

Protecting Your Institution From Wild Fires: Planning Not To Burn And Learning To Recover

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The fires in Florida have illustrated the need to insure that your institution, whether a library, museum, or historic site, is prepared to face the threat of rural wild fires. It's important, first of all, to understand that there are some dramatic differences between urban and rural fires.

Once a fire starts in a rural, outdoor setting, it is often very hard to control. Often adjacent property owners won't be as concerned as you are--and their woodlots may endanger you and your collections. Ribbons of urban sprawl have also made rural fires harder to control by breaking up the natural barriers, like swamps and wetlands, that used to help contain forest fires. In addition, wildland firefighters are trained to protect natural resources, not homes, buildings, and collections. Being located far from fire stations and perhaps even water supplies, further endangers your collections. Within minutes an entire building can be engulfed in flames and destroyed.

This publication is designed to help point out what you can do to protect your collections and also steps you can take during recovery efforts to help minimize the damage.

Fireproof your Institution's Property

- The first thing you can do is to make sure that your property has "defensible space." In a fire situation dead trees, shrubs, mulch, and the wrong plants can provide all the fuel necessary to turn a brush fire into a raging inferno. Removing the flammable vegetation reduces the threat of fire and increases the chance your institution will be spared.
- In pines make sure you have at least a 100 foot safety zone around the building. Elsewhere have at least a 30 to 50 feet safety zone.
- Remove all dead trees, plants, and shrubs. Reduce excess leaves, plant parts, and low-hanging branches. Eliminate the small trees and plants under trees--these allow ground fires to "jump" into the trees.
- Space trees at least 30 feet part and prune them to at least a height of 10 to 15 feet.
- Make sure that shrubs are at least 20 feet away from your buildings. Break up shrubbery plantings into "islands," with at least 15 feet of separation between them. Use non-flammable mulch, such as stone or gravel, around buildings.

- There are no "fire-proof" plants, but select high moisture plants that grow close to the ground and have a low sap or resin content. Groundcover that resist ignition include rockrose, iceplant, and aloe. Shrubs include hedging rose, bush honeysuckles, currant, sumac, and shrub apples. Hardwoods like maple, poplar, and cherry are more resistant than pine, fir, and other conifers. Check with your local agricultural extension agent for additional drought-resistant plants that are suitable for your area.
- Keep up with landscaping chores. Be sure to mow regularly, trim and remove dead wood, ensure adequate irrigation, and store all flammables at least 100 feet from collection storage buildings. At historic sites be sure that fire wood is at least 100 feet away from historic houses.

Plan Ahead

- If you do not have fire hydrants in close proximity to your institution, identify and maintain an adequate alternative water source, such as a small pond, cistern, or well. Be sure you have, and regularly test, a gasoline water pump to ensure you have access to these alternative water sources.

Consider installing outdoor cabinets with 1½-inch fire hoses and training staff to use them in emergency situations. At a very minimum ensure that you have at least one bibb on each side of your building and additional outlets at least 50 feet from the building. Be sure to have garden hoses at each faucet to reach the entire building and roof. Sometimes fires occur in the winter, so be sure that outside outlets are freeze-proof. Also consider the use of additives to the water that can increase effectiveness when fighting fires.¹

- Provide emergency vehicle access with properly constructed drives that are at least 15 feet in width. Avoid nearby trees and other obstacles.
- Provide quick access to fire tools--fire rakes, shovels, and ladders to reach your building's roof.

Build for Survival

- Make sure that your roof is fire resistant. Tile, slate, and metal are best. Otherwise, be certain that the roofing meets UL standards.
- Cover all exterior vents, attics, eaves, and air intakes with metal mesh screens no larger than 6 mm.
- Multipane windows with tempered safety glass are good investments in wildfire areas. So are fireproof shutters to protect large windows from radiant heat.

Some building materials--such as brick, stone, and concrete--are considerably more fire resistant than wood. However, if you have an existing wood building or a historic structure with wood siding, consider using a commercial fire retardant. These are applicable as either top coats over paint or as an ingredient in paint.²

- Ensure that interior furnishings are also fire resistant. For example, ensure that draperies are fire-resistant for additional window protection and move other flammable materials away from windows.
- Avoid using propane tanks near buildings, if at all possible.
- Make sure that your building meets all applicable fire codes. For example, if there is a fire, will your HVAC system either shut down or reverse fans to expel smoke out of the building? In the Contra Costa County (California) Courthouse fire, the HVAC system continued to operate, spreading thick smoke throughout the building--even into areas not affected by the fire. Also, do you have fire doors? These not only help contain fire, but they also help to contain smoke and soot.

Surviving Nearby Fires

Occasionally your institution may be in the vicinity of wildfires, but not actually threatened directly. Even under these conditions, however, you will almost certainly be exposed to large quantities of smoke (discussed below). Institutions are usually disinclined to turn off their HVAC systems, since they would lose not only cooling, but whatever dehumidification they normally have. Most facilities will continue to operate their HVAC system, but there are steps that you can take to reduce your smoke intake.

- Close all exterior doors, windows, and outside air vents. Set your HVAC, if possible, to use only recirculated air or at least minimize intake of outside air.

Install and constantly operate HEPA filters in your building.³ Replace the charcoal filters daily to help control the smoke smell.

- Check with your HVAC maintenance firm to see if your institution can use more effective filters--even if only for a few days--to help reduce the intake of filtration.

DON'T use electrostatic filters.⁴ Not only do they produce ozone, but they encourage the dust (and smoke particles) to settle out on your collections.

Evacuate When Necessary

- Remember that no collection is worth a human life. Be prepared so that if evacuation becomes necessary you and your staff can do so immediately. Here are tips to make the evacuation smoother.
- Be sure to have protective clothing you can wear during an evacuation--sturdy shoes or boots, cotton or woolen (even in summer) clothing, long pants, a long sleeve shirt, gloves, and a handkerchief to protect your face.

Collect all electronic data you may need in recovery efforts--such as catalogs and condition reports.⁵

- Close all windows, vents, doors (even internal doors), blinds or other non-combustible window coverings. Seal internal doors as well as possible. If nothing else is available, use duct tape--this will help contain smoke and soot, reducing its spread through your facility. Be aware, however, that duct tape can be difficult to remove from some building materials and should never be used on collections.
- Shut off gas at the meter. Turn off pilot lights, if necessary.
- Shut off HVAC system to reduce the spread of smoke. Leave heavy-duty commercial fans on inside the building to help air circulation.
- Move flammable furnishings and collections into the center of rooms, away from windows and walls.
- Leave electric lights on--these may help to increase the visibility of your building in heavy smoke. Also be sure that all security systems are left on.
- Seal outside air intake vents with precut metal or plywood. There are also commercial seals that can be used.
- Turn off propane tanks.
- Do not leave high pressure gas canisters on-site. You should either move them to a safe area or release all of the gas, take off the valves, and clearly mark them as empty.
- Leave outside sprinkler systems on. If there is time, thoroughly wet outside vegetation. If you can, place sprinklers on the roof and leave running--but be sure you have adequate roof drainage and that all drains are open.

Check with your local fire department to see if they use the Knox Rapid Entry System--a lock box that contains keys, allowing fire department access to your building in emergencies. If the system is available in your area you should be using it.⁶

Collection Storage Does Make A Difference

Experience from previous fires reveals that how collections are stored does make a difference. For example, files stored tightly in open shelves fared better than loosely stored files--the tight files allowed little oxygen in and often only the exterior edges were charred. Documents in filing cabinets, while protected somewhat from the flames, were subjected to very high temperatures. Under such conditions materials will warp (such as text blocks), melt (such as film and plastic), or in some cases actually vaporize. And all will become very brittle.

Personal Protective Equipment

Besides gloves, boots, and cotton clothing, you may also want to consider purchasing emergency escape hoods. These devices filter smoke and poisonous gases, providing additional time to escape fire conditions. They are widely used by airline crews and others in business and industry who need to ensure their staff has time to escape or time to help others. They are perhaps the single best personal protective device you can provide when fire is a threat. They are ideal for floor wardens, or others that are responsible for ensuring that areas are evacuated, as well as individuals who may have to evacuate through thick wildfire smoke.⁷

What is Smoke?

Smoke is basically fuel that didn't burn, made visible by the presence of small particles of carbon and other material. Complete combustion gives off light, heat, the gas carbon dioxide, and water vapor. Smoke contains these gases and the tiny particles known as PM10. PM10 stands for "Particulate Matter less than 10 microns in diameter". They include small droplets of wood tars (if originating from a wood fire), gases, soot, and ash. In fact, most smoke particles are less than one micron in diameter.

PM10s are so small that the body's natural defense mechanisms can't keep them from entering deep into the lungs--leading to serious respiratory problems. In fact, they are very efficient vehicles for transporting toxic materials, as well as bacteria and viruses. They become significant concerns at averages of less than 40 micrograms per cubic meter--and smoke from a single controlled burn in a fireplace can cause levels to exceed 200 micrograms per cubic meter in the outdoor air immediately surrounding the property. Since PM10s are so small, they may stay airborne for upwards of three weeks.

Wood smoke has been studied by the EPA and found to contain carbon monoxide, methane, VOCs, formaldehyde, benzene, acetic acid, formic acid, toluene, oxides of nitrogen, sulfur dioxide, organic carbon, and even traces of heavy metals. This may help you understand why smoke is not only so dangerous to people, but also collections.

Of course, in most situations smoke comes not just from burning wood, but a whole host of other materials--plastics, fabrics, foods, and other construction materials. These produce a range of toxic off-gases, as well as complex odors.

Synthetic odors are generated by burning plastics and synthetic textiles. This form of residue is typically black in color and smudges easily. Burnt wood, cotton, or paper products produce natural odors and the residues are typically gray to black and usually powdery. Protein odors result from burning meat, flesh, or grease and the residue is greasy and yellowish to brown in color.

Smoke may seem to dissipate quickly after a fire, but the rapid cooling of the particles of incomplete combustion leave a film and odor that penetrates throughout buildings and collections. The acidic nature of the film causes discoloration, corrosion, and overall damage.

Smoke can be classified as either driven or free floating. Driven smoke is energized and pressurized--it has force behind it. Vertical surfaces are the most common places where driven smoke will be found. For examples, walls catch driven smoke as it is being pushed through the building. In contrast, free floating smoke, which originated as driven smoke, has lost its energy and is typically found on horizontal surfaces where it has settled.

Fires may also be classified as having either low or high oxygen content and each produces different types of damage. For example, a low oxygen fire is a smoldering type and it will leave a wet, smoky residue. A high oxygen fire produces a dry residue that is often easier to remove.

You should also understand a little about the nature of fire. Fires produce intense dry heat. As the flames are extinguished, a hot, humid, smoldering fire is created. It is not uncommon to see

relative humidities range from as low as 2% in a fire to upwards of 100% as water is applied. This high relative humidity can cause extensive problems, especially among wood objects. Their pores open and the wood absorbs various odors which are often very difficult to remove.

As mentioned earlier, smoke is corrosive and can easily damage a wide range of collections. This damage is usually exacerbated if you touch the item with your bare hands--the combination of finger oils and the acidic by-products can etch into finishes and metals. As a result, it is critical that you always wear gloves during fire recovery efforts. Often the most suitable will be nitrile gloves.⁸

After a Fire

After a fire you will likely have several types of damage. Some collections or parts of your building will be water damaged. We don't discuss water damage here, although there are a variety of excellent sources for additional assistance. Some items will be heavily damaged by the fire--exhibiting ashing, charring, melting, or other distortion from the heat. Much of this material is likely not salvageable. The remainder may be lightly scorched, covered in soot, and have a strong odor of the fire. It is these materials that we will focus on this discussion.

The fire department will have equipment to help pump water out of the building and vent much of the smoke outside. You should ask them for their assistance and advice--they have a lot of experience dealing with different types of buildings and different conditions of fire damage.

After this you should immediately contact your insurance carrier and notify them of the fire and/or smoke damage. You should ask for immediate assistance from a senior adjuster, explaining the unique nature of your collections and that salvage is time sensitive. A study after the 1985 Huntington Art Gallery fire found that some soot materials became harder to remove from collections through time.

No matter how bad the fire or smoke damage, remember that life safety must always be the first concern. Fires can release a number of hazardous materials--PCBs from transformers, toxic chemicals from labs, asbestos from insulation of pipes. Even after a fire electrical lines can still be energized--and deadly. The building should be carefully examined by your engineer to ensure that it is safe to enter.

If recovering yourself, it will help to prioritize collection damage. After the 1995 Contra Costa County (California) Courthouse fire, documents were classed as level 1 or 2, depending on the heaviness of the soot. Such records needed cleaning, but little else. Level 3 records were scorched, but not burned. These required cleaning, but brittleness became a major issue in handling and cleaning. Often such materials need support during handling (you can use strong paper or cardboard, which should be in your recovery supplies). Level 4 documents were burned, but had little or no information loss. After cleaning they could be trimmed to remove the burnt areas. Or they could be immediately copied⁹ Level 5 documents had lost all or nearly all of their information content.

Keep in mind that even seemingly unaffected items may have suffered damage in a fire. For example, the high temperatures of fires can melt adhesives or plastics and distort textblocks. Films and tapes inside containers can be much more damaged than it appears from a cursory glance of the container itself.

You may also discover that much of your institution's floor is covered in a mass of charred timbers, broken materials and glass, and a soup of soot and water. Consequently, you must begin by sorting through this slush so that additional damage isn't done by walking on collections. Since these materials will likely already be waterlogged, you will probably do well to rinse them off--they will be easier to treat if they are recognizable as collection objects. You will also want a large number of disposal trays (disposable aluminum baking pans work well) in which you can begin the process of sorting out different materials.

Salvage of the Building

Use HEPA vacuums to remove the dry soot and any chemical residue left by extinguishers. If possible (without endangering collections) open the building and use fans to ventilate, helping to remove the smoke smell. Staff undertaking recovery will want to wear gloves. Often goggles and boots will be appropriate. Likewise, HEPA respirators may be necessary. Remember that throughout recovery, personal safety must be the major consideration.

Because of their soft surface, dry cleaning sponges are ideal for removing loose soot and smoke from latex paint, blown ceilings, and acoustic tiles.¹⁰ The sponges are used dry and you should begin on the ceiling, since debris will drop down. Then move to the walls, again beginning at the top and working to the bottom using straight, parallel strokes that overlap a little. When the surface of the sponge becomes clogged with soot, simply skim it off with a knife to reveal a new cleaning surface.

Made from vulcanized natural rubber, these sponges leave behind a large quantity of particles or crumbs embedded with soot. These should be vacuumed up since they are not only dirty, but the rubber will become gummy through time.

Dry cleaning sponges are not recommended for oil-based paint, acrylic paint, or vinyl wallpaper. Nor are they recommended for the greasy soot resulting from kitchen fires or the burning of meat or flesh. For these surfaces, and this type of soot, your best approach is to use a regular sponge and a strong detergent capable of cutting through grease. Pine cleaners are often recommended, although there are a variety of "kitchen" detergents and you should probably try several to see which works best in your particular situation. There are also a variety of industrial products made for the removal of soot--contact your local janitorial supply company. But be aware that many of these commercial products are much harsher (for example, one product, SuperKleen, has a pH of 12) than those used by homeowners. It's best to test first and also wear protective devices.

Be sure to clean Formica and chrome fixtures in kitchens and bathrooms to prevent permanent staining (the acidic soot will etch these materials). Likewise, quickly wipe down porcelain fixtures.

It is essential, however, that you remove all of the soot--the sooner it is gone the sooner you will begin to get some control over the fire smell. If structural framing is damaged, some portions may need to be replaced. But even scorched timber should be cleaned to remove the smoke smell. This is typically accomplished by using a sealant¹¹. Another approach, however, is the use of a "soda blaster"--which uses baking soda (sodium carbonate) as the blasting media to remove the charred wood.

Historic buildings present a range of additional, and difficult, recovery situations. All architectural remains should be collected--nothing should be thrown out. Many items can be cleaned and re-installed. Others, such as plaster ornaments, may have portions still intact that can be used for molding replacements. Tiles and flooring, while perhaps not recoverable, may be sufficiently intact to guide replacement efforts. Even burned or scorched paneling or wall coverings should be retained since they may serve as models for replacements or may actually be salvageable. If a historic building has been involved, it is essential that you bring in an architectural conservator who can work with you to sort out the lost from the salvageable.

Salvage of Collections

It is almost always important to call in preservation and conservation experts to assist in the salvage of collections. The suggestions offered here are not intended to be a replacement for the advice of individuals who have the opportunity to examine the damaged or affected collections and develop treatments specifically for those items. This information, however, may be of assistance when preservation/conservation assistance is not immediately available.

Many items can be cleaned by simply vacuuming--using a HEPA filter. Also be sure that the floors of areas which are not heavily involved are protected from soot, drips, and stains--cover them with plastic (but be aware of the slip hazard) or towels. Also understand that the smoke odor, often overpowering, will be transferred with the soot and smoke damaged collections.

You should inventory, photograph, and note the treatment that each object receives.

Carpets-- If covered with water and other debris, carefully sweep the debris off, roll them up, and remove them to a safe spot where they can be unrolled and rinsed off with low pressure water, such as from a garden hose. Be very careful in the transfer, since the fabric will almost certainly be weakened by the weight of the water. Most will require additional cleaning, using a product such as Triton-X¹², with repeated rinses. They will then likely require drying on non-rusting metal or plastic racks with about a 2-inch mesh.

Costumes-- Separate costumes into two groups: those which can be safely cleaned commercially and those which cannot. Tests on modern materials reveal that a combination of liquid and dry detergents with bleach were most effective at removing smoke damage--although such harsh treatments should only be used on modern materials and not collections. A safer approach, suitable for cottons and polyesters is the use of a warm water wash with liquid detergent. Up to five washings may be necessary to remove the visible smoke and the smell. Typically dry cleaning is less effective at removing the smoke odor than detergents. Some dry cleaners use ozone to remove smoke odors and this should be avoided (see discussion below). More delicate

textiles should be vacuumed, being sure to use a screen to prevent small, fragile items from being sucked into the vacuum tube.

- **Wood furniture--** Most furniture can be cleaned using cotton swabs wetted with mineral spirits. Afterwards the wood should be buffed with diapers or other soft, lint-free cloth. You should be careful to avoid damaging loose veneer (which will require reattachment) or gilt bronze mounts (which may be cleaned with ethyl alcohol).

Bronze statues-- These can be cleaned with cotton swabs using a mild soap (Orvus Wa Paste¹³) and distilled water solution. They should be immediately buffed dry with diapers.

- **Paintings--** Typically paintings will need to be unframed so they can be cleaned separately from the frames themselves. Be careful, however, to inspect each painting for loose or flaking paint. If stable, most paintings can be cleaned with mild solvents (such as water, Orvus Wa Paste and water, or VMP naphtha) that will remove the soot without affecting the varnish layer. Gilt frames will most likely require cleaning with mineral spirits, but again it is essential that care be taken not to remove fragments of the gesso on the frames.
- **Upholstered furniture and other textiles--** conservators have developed a range of techniques to clean these materials. One approach used in the Huntington Art Gallery fire was a solvent activated poultice, when objects couldn't be washed with water. The treatment used a rice hull ash poultice and a type of freon as a solvent. The ingredients were mixed, spread on the textile, and covered with plastic. After about 45 minutes to an hour the plastic would be removed, the poultice was allowed to dry, and then vacuumed off the textile.
- **Books and paper--** Paper materials may be treated by either vacuuming (using a HEPA vacuum) or wiping down with a dry cleaning sponge. Special attention should be paid to the headcap, where soot may have settled. Be sure to keep the book closed tightly, to prevent the soot from being forced into the text block. Individual paper documents will likely require individual cleaning of both sides of the document using dry cleaning sponges. Afterwards be sure to vacuum up all particles of the sponge, using if necessary a screen to prevent damage to the document.
- **Silver and glass objects--** These may be washed in a warm water and Orvus Wa Paste solution. Silver should be thoroughly rinsed, first with water and then with ethyl alcohol. The alcohol will allow faster drying, ensuring that no moisture is trapped in crevices. For silver be certain that the piece isn't weighted with plaster--such items should never be wetted. And for glass be careful not to loosen previous repairs.

Using Restoration Companies

There are a number of companies that offer fire restoration service. These services typically include board-up (of windows and doors) and cover-up (of roofs) service, moving out collections, cleaning, smoke odor removal, cleaning and restoration of electronics, structural repair, and control of corrosion. Before jumping at such services, however, be sure you understand what will be done--and how.

Several issues require your attention. First, how well trained are the individuals who work for the restoration company?

Many restoration companies send a manager and a couple of key team members, but hire the remainder of their labor from the local market. This means that many, perhaps the majority, of the individuals working in your institution may have absolutely no disaster recovery experience. Consequently, you should insist on having a clear, and detailed, account of how these individuals will be trained--not only to perform recovery operations, but also on how they will treat your collections. You should also insist on appropriate insurance coverage protecting your building and collections. You may also want to insist that individual workers are bonded.

The second question you should consider is whether the techniques they propose are appropriate for your collection? What is typically used, and is perhaps appropriate, in a household setting may not be acceptable for your collections. For example, most commercial restoration companies like to use a variety of chemicals--chemicals to seal in soot, chemicals to treat for mold, chemicals to reduce the smell, chemicals to clean items, and even chemicals to "eliminate" the smoke odor. What are these chemicals and are they appropriate? Without insisting on step-by-step explanations and doing research yourself, you may wind up causing more harm than good.

Realize also that restoration companies have relatively few opportunities to work with collections. Even fewer have trained conservators on-staff. So be wary of claims for services such as "fine art cleaning and restoration" or "restoration of books and documents." Remember, it is up to you to ensure that the techniques are appropriate and are being done by individuals with appropriate training and expertise.

There are a range of professional restoration organizations. Examples include the Association of Specialists in Cleaning and Restoration (ASCR International), the National Institute of Disaster Restoration (NIDR), and Institute of Inspection, Cleaning, and Restoration Certification (IICRC).

Some of these organizations have very specific training requirements. For example, to become Certified by the National Institute of Disaster Restoration division of ASCR, an individual must work in the field for at least three years, attend at least one ASCR seminar within a year of their application, provide information on their business background, and provide evidence of good character and business reputation. Then they must attend the Certified Restorer School, earning at least a grade of 80% on the written exam, subscribe to the code of ethics, and complete a formal report on a restoration project. While none of this guarantees competency, it does indicate that an individual is willing to invest considerable effort, time, and money in attaining their certification.

You should ask what organizations a company belongs to and whether individuals in those organizations are certified. But remember, there is a big difference between a "restorer" and a "conservator." Carefully consider the value of your collection and determine the minimum qualifications of the individuals you want handling and treating your objects.

Removing the Smoke Smell

One of the biggest concerns among most institutions is getting rid of the odor of a fire. Unfortunately, this is also among the most difficult activities. Records which survived the 1906 San Francisco fire and are today in the National Archives still smell strongly of smoke--over 90 years later.

Besides the use of chemicals to mask the smell, there are two general approaches used commercially. One is called Thermal Deodorization and the other is Ozone Treatment. Neither are acceptable for valuable museum, library, or archive collections.

Thermal deodorization uses high temperatures to drive off the smell. Having survived the fire, and suffered the resulting damage such as premature aging and increased brittleness, you should not subject collections to yet additional stress. Thermal deodorization is unacceptable and should be avoided.

Ozone treatments use ozone generators to create large quantities of ozone (O₃)--a very powerful oxidizer that attacks virtually all organic materials. When humans are exposed to ozone it causes irritation of lungs, eyes, and skin. When collections are exposed to ozone it will deteriorate leather, alter dyes, embrittle paper, and fade inks. In other words, it prematurely ages virtually everything in collections. Consequently, it, too, should never be used as a means of eliminating the smoke odor.

Unfortunately, this just about eliminates the arsenal of the professional restoration company. You do have some options--although none are "silver bullets." As explained earlier, you should clean everything--floors, walls, ceilings, carpets, drapes, furnishings. Structural damage should be sealed or replaced. By getting rid of as many odor sources as possible you will minimize the problem.

You should also flush the building with large volumes of fresh, clean air. If it is impossible, or impractical to open the building to gain fresh air, then use HEPA filters to capture the fine smoke particles. Just remember to change filters often.

For a small number of relatively small objects, you can seal the items in a plastic bag with baking soda, clay cat litter, or activated charcoal--all will, over time, absorb much of the offending odor.

Remember, too, that the source of the odor can be very complex. For example, with furniture, the smell may be literally on the surface in the soot; or it may be impregnated into the finish, which perhaps softened during the fire; or it may actually be in the pores of the wood, especially if the furniture was exposed to high humidity levels during the fire. Consequently, there will likely be some objects that retain the fire smell for very long periods of time. However objectionable this smell may be, you will do your collection far more harm by subjecting it to either thermal or ozone treatments.

¹ One such product, the Fire Blaster, is manufactured by Crestline Industries, Inc., 11436B Cronridge Drive, Owings Mills, MD 21117, 410/654-9730. This is a "gun" that attaches to a

garden hose and provides up to 8 minutes of concentrate/water mixture for Class A fires. The mixture is 20 times more effective than water alone.

² One such product is manufactured by Crestline Industries, Inc., 11436B Cronridge Drive, Owings Mills, MD 21117, 410/654-9730.

³ There are a number of models, including Holmes and Honeywell. They are typically available at discount stores, large home centers, and at industrial supply companies like Graingers. Purchase enough to filter the actual square footage involved, even if this requires operating 10 to 20 units.

⁴ There is some filter media that is "electrostatically charged." This is acceptable. Avoid electrostatic filters that operate using an electric current.

⁵ Remember that there are big differences between fireproof safes and fireproof media safes. Regular safes, designed for paper materials, will have higher internal temperatures and humidity levels. In contrast, media safes must maintain an internal temperature no higher than 125°F for at least one hour. And some media safes provide even lower temperatures, required for many back-up tape technologies. One such safe is manufactured by Media Protection Products, 2495 Main Street, Suite 547, Buffalo, NY 14214, 800/445-3309.

⁶ For more information concerning the Knox Rapid Entry System you can contact your local fire department or The Knox Company, 17672 Armstrong, Irving, California 92714, 800/552-5669.

⁷ One device is the EVAC-U8, manufactured by Brookdale International Systems, Inc., #1-8755 Ash Street, Vancouver, B.C., Canada, V6P 6T3, 604/324-EVAC.

⁸ One supplier is United Laboratory Plastics, PO Box 8585, St. Louis, MO 63126, 800/722-2499.

⁹ Be aware, however, that the courts have not determined whether copied information is admissible, so it may be necessary to retain, in storage, the original records.

¹⁰ These sponges are available from preservation supply companies such as University Products, Inc., PO Box 101, Holyoke, MA 01041, 800/628-1912, or from several manufacturers, including Quality Rubber Company, Inc., PO Box 71, Sedalia, MO 65301, 813/397-8802 and The Gonzo Corp., Canton, MA 02021, 800/221-0061.

¹¹ One such sealant is Fix Soot, distributed by PCS, 1450 N. Hundley, Anaheim, CA 92806, 800/368-1247.

¹² Available from preservation supply companies such as University Products, Inc., PO Box 101, Holyoke, MA 01041, 800/628-1912.

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