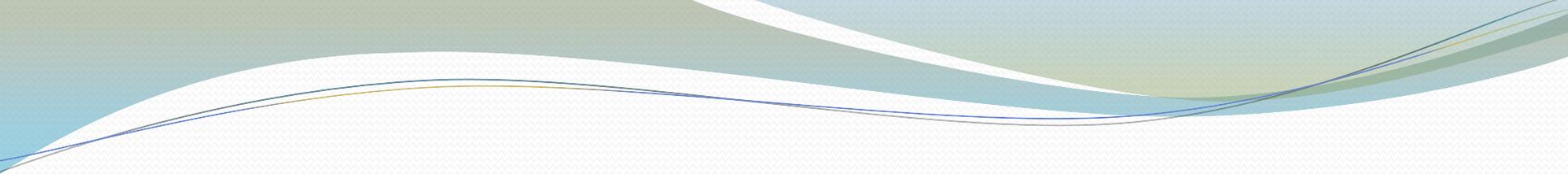
What is on fire here and how would you put it out?



Types of Fires: **Class D**

- Fires caused by burning metals:
 - **Flares are the main concern**
 - Nickel Metal Hydride batteries also (PlayStation)
- Tactics:
 - Get it off the boat
 - May use material to try to cool, isolate and smother
- Concerns:
 - Does not play nice with water!



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- Video Clip 3

Blaze casts pall over catamaran's racing schedule

Fire ripped through the hull of the world's biggest ocean racing catamaran in Auckland yesterday afternoon, sending crew scrambling for safety and putting the immediate racing plans of the \$8 million vessel in doubt.

Fire broke out aboard PlayStation while it was moored on the eastern side of the Viaduct Basin for the Team New Zealand command. The extent of damage was unclear last night.

Rupert Kirby, a tourist catching the sun with his wife, said he heard two small explosions, then saw crew members scrambling from the starboard cockpit and forward hatch, seconds before flames shot out.



Steve Fossett

The crew tried to fight the blaze with extinguishers but were forced back by the heat.

Senior Station Officer Bar-

ry Fox of the Fire Service said it took firefighters about 10 minutes to bring the fire under control. They then flooded the hull.

The catamaran, owned by American adventurer Steve Fossett, was built in Auckland last year with the aim of taking on ocean racing records.

In March, it set the record for the greatest distance travelled in 24 hours at 880 nautical miles.

An attempt to break the record crossing the Atlantic, scheduled for June, may have to be put off because of the fire.

The catamaran was due to be shipped to America next weekend.

— Tony Wall



FLASH FIRE: The \$8 million catamaran that caught fire in Auckland yesterday holds the world record for sailing the longest distance in 24 hours. The New PlayStation was due to be shipped to the US next weekend. The blaze has cast doubts over a challenge to the Atlantic crossing record in June.

What type of extinguisher would you use?



Sources of fires on boats #1

- 55% Poorly installed **electrical** systems (C)
 - 30% DC shorts and wiring
 - 12% DC engine voltage regulator
 - 4% AC appliance/heater
 - 4% AC shore power system
 - 2% AC wiring/panel
 - 2% DC battery charger

Sources of fires on boats #2

- 24% Engine and Transmission Overheating
 - 19% engine overheating
 - 2% turbocharger overheat
 - 2% transmission overheat
 - 1% backfire
- 8% Gasoline fuel leak
 - 95% of fuel-related fires involve gasoline
- 1% Galley stoves
 - Declining compared to when alcohol stoves were popular
 - *(that was me – alcohol stove fire)*
- 12% Unknown or miscellaneous





BoatU.S. Insurance



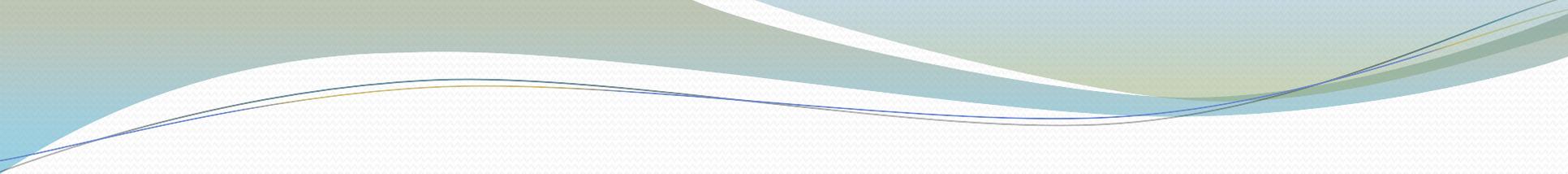


Purpose of Portable Fire Extinguishers

- Provide rapid attack of unexpected fires
- May be primary tool for initial attack
- May be more efficient and better suited for the job at the time
 - ❖ **Must be readily accessible**
 - ❖ Must be in working order
 - ❖ Must be suitable for the job at hand
 - ❖ Must be used by trained operators
- May be more convenient to use

Limitations of Portable Fire Extinguishers

- Limited discharge distance
- Limited amount of extinguishing agent
- May be only partially effective/ineffective
- Limited discharge time
- Must be maintained and protected from damage
- Expensive to use
- May disturb the fuel source (spread fire)

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- Video Clip 4

Using Portable Fire Extinguishers

- Approach fire from windward side
- P-A-S-S
 - ❖ Pull
 - ❖ Aim
 - ❖ Squeeze
 - ❖ Sweep



Using Portable Fire Extinguishers- continued

- Don't scatter the fuel
- Work systematically in pairs
- Never turn your back on the fire
- Expel entire contents of the extinguisher
- Overhaul smoldering fuel
- Lay empty extinguishers on their side
 - ❖ Signifies they are empty



Extinguisher Inspection

- Inspection Procedures:
- **Before Use:** (Immediately)
 - ❖ External visual check for damage
 - ❖ Hose/nozzle not clogged
 - ❖ Weight feels right
 - ❖ Pressure gauge in operational range
 - ❖ Expel a small amount before advancing

Extinguisher Inspection

Quick Check (Monthly):

- In the proper location
- Readily visible
- Access not blocked
- Faceplate visible
- Tamper seal intact
- Determined to be full by lifting or weighing
- No sign of damage, corrosion, or clogged nozzle
- Hose/nozzle is undamaged and free of cracks
- Hydrostatic test date is within specified time

Extinguisher Inspection

- **Maintenance:**

- ❖ At least annually
- ❖ By qualified personnel
- ❖ See NFPA 10 for in-depth procedure

- **Service:**

- ❖ After each use
- ❖ Broken tamper seal
- ❖ By qualified personnel

- **Damaged extinguishers:**

- ❖ Red tag out-of-service
- ❖ Evaluated by qualified person
- ❖ Discard or return to manufacturer
- ❖ Hydrostatic test if superficial damage



Portable Extinguishers

- Sodium Bicarbonate
 - Low toxicity
 - Inexpensive
 - Excellent for Class B
 - Messy clean up



Inexpensive Portables

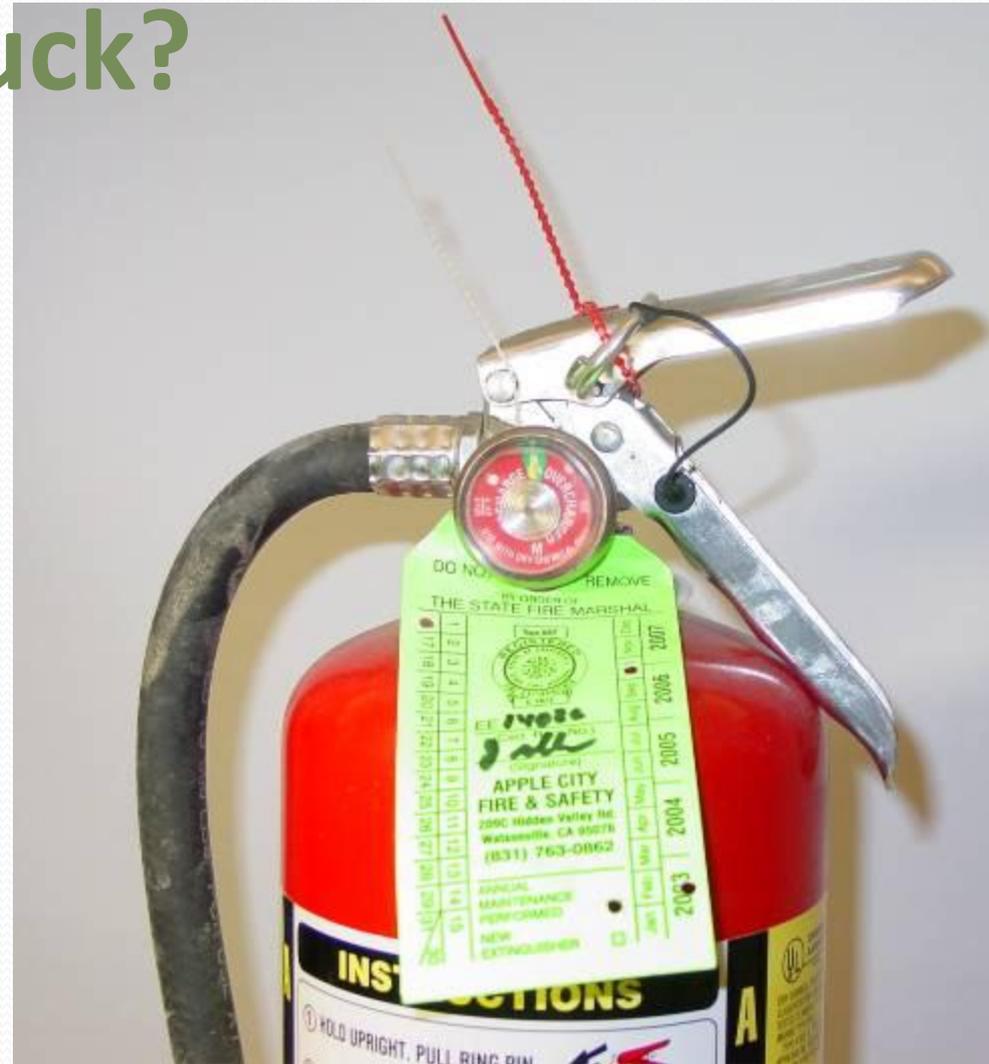
Portable Extinguishers

- **Tri-Class or Multipurpose Dry Chemical**
 - No worry about selecting the right extinguisher
 - Forms a crust on Class A fires, making clean up challenging
 - Need to turn upside down and shake it to loosen the power on a regular basis!
 - Needs to be recharged at least yearly (even if not used)!



Tri-Class Portable

Check the gauge. Could it be stuck?



Portable Extinguishers

- Carbon Dioxide
 - Cools and suffocates
 - Pretty ineffective - Large extinguishers!
 - Leaves no residue
- Halon and its derivatives
 - Halon 1211 and 1301 cannot be bought, but can be refilled
 - Halotron 1 is a replacement



Halotron Portables

Fixed-Mount Extinguishers

- FM-200 Halon replacement
 - Mounted in the engine room
 - Heat causes “stinger” to burst
 - Activated at 175 deg F
 - Fl



Stinger FM-200

Fire fighting tips

- Have extinguishers located in all occupied spaces of the boat, cockpit, and the engine room
 - Trick; cut a small hole for quick access, cover it to make it look nice and to seal it, to use in the engine compartment to “flood” the space with an extinguishing agent.
- Fight a fire quickly; fires are virtually impossible to put out if given a head start
 - Fire volume can double every 7 seconds!!!!
- Use extinguishers to allow you to escape from below
 - How could you get out of every stateroom, head or compartment if the main hatch was blocked?
- PASS – Pull-Aim-Squeeze-Sweep (**Aim extinguisher low at base of fire and sweep across base of flames.**)

Did we use too much water to put this fire out? Always keep dewatering in mind when fighting a boat fire!



Fire fighting tips

- Install extinguishers above floor - keep them away from water!
- Have a back-up person assist ; close at hand with the extra extinguishers!
- Use a flashlight and stay oriented
- **Stay low** - avoid smoke (better visibility)
 - Smoke kills more people in fires than actual burns. Do a dry run, with a knit cap and try to get out of your boat without using the main hatch
- Have an exit plan!

Just like home!

- Have a fire escape plan and practice it
- Install CO and smoke alarms in each compartment
- Remember, CO is the silent killer!
- Change your smoke alarm and CO alarm batteries yearly (at least)
- Make sure everyone knows how to call for help
- Have fire extinguishers readily available and make sure everyone knows how to use them