

An electrical fire started during repair work on this boat in a private marina in St. Barts.

Part 1: Marina and Boatyard Fires – Prevention, Mitigation, and Response

By Daniel K. Rutherford, IAMI, CMI, LPI

Editor's Note: This article is the first in a two-part series focusing on marina fire prevention. The second article will be published in the March 2023 issue of Marina Dock Age and will cover some of the fire scenarios marinas can face and how to prevent catastrophes from occurring.

The subject of marina, boatyard and/ or shipyard fire is a complex one. It is a marina owner's worst nightmare. Imagine receiving a call in the middle of the night from the local police or fire department. Your marina, boatyard, or dock is fully engulfed in flames. Or, worse yet, you are working on a project at the boatyard and a fire erupts and you cannot control it and within minutes, your entire livelihood, something you and your family worked to build for perhaps decades goes up in smoke and ashes. This is a real threat. It happened recently at Mattapoisett Boatyard in Massachusetts (<https://www.youtube.com/watch?v=J01xtjIC5Gk>). A fire originating in one of the shops quickly

spread throughout the entire facility and at the end of the day, generations of work had been wiped out.

So, let's take a deeper dive into why there is a heightened risk of fire at a marina or boatyard, what can be done to mitigate those risks, and how to respond in the event that your worst nightmare becomes reality.

The Risk

Like black powder in a musket, boatyards are pre-primed for a fire event. Think about it. Where do you have such highly combustible materials as resin, catalysts, acetones, thinners, paints, fuels, woods, building materials, and plastics all combined with ongoing mechanical and



A massive fire caused widespread destruction at Mattapoisett Boatyard in Massachusetts last August.

electrical operations, paint and finishing operations in spray booths (or outside – come on, be honest, you do it), fueling operations, battery storage and charging, and even shrink wrapping.

Add to that the simple changes in how boats are stored has increased the risks of a disaster tenfold. In the past, boats were hauled and side-tracked. That term meant that after the railway hauled the boat on the cradle car, the boat was side-tracked down a set of rails to the side of the main railway. By design, boats were several feet, if not a yard apart. Then the modern-day straddle-lift was born and as boats were moved and cradled them, they were at least a straddle-lift leg apart. Not much different than the



A handful of boats were destroyed when this land winter storage facility caught fire after a heater was plugged into an extension cord.

comes to the potential for the rapid and uncontrollable spread of an open flame event. Frankly, it makes it nearly impossible to attack and suppress that

type of fire.

Marinas are bigger these days, too. It is not uncommon to see a marina have hundreds, if not thousands, of in

water dock and slip spaces. Docks can be several hundred feet long and can include covered and uncovered slips. This makes a fire on a boat while in the water very challenging to fight.

Typical Causes

I'm going to start off with electric heaters. No, no, no! "If I had a nickel", as Mom would say. Electric heaters pose a real threat. It is not just the heat that they generate (catching nearby combustibles or freshly varnished surfaces on fire when someone is using them to dry their newly varnished interior) it is the amperage that they draw and the resistive heat buildup on electrical connections and shore power systems that is the real concern. So, this is a hard no. Your dockage and storage contracts need to specify this clearly and unequivocally.

A close second, and usually one

FUEL DOCK SAFETY NFPA 30A

Here are a few parts of 30A that are worth noting. You may or may not agree with all of this, but these are some of the recommendations and probably the standard by which you or your team are judged.

11.10.1 The following shall be the responsibilities of the attendant:

- Prevent the dispensing of Class I liquids into portable containers that do not comply with 11.8.2. (Basically, only use gas containers approved by your local AHJ.)
- Be familiar with the dispensing system and emergency shutoff controls. (I recommend that the emergency shutoff be well marked so that anyone can see it in case of an emergency.)
- Ensure that the vessel is properly moored and that all connections are made.
- Be within 4.6M (15 feet) of the dispensing controls during the fueling operation and maintain a direct, clear, unobstructed view of both the vessel fuel filler neck and the emergency fuel shutoff control.

11.10.3 During fueling operations, smoking shall be forbidden on board

the vessel or marine craft and in the dispensing area.

Before opening the tanks to be fueled, the following precautions shall be taken:

- All engines, motors, fans, and bilge blowers shall be shut down.
- All open flame and smoking materials shall be extinguished and all exposed heating elements shall be turned off.
- Galley Stoves shall be extinguished.
- All ports, windows, doors, and hatches shall be closed.
- After the flow of fuel has stopped,

the following shall occur:

- The fill cap shall be tightly secured.
- Any spillage shall be wiped up immediately.

If Class I liquid has been delivered, the entire vessel shall remain open.

Bilge blowers shall be turned on and allowed to run for at least 5 minutes before starting any engines or lighting galley fires. If bilge blowers are not available, 10 minutes of ventilation shall be required.

Some additional thoughts not in NFPA 30A that I think are important to note are:

Don't fuel customer boats directly – Hand them the nozzle for the fuel type they requested and monitor the fueling process. This may vary by state regulation, but in my opinion, it is far better for the customer to be responsible for the fuel delivery than your fuel dock attendant.

The fuel dock is a busy place. Have enough trained staff to abide by the above guidelines from NFPA.

Make sure your staff clearly communicates with your customer. Remember the three-syllable rule. "Gas-O-Line" or "Die-Sel-Fuel".

Do not deliver fuel to clearly impaired vessel operators. Have your staff trained to call for management.

If a vessel is having mechanical difficulties, move them, or have them towed, to another dock away from the area used for dispensing fuel.

Have additional fire suppression materials at the ready and train your staff on their use. I recommend a system such as an Amerex wheeled fire extinguisher in sizes from 50 pounds on up. These types of systems are outlined in NFPA 10 in addition to NFPA 303.

THE BASIC DO'S AND DON'TS OF MARINA FIRE PREVENTION

DON'T

- NO BBQ on boats.
 - Designate a BBQ area in your marina where customers can safely BBQ that is well away from the docks and boats.
- NO Open flame fires on docks or boats, period.
- NO Heaters or other unattended electrical devices plugged into extension cords (see next bullet).
- NO extension cords running to who the heck knows where (probably a heater).
- NO "Hot Work" without properly gas freeing tanks or compartments.

DO

- DO Train, train, train.
- DO Drill with your local AHJ and employees.
- DO Inspect your facility regularly.
- DO Look for potential hazards (those extension cords, trash, oils, contaminants, etc.).
- DO Dispose of trash/oil/hazardous materials properly.
- DO Inspect shore power cords and other electrical

connections on the dock and shops.

- DO Properly store flammables, paints, thinners, and resins.
- DO Dispose of catalyzed resins properly.
- DO Have good signage. Include fire prevention rules and regulations.
- DO Post required NFPA 30A Signage at fuel distribution locations.
- Do Well mark your main electrical disconnects and train staff on where they are and how to use them.
- DO Have HHA's and Waivers signed by all customers, at all times for all business operations.
- DO Provide for proper access and fire lanes for emergency response.
- DO Keep offsite customer records.
- DO Document your buildings, vessel inventory (new, used, owned, rentals), tools and equipment, employee tools, supplies and equipment, contents, and other valuables so in case you need the information to present a claim, you have it already documented and ready to go.

side-track. Then Brownell invented the real game changer, the hydraulic trailer (and variations such as self-propelled hydraulic yard trailers). Together with

jack stands and dunnage, boats held for summer or winter storage could be placed, quite literally, inches apart. Even better, as now marinas have

indoor and outdoor rack storage. Now boats are nearly touching and five stories high. Good on the increase in revenue part, but really bad when it

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Multiple boats were destroyed in a fire ignited by a heater at Lincoln Harbor Marina in Weehawken, New Jersey.

Follow the Standards

The following are some standards that you and your crew should be familiar with. I recommend getting copies of the standards and keeping them in your management library. In addition to all of these recommendations, you should have a library of operation manuals at your staff's disposal. Training materials on machinery operation, rules and procedures, safety manuals and standards should be stored in this

library. As for standards, here are some of the most important standards that relate to the topic of fire and fire safety. Standards may not be law, but your local laws and ordinances may be based on these standards and the courts will most definitely rely on them in any contested case of liability.

NFPA 303 and 30A: The National Fire Protection Association (NFPA) is the standards-based organization for practically all industries, marina and

NFPA 30A 11.10.8 SIGNAGE REQUIREMENT

In red letters on a white background the following "shall be conspicuously posted at the dispensing area".

Before Fueling:

- Stop all engines and auxiliaries.
- Shut off all electricity, open flames, and heat sources.
- Check all bilges for fuel vapors.
- Extinguish all smoking materials.
- Close access fittings and openings that could allow fuel vapors to enter enclosed spaces of the vessel.

During Fueling:

- Maintain nozzle contact with fill pipe.
- Wipe up spills immediately.
- Avoid overfilling.
- Fuel filling nozzle must be attended at all times.

After Fueling:

- Inspect bilges for leakage and fuel odors.
- Ventilate until odors are removed.

boatyards included. While not law, the standards are utilized by the Authority Having Jurisdiction (AHJ) nationally to make laws and regulation. They are the recognized standards and, as such, should be adhered to. NFPA 303 is the Marinas and Boatyard standard and 30A is the Code for Motor Fuel Dispensing Facilities and Repair Garages standard. Chapter 11 within 30A is the chapter dedicated to Marine Fuel Dispensing Operations.

NEC 555 – National Electrical Code – Article 555: This is the section of the codes that deal with marina and boatyard electrical systems to include "the installation of wiring and equipment in the areas comprising fixed or floating piers, wharves, docks and other areas in marinas, boatyards, boat basins, boat houses, yacht clubs, boat condominiums, docking facilities associated with residential condominiums, any multiple docking facility, or similar occupancies, residential docks... and facilities that are used, or intended for use, for the purpose of repair, berthing, launching, storage, or fueling of small craft and the moorage of floating buildings." Pretty comprehensive and that is just part of the first paragraph of the standard. Suffice to say that you and your electrical contractor need to fully understand and comply with your jurisdiction's adoption of this code. The differences between 2014 and 2022 are vast.

ABYC TY 28 : American Boat and Yacht Council Technical Information Report. I threw this in because it deals with the boat lifting and storage ashore for vessels and it recommends that compliance with NFPA 303 standards for supplying power through only GFCI (Ground Fault Circuit Interruption) be adhered to. It also notes that, "No unattended electrical equipment should be in use while the boat is in dry storage."

Local Building Codes: Make sure you are in compliance with your local building, fire, and electrical codes. ⚓

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associated with the above heater issue is the use of extension cords. Again, it is usually not the cord, but what it is powering. As a marina or boatyard owner and operator, you just can't really know unless you trace the cord into the boat to find out. Usually, it is powering a heater or some other high amperage device and, again, the potential exists for a slow resistive buildup of heat and a resulting fire. So, my advice is simple. Boats in the water at slips should be using designated shore power systems only. Boats in dry storage should not have extension cords running to them while unattended. This should be enforced.

Your shrink wrap process also needs to be well-thought-out. Is shrink wrap material fire retardant? If you listen to the manufacturer of the material, they would have you believe that it is. However, in real life testing and fire cause investigations, it is not only not fire retardant, it is flammable and will propagate a flame. How do you shrink wrap? With an open flame gun, of

course. Worse yet, sometimes that gun is put on the end of a ten foot pole to extend its reach, and users may remove the guard from the gun to reduce weight. When the gun touches the shrink wrap material, it starts a fire that is not visible and 30 minutes later, a row of boats is aflame. No kidding.

A few other hot items to address include portable container storage of combustibles like paints, resins, thinners, acetones, and fuels. It is essential that these are stored in metal cabinets. Open containers are dangerous. Dispose of hazardous materials safely and away from structures if at all possible. Do not leave catalyzed resins unattended – ever. Dispose of them properly outside and in fireproof containers or drums. Then there is the need to gas free any and all tanks for hot work. This is a requirement under CFR 33, NFPA and several OSHA standards. So, what is “hot work”? It is not just welding. “Hot work” includes “electric or gas welding, cutting, brazing, or similar flame or spark producing operations”. Years ago,



This boat caught fire when a grinder sparked a gas vapor explosion at a New Jersey boatyard.

a friend of mine who owned a boatyard in New Jersey died while installing a fuel gauge sending unit in a customer's fuel tank. How, you wonder? He had to remove some caulking/sealant that was under the old sender, so he took out his trusty grinder. The tank bled (gas vapor explosion) and that was that. Very sad, but preventable had he just known or understood the risk.

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Part 2: Marina and Boatyard Fires – Prevention, Mitigation, and Response

By Daniel K. Rutherford, IAMI, CMI, LPI

Editor's Note: This is the second article in a two-part series about marina fire prevention. The first article Part 1: Marina and Boatyard Fires – Prevention, Mitigation, and Response can found on marinadockage.com.

The previous article highlighted some of the common risks and causes of marina fires and the standards marina owners and operators should adopt and follow in order to help prevent a fire. The following are some regular fire scenarios for marinas and boatyards and some observations and prevention recommendations.

Storage Yard Fire: There is a

concern for a lack of access to fight a fire in a jam-packed storage yard. Trying to access a row of boats that is behind another row (or two) of boats is practically impossible for responding firefighters. It is recommended that boats be placed in rows no deeper than two boats, with a fire lane behind the row of two and ahead of the row. That will give clear access for customers as



Fueling boats needs to be carefully overseen. A fuel leak led to this boat catching on fire.

well as first responders in the event of an emergency. Again, no extension cords should ever be running to stored

Covered docks are especially susceptible to fire. The covered docks at Markley Cove Marina on Lake Berryessa in California were completely destroyed in wildfire in 2020.

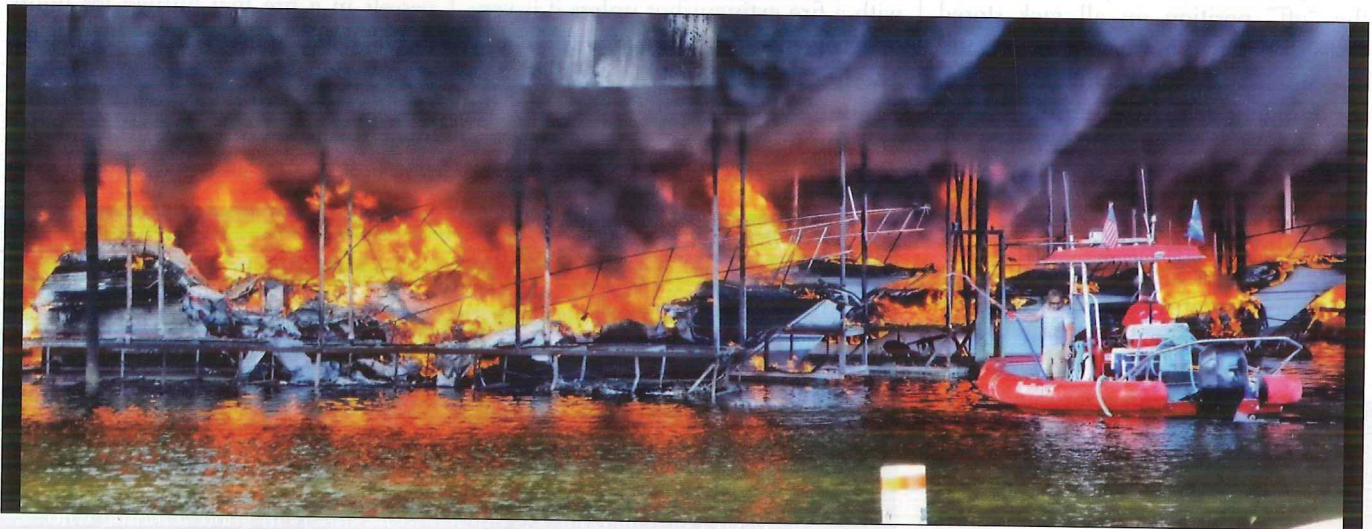




Several boats were destroyed in this fire inside a rack storage building. Photo courtesy of Dave Kacprowicz, Consolidated Marine Services, Inc., Erie, PA.



This rack storage building was completely destroyed in a fire.



This marina fire on Lake Texoma in Texas in 2017 was caused by a flash fire by a mechanic working on one of the boats. The fire destroyed one dock and more than 20 boats.

the heat and help spread the fire more rapidly than slips without covers. This is particularly true where the shed roofs are not vented. Heat and smoke retention make suppression activities particularly challenging. Essentially, the fire has plenty of oxygen entering the sides of the slip to sustain combustion, but the heat is trapped, thus further fueling the fire.

Fuel Dock or In-Water Fueling Fire: The causes of fueling fires can generally be lumped into the following two categories: operator error and vessel or vessel maintenance issues. Common operator error issues include introducing fuel into orifices not intended to accept fuel, and not checking the bilge and/or engine compartment for fuel or fuel vapor after the fueling process has ended. Fuel leaks at fill and fuel

supply hoses, fuel tanks, and sending units account for the root cause of a large majority of fires. This goes back to operator error, however, because if the bilges and engine compartment were checked before introducing electricity to the equation (starting circuits, wiring or pumps), then the hazard would be recognized and steps to mitigate that hazard could be taken. The days of the high school or college kids on summer break casually manning the fuel dock in their shorts and t-shirts are over. The fuel dock is, perhaps, one of the biggest profit centers at a marina, but it can also be one of the most dangerous. Fuel dock attendants should be very well trained. They should know how to deliver the proper fuel to customers, but also know what to do in the case of an emergency. There must be an emergency plan.

Every fuel dock operation must adhere to NFPA 30A.

Service Bay Fires: Ideally, the service bay should be away from other customer boats and property. This, of course, is not always feasible, so it is important to train the staff. Have fire suppression materials at the ready (more than recommended under NFPA 303 or NFPA 10) and train staff on how to use them. Again, no “hot work” unless tanks are properly gas freed. The local AHJ may require a certification prior to the commencement of work.

Prevention is Key

Train, train, train. There is no substitute for proper emergency training and that includes fire prevention and, if necessary, firefighting. There is a vast lack of experience within most

boats unless the boat owner/customer is present and using the cord. Make it a well-known rule that any unattended cords will be unplugged or simply disengage all exterior power outlets after the close of business. Adhere to the rule.

Inside Rack Storage: These fires typically cause utter destruction. Dry or wet suppression systems don't seem to cut it, regardless of what any Authority Having Jurisdiction (AHJ) thinks or requires. In most cases, boats can't be recognized after these types of fires. Engines (other than the iron blocks) are puddles of aluminum. When possible, battery switches should be turned to the "off" position on all rack stored boats. Ideally, marina owners and operators want to make the contents of the building as inert as possible. That means, no boats being serviced, no batteries charging, and no fuel or other hazardous materials being stored within the confines of the building.

Dock or Wet Slip Boat Fires: There are many concerns here. Lack of access being chief among them. Fire spread

due to wind and close proximity is another. When it comes to a fire at a dock, it is shocking how fast the fire "jumps" from the origin boat to the adjacent boat. Generally, there is a lack of suppression materials available. NFPA 303 requires a fire extinguisher every 75 feet (in a protective and well-marked housing) in any one direction. That means 150 feet apart. There is an additional requirement for an extinguisher to be within 25 feet of the entrance to the dock, presumably for someone running to assist so it is within reach. But it is nearly impossible to suppress a fire on a fiberglass boat with a fire extinguisher unless it is very early on in the fire progression. It can also be very dangerous to stick around. Some docks are fitted with dry or charged lines. This is great, if they are present and the fire crew knows how

to use them. If not, then one option is to tow any boat involved away from the other boats. This, however, is also dangerous and takes training and experience. It may also open a marina up to other liabilities. But if it is done as a preservation, any potential plaintiff would be hard pressed to make that case.

In-Water Covered Docks: Covered shed fires are perhaps one of the deadliest. In 2017, fire ravaged the U Dock covered slips at Highport Marina on Lake Texoma in Pottsboro, Texas. It took minutes for the fire to spread from the origin vessel to more than 20 vessels in a fire that burned for hours, if not days. In January of 2020, eight people perished in a covered shed fire in Jackson County, Alabama. Over 35 vessels were destroyed. Covered sheds, like indoor rack storage facilities, retain

IAMI LAUNCHES NEW FIRE INVESTIGATOR PROGRAM

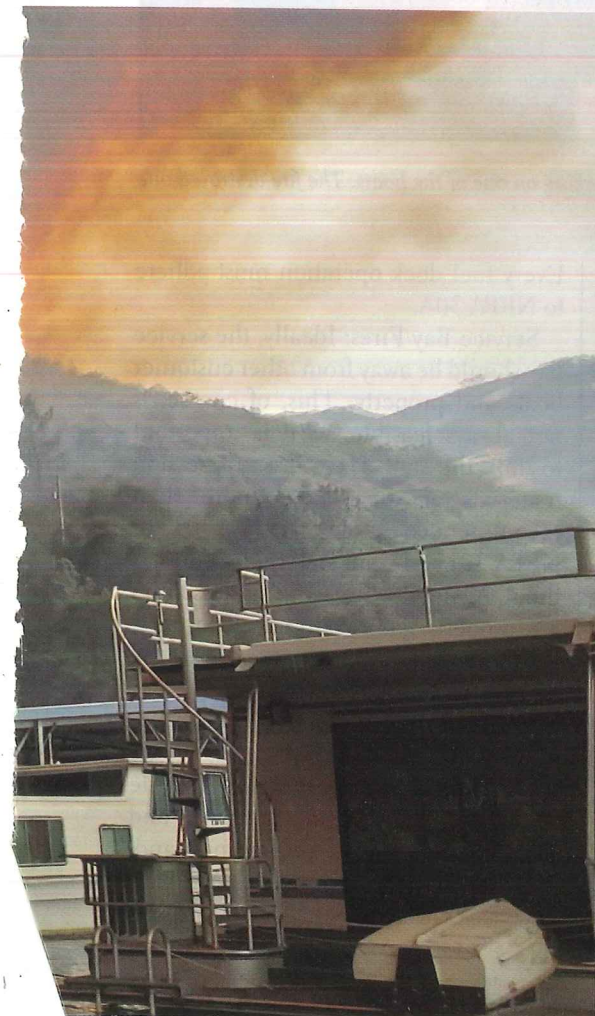
The International Association of Marine Investigators (IAMI) has launched a new marine fire investigation specific professional designation. The Certified Marine Fire Investigator Program (CMFI) was founded to provide an additional benefit to its members who specifically investigate marine vessel and marina/boatyard and marine facilities fires.

The CMFI designation(s) is limited to members in good standing who have attained and held the IAMI CMI designation for at least one year prior to applying for the CMFI. The designee shall have experience and/or training in a wide range of areas including, but not limited to, the detection, prevention, and investigation of vessel related thefts adjusting vessel related insurance claims, marine surveying, admiralty law as it is related to recreational vessel, origin and cause of fires, marine insurance policy interpretation, accident reconstruction, matters related to hull construction, and the operation and repair of motors. The applicant for the IAMI – CMFI shall hold a designated Fire Investigator certification from recognized state certification program or a certifying organization or association (NAFI – CFEI or IAAI – CFI).

Through rigorous examination, Certified Marine Fire Investigators have demonstrated their experience and training. In addition to their own area(s) of expertise, they bring a new dimension and insight into their respective fields of endeavor. From the beginning of a vessel fire, vessel explosion, or marina/boatyard fire and the filing of an insurance claim, the CMFI will be positioned to provide a complete and thorough investigation and analysis to their respective client.

IAMI has awarded the first CMFI designations to Bill Nolan of Fire Origin and Cause Unlimited Services (FOCUS) of Long Island, New York, Glen Lawson of Southern Forensic Services, LLC of Louisiana, and Captain Joe Derie of Southwest Passage Marine Surveys, LLC., of Portland, Oregon.

IAMI provides the highest level of marine related investigative training available today anywhere in the world.





Marina owners should develop a relationship with their local fire department so firefighters are familiar with the facility.

professional firefighting communities in the handling of boat and marina/

boatyard firefighting techniques. Most firefighters have never fought a fire on a dock or in a marina and most don't understand the fuel loads and unique set of circumstances that a marina or boatyard complex can throw at them. So, invite the local fire department to the facility. Have a BBQ and combine that with a training session. Show them the docks, the access points, the main electrical disconnects (which, by the way should be well marked and not be behind dumpsters or other equipment) and other peculiarities of the facility. Developing this relationship now and conducting regular training with the local department is an essential tool to both minimize risk and prepare for the worst. NFPA 303 requires training of staff and record retention of that training. Fire prevention is everyone's responsibility.

A fire is probably a marina's worst nightmare. But, to be honest, it is also one of the most preventable catastrophes. Aside from the random



Shrink wrap can catch fire, so it is important for marinas to follow strict procedures when using the material.

wildfire, most fires are the result of someone overlooking something or not following the rules. With proper awareness, training, and action, marinas can minimize the risk and if the worst happens, minimize the exposure. ⚓

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