



Fire Prevention and Safety on the Farm

SOUND MANAGEMENT PRACTICES FOR PRODUCERS

Fire prevention is critical on any farm, but sometimes overlooked until it is too late. The heat and smoke of fire, along with the toxic gases and rapid loss of oxygen, can kill quickly. Without prevention and safe management practices, you put your own life at risk, as well as that of family members, employees and animals. On top of that, your farm buildings, equipment and means of earning an income can be wiped out in minutes. Safe management practices can make the difference.

For starters, you should:

◆ **Avoid “building in” fire hazards in the initial construction of your farm buildings and management practices. For example, use all noncombustible or flame-retardant materials possible. Also, keep motors and machine tools free of dust and grease.**

◆ **Fight fire before it starts by keeping all ignition sources away from combustible material in and around your farm buildings.**

◆ **Get proper fire insurance coverage for your livestock, buildings and equipment.**

MAKE TIME FOR INSPECTIONS AND FIRE DRILLS

- ◆ *Invite your local fire department to your farm.* Let them get acquainted with your facilities and help identify any fire hazards. Ask for their input in making your operation more fire-safe and fire-proof.
- ◆ *Develop and carry out a fire safety inspection for animal buildings and other buildings.* Follow a routine preventive maintenance schedule and checklist for fire hazards.
- ◆ *Conduct regular fire drills, so all family members and employees know what they should do.* After a drill, hold a meeting to discuss improvements in procedures and equipment. Educate yourself and others about fire safety practices.
- ◆ *Update and upgrade your farm buildings in accordance with the latest National Electrical Code.* Use all noncombustible materials. Install a lightning protection system and inspect it periodically.

KEEP THINGS CLEAN AND IN GOOD REPAIR

- ◆ *Make good housekeeping part of your daily routine.* Cut down and remove weeds and brush from around buildings. Keep work areas clean, dry and unobstructed. Never block exits or aisles, even for a few minutes. If you have a poultry building, check for excessive accumulations of dust, down feathers or cobwebs on sides, roof or rafters. Find a place for everything and keep it there.
- ◆ *Test your fire or smoke alarm system at least once a year.* Likewise, flush outside private fire hydrants at least once a year. Check fire doors and shutters on a regular basis to make sure they are free of any obstructions and in good operating condition. Check all water control valves and air and water pressures of automatic sprinkler systems every week.
- ◆ *Make sure that power needs for ventilation, feed distribution and other functions are met without overloading your electrical system.* Follow the National Electrical Code. Use good material and proper fuse size or circuit breaker rating. Use junction boxes at all splice points. Use waterproof wiring and receptacles, enclosed electric motors and similar equipment in any buildings which are cleaned periodically with high-pressure equipment.

FIRE EXTINGUISHER TIP

Remember the phrase P-A-S-S if you attempt to put out a small fire with an extinguisher. P is for pull the pin of the extinguisher (or with some units, Press the puncture lever or release the lock hatch); A is for aim low or point the unit's nozzle at the base of the fire; S is for squeeze the handle to release the extinguishing agent; and the other S is for sweep from side to side. Keep the extinguisher aimed at the base of the fire and sweep back and forth until it appears to be out. Never turn your back on a small fire, even if it looks as if it is out. Be prepared in case it flashes again.

Additional resources:

Your local fire department, the National Fire Protection Association, your county agricultural agent

Related publications:

"Fire Control in Livestock Buildings," (NRAES-39), a publication of the Northeast Regional Agricultural Engineering Service.

The National Fire Protection Association Catalog, available by calling (800) 344-3555.

- ◆ *Inspect all wiring and electric motors and appliances* for exposed wires, broken insulation, improper grounding and improper installation. Equip motors with thermal overload relays or cutouts.
- ◆ *Check the heating system* to make certain that every furnace or stove is in good repair. See that ducts and air shafts are clean of dust and debris, motors are cleaned and oiled (if necessary) each season, and pulley belts are in good working order. Check gas and fuel oil systems for leaks and unsafe installations. Keep all types of heating devices and other equipment clean and in good condition.

MINIMIZE HAZARDS ON SITE

- ◆ *Strictly enforce a "no smoking" rule* inside any buildings or areas where flammable and combustible materials are stored. Never smoke near storage, shipping or receiving areas where boxes or other containers can easily start a fire.
- ◆ *Be extremely careful when handling gasoline.* It is flammable and explosive. If your clothing becomes contaminated with a flammable material, change immediately. Never refuel gasoline engines while they are running or hot.
- ◆ *Keep flammable liquids in labeled safety containers and store them in approved flammable-liquid safety cabinets.*
- ◆ *Keep above-ground fuel storage tanks at least 40 feet from buildings.* This setback minimizes the potential for fire spread and generally is required for compliance with Wisconsin's Flammable and Combustible Liquids Code, ILHR 10. For more information, contact your regional storage tank inspector at the Department of Industry, Labor and Human Relations.

KNOW YOUR FIRE EXTINGUISHERS

- ◆ *Select and provide proper fire extinguishers.* Always make sure the unit on the wall matches the type of fires that could develop in that area. There are different types of extinguishers for different kinds of fires. If you use the wrong unit on a fast-moving fire, you can cause the fire to spread even faster.
- ◆ *Read the extinguisher's instructions to learn how to use the extinguisher before a fire ever starts.* Make sure all extinguishers are serviced, maintained and tagged at intervals, not to exceed one year.
- ◆ *Know your limits and always think safety first.* Fire extinguishers cannot do the job of a local fire department. When a fire burns for more than a couple of minutes, the heat starts to build up and intensify. Once that happens, you are past a point of first aid. Get out of the building and let firefighters handle the situation.

Farmstead Evacuation During a Fire

SETTING PRIORITIES IN AN EMERGENCY

Fires are dangerous anywhere, but on the farm they pose unique perils for animals and their owners. Toxic fumes can kill or cause permanent lung damage. Panicked animals behave unpredictably or refuse to respond to normal handling approaches. They may trap themselves and their rescuers in a rapidly spreading fire.

Work with your local fire department to minimize fire risk on your farm. Formulate an emergency fire plan and practice it regularly with family members and employees. Likewise, conduct periodic fire safety inspections. (See the fact sheet “Fire Prevention and Safety on the Farm.”) Above all, remember that your first priority should always be human safety—and that includes you.

PRIORITIES

People have been seriously injured or killed when trying to save animals, grain or equipment on their farms. They forget that smoke and toxic fumes can kill them in seconds.

- ◆ *Human safety, including your own life, must be your first priority.* Make sure you, your family members and employees are safe. Call the fire department immediately and let the experts take control. If you can use a fire extinguisher on a small fire, do so. But realize its limitations in the face of a fast-moving blaze.
- ◆ *Your property, as a business investment, comes second.* When your farmstead is burning, it's time to make your hardest business decisions. Firefighting crews may ask you which building to save first, second, third, etc. Ask yourself if it is more important to save livestock, machinery or feed. If a livestock building is on fire, animals may already have been exposed to deadly heat, smoke and gases. It may be safer and more realistic to save an adjacent building or vehicles stored inside it.

CALLING THE FIRE DEPARTMENT

- ◆ *When calling the fire department, be prepared to give accurate and complete information, including:*
 - a) The exact location of your farm.
 - b) The extent and location of the fire.
 - c) The color of smoke coming from the burning structure(s). For example: “A lot of black smoke is coming from the back of the vehicle storage building.” This helps firefighters know what materials are burning and what materials they need to fight the fire.
 - d) Anything else the dispatcher requests. Stay on the line until the dispatcher is through collecting all the necessary information.
- ◆ *Make sure the fire department has complete access to the blaze.* Do not let vehicles, livestock or people block the driveway or access to buildings. This is a typical problem for firefighters. It can only lead to greater damage and danger for all concerned.
- ◆ *Alert firefighters to potential hazards, including pesticide and chemical storage areas and fuel tanks.*

AFFECTED LIVESTOCK

If animals have suffered from heat, smoke inhalation or burns, get a veterinarian to examine and treat them immediately. If possible, spray water on animals to cool them.

Some animals may need to be destroyed. According to meat safety laws in Wisconsin, animals that have died from fire (or any means other than slaughter) are automatically condemned and cannot be sold for food. Injured animals need state certification from a veterinarian before they can be sold for slaughter. For more information, call the Meat Inspection and Safety Bureau at the Wisconsin Department of Agriculture, Trade and Consumer Protection at (608) 266-2227.

LIVESTOCK BUILDINGS

Livestock evacuation is very risky business. If fire or smoke is significant within an animal building, the danger is generally too great to risk your own life. Some considerations include:

- ◆ *Smoke, fire, burning insulation and toxic fumes.* Some types of insulation consume oxygen, give off poisonous smoke or “rain fire” — that is, they may melt and drip as they burn. Fiberglass doesn't burn. Be aware of the type of insulation in your barns and anticipate how it might react in a blaze. Remember that smoke inhalation and heat already may have harmed your animals to the extent they need to be destroyed. Don't be the next victim.
- ◆ *Animals may refuse to leave the building.* Cows and horses tend to panic if they are frightened or forced to use a secondary exit. In some cases, evacuated animals run back into burning buildings. Some farmers have had luck leading a few panicked animals out by throwing a gunnysack over their heads.
- ◆ *Don't become trapped.* If you are able to evacuate animals, be sure you are not leading them toward a dead-end, such as a gate that won't open outward.
- ◆ *Containment may be the best answer.* Oxygen fuels a fire. Sometimes it is best to close the doors and wait for the fire department. Poultry buildings, especially, are prone to flash fires because of their construction and the large amounts of dust inside. If you open the door, a burning poultry building is likely to burst into flames.
- ◆ *Smoldering hay.* If hay is slowly smoldering in an upper level of a barn or silo, call the fire department and, if possible, begin evacuation. This is one instance where you may have enough time for a quiet, orderly evacuation. DO NOT try to throw smoldering hay out a window or door; exposure to oxygen fuels a blaze.

Additional resources:

Your local fire department, your county agricultural agent, the National Fire Protection Association

Related publications:

“Fire Control in Livestock Buildings,” (NRAES 39), the Northeast Regional

Clean-up After a Fire on the Farm

SAFETY CONCERNS AND WHERE TO GO FOR HELP

Hazards may still exist after firefighters leave the scene of a farm fire. Contaminated water runoff and hazardous debris are two of the most common challenges for farmers during clean-up efforts. With a little foresight, you can avoid injury to yourself, your family and your livestock. You also can streamline clean-up and rebuilding.

GENERAL GUIDELINES

- ◆ *Contaminated water runoff.* When water used in firefighting mixes with pesticides, fuels or other hazardous materials, the result is a harmful runoff. It poses an immediate threat to groundwater (including your wells), surface water, humans, animals and the environment. By law, appropriate steps must be taken for containment and clean-up.
 - a) *Notify authorities.* If hazardous materials have been released in the course of firefighting, local and state authorities must be notified and consulted for legal clean-up methods. Immediately contact your Local Emergency Planning Committee (LEPC), as well as the Wisconsin Division of Emergency Government Spill Hotline at (800) 943-0003.
 - b) *Containment.* In some cases, the fire department may help build dikes or ditches to help contain water runoff until local emergency response teams (hazardous materials specialists) arrive. In other cases, emergency response teams will be called in to contain and clean up the spill. If a spill is very small, officials may request that you clean up the spill and dispose of waste at the next Agricultural Clean Sweep event. In either case, try to direct hazardous runoff away from porous (sand or gravel) soils to avoid groundwater contamination.
 - c) *Take safety precautions.* Wear protective gear if you must enter a contaminated area, such as a flooded pesticide storage room. Keep livestock away from contaminated waters. Place warning signs on contaminated areas and/or fence them off so that livestock, children or others aren't accidentally exposed.

- ◆ *Building debris.* Before beginning clean-up, take photographs or make a videotape of damage. This will be helpful for insurance records and/or income tax loss deductions. Also, have an insurance adjuster inspect the premises. Based on insurance reimbursement and advice from a building inspector or contractor, make decisions about whether to rebuild or restore existing facilities (See the fact sheet, "Salvaging Buildings After a Fire.") Some clean-up suggestions:
 - a) *Turn off the power to damaged buildings.* Normally, power is shut off during firefighting. Nevertheless, be absolutely sure you are not dealing with live wires.
 - b) *Wear protective gear and use caution.* Falling debris, exposed nails, glass, contaminants and sharp edges all pose hazards during clean-up. Wear steel-toed boots, a hard hat, gloves and other protective gear when necessary.

- c) *Ask about local and state requirements for refuse disposal, including any special requirements for livestock killed by fire.*
 - d) *Hire a professional contractor for demolition. A professional is your best bet for safe, efficient clean-up.*
- ◆ *Farm equipment and vehicles.* Contact your insurance agent to ascertain coverage and decide whether restoration is feasible. Even if vehicles were not burned, heat can damage rubber, plastic, glass and paint. If farm vehicles and field equipment have sustained only minor to moderate smoke damage, specialty cleaning companies can provide steam cleaning. Smoke cannot get into sealed engines, so reconditioning usually is not a concern. For milking equipment, contact the manufacturer about clean-up and testing services.

Additional resources:

Your county agricultural agent, your insurance agent

Salvaging Food After a Fire

WHAT'S SAFE WHEN THE WORST IS OVER

Use extreme caution when trying to save food after a fire. Food and utensils damaged by heat, smoke, chemicals or water may not be safe to use. Food in cans or jars may appear to be okay. But if it has been close to the heat of the fire, it may no longer be edible. Heat from the fire can activate food spoilage bacteria or cause undesirable flavor changes.

Toxic fumes can contaminate food items as well. Items stored in permeable packaging should be thrown away. If you detect an off-flavor or smell in refrigerated foods, dispose of them as well. Your family's health is not worth the risk.

WHEN IN DOUBT, THROW IT OUT

Be thorough in inspecting kitchen items for water, smoke, chemical and heat damage. When in doubt, throw it out.

- ◆ Throw out any of these items if they have come in contact with waters or chemicals used in fire fighting:
 - a) Fresh produce, meat, poultry, fish and eggs.
 - b) Opened containers and packages.
 - c) Containers with peel-off tops, or cork-lined, waxed cardboard or paraffin (waxed) seals.
 - d) All food in cardboard boxes, paper, foil, plastic, cellophane or cloth.
 - e) Spices, seasonings and extracts, flour, sugar and other staples in canisters.
- ◆ Throw away any items that were charred or near the fire. Heat damage may not be apparent on the outside of canned goods, but extreme heat can harm the contents. Throw them away.
- ◆ Throw away any raw foods stored outside the refrigerator like potatoes or fruit, which could be contaminated by fumes or chemicals.
- ◆ Disinfect cans that have no heat damage and are free from dents and rust. Mark contents with an indelible pen, then remove the label. Clean with detergent and scrub brush. Immerse for 10 minutes in a warm solution of chlorine bleach and water — 2 tablespoons of bleach per gallon of water.

REFRIGERATION AND FREEZER CONCERNS

Refrigerator and freezer seals may not be air-tight. If food has an off-smell or flavor when it is prepared, throw it out.

If the electricity is out to the refrigerator or freezer, follow these guidelines:

- ◆ Discard refrigerated meats, seafood, milk, soft cheese, eggs, prepared foods and cookie doughs if they have been kept above 40 degrees F. for over two hours. Also discard thawed items that have warmed above 40 degrees F., with the exception of breads and plain cakes.
- ◆ Discard any refrigerated items that turn moldy or have an unusual odor or appearance.

- ◆ Refreeze partially or completely frozen foods.
- ◆ Cold but fully thawed, uncooked meat, fish or poultry should be checked for off-odor. If there is none, cook and eat or cook and refreeze.
- ◆ Discard combination dishes such as stews, casseroles and meat pies if they are thawed.
- ◆ Refreeze thawed (but cold) juices, baked goods, and dairy items such as cream, cheese and butter.
- ◆ Do not refreeze thawed vegetables unless ice crystals remain. Cook and use them if there are no off-odors.

Additional resources:

Your county family living agent, the American Red Cross, the Federal Emergency Management Agency

Related publications:

UW-Extension Publications–

“When the Home Freezer Stops,” (B2837);

“Quick Consumer Guide to Safe Food Handling,” (BG248);

“Keeping Food Safe,” (B3474).

Information from: University of Wisconsin Cooperative Extension, Purdue University Cooperative Extension Service, Michigan State University Cooperative Extension Service, “Food News for Consumers,” Spring 1992.

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Disinfecting Dishes, Cookware and Utensils

SAFETY GUIDELINES AFTER A DISASTER

DISASSEMBLE, WASH AND DISINFECT

During a disaster such as a flood, tornado or fire, kitchen items easily can become contaminated. Floodwaters may contain silt, raw sewage, oil or chemical wastes, while fires may leave residues from toxic fumes or fire-fighting chemicals. Before using any item that has come in contact with these substances, follow the guidelines at right.

Take apart any item that can be cleaned in pieces. If possible, remove handles from pots. If you have a dishwasher and the hot water temperature is at least 140 degrees F., use a long wash cycle and heated drying cycle to clean and disinfect dishwasher-safe items. Regarding other items, or all items if you don't have a dishwasher, follow these steps:

- ◆ Wash all items in a strong detergent solution. Use a brush to remove dirt. Rinse in hot water.
- ◆ Immerse glass, porcelain, china, plastic dinnerware and enamelware for 10 minutes in a disinfecting solution of 2 tablespoons of chlorine bleach per gallon of hot water.
- ◆ Disinfect silverware, metal utensils, and pots and pans by boiling in water for 10 minutes. Chlorine bleach should not be used in this case because it reacts with many metals and causes them to darken.
- ◆ Air-dry dishes. Do not use a towel.
- ◆ Discard and replace soft, porous plastic or wood items saturated by floodwater, since they cannot be sanitized. These include baby bottles, nipples and pacifiers.
- ◆ If cupboards and counters come in contact with floodwater, clean and rinse them with a chlorine bleach solution before storing dishes. Likewise, clean and disinfect surfaces affected by smoke, toxic fumes or firefighting chemicals.

Additional resources:

Your county family living agent, the American Red Cross, the Federal Emergency Management Agency

Related publications:

"Repairing Your Flooded Home," American Red Cross/Federal Emergency Management Agency, 1992.

Salvaging Feed After a Fire

OPTIONS AFTER SMOKE, WATER OR FIRE DAMAGE

SILAGE

The best rule for fire-damaged feed may be, “Assume the worst until proven otherwise.” Damage to feed may come from heat, water, chemicals, smoke or the fire itself. In some cases, you may have a total loss; in other cases, you may be able to salvage all or part of your feed. But for the safety of your animals, either dispose of or test any suspicious feed. If you feed contaminated, moldy or otherwise damaged feed, you risk lowered production, illness or death in your animals. At the least, animals may refuse to eat feed that has been charred or has an odor.

- ◆ *Damaged silage* must be unloaded because:
 - a) Overheated silage has lost its nutritional value.
 - b) The top layers of wet silage may spoil or be unacceptable to animals.
 - c) Any missed hot spots may reignite.
- ◆ *Heat damage and fire damage.* Silage that has been heated above 150 degrees F. loses much of its nutritional value. Charred silage also will have little feed value; cows may not eat it, depending on taste or aroma. In some instances, cows actually eat more heat-damaged silage to try to compensate for the lost nutritional value. To determine quality of overheated silage, send it to a feed testing laboratory. Silage below the fire level will not be damaged and will not lose any nutritional value.
- ◆ *Water damage.* Silage saturated with water may mold and spoil because much of the preserving acid produced during fermentation has leached out or been diluted. The nutritional value of the saturated silage is reduced and the cows may refuse to eat it. Consider spreading it on land as a fertilizer.

GRAIN AND HAY

- ◆ *Debris.* Be aware that metal, lead paint, nails from the roof or other debris may have fallen into the feed during firefighting. Disposing of grain may be your best option if debris has compromised the feed.
- ◆ *Darkened or burned feed.* These have been oxidized and, therefore, nutritional value has been reduced. Animals most likely won't eat these feeds. Dispose of them or spread them on fields as fertilizer.
- ◆ *Wet feeds.* It may be difficult or impossible to dry wet grain or hay naturally. If these feeds are readily available and clean (no chance of chemical contamination or fire-fighting debris), feed them to livestock. Recognize that wet feeds may have only a few days of “shelf life” before spoilage occurs. Otherwise, spread them on fields as fertilizer or dispose of them.
- ◆ *Baled hay.* Small quantities may be dried naturally if broken apart. Larger quantities are generally a loss because of the difficulty of drying. Hay quickly spoils when wet—and moldy hay may be dangerously toxic to animals. If possible, spread hay on fields as a fertilizer or dispose of it.

Additional resources:

Your county agricultural agent, your veterinarian, forage testing laboratories

Related publications:

“Extinguishing Silo Fires,” (NRAES-18), Northeast Regional Agricultural Engineering Service.

Salvaging Farm Buildings After a Fire

ASSESSING DAMAGE AND OPTIONS FOR REBUILDING

Before trying to salvage a structure after a fire, assess the true worth of what remains after fire, heat, smoke and water damage. The true worth will be higher if the structure can be effectively used as part of a reconstructed facility.

An engineer or experienced contractor can help you assess true worth. These experts can also help you consider options for reconstruction or new construction. Insurance coverage and other assets will probably be the final factor in your decision-making.

INSPECT EXISTING MATERIALS

- ◆ *Fiberglass and blown-in insulation.* If insulation has gotten wet, it will have to be removed and replaced with dry materials. If wall surfaces must be replaced in the process, consider upgrading wiring and plumbing at this time.
- ◆ *Steel.* When exposed to intense heat, steel loses its strength and any surface-applied corrosion protection. Steel beams cannot be relied upon to support loads for which they were originally designed. Replace these members if exposed to extreme heat to assure structural integrity of the building.
- ◆ *Metal roofing and siding.* Both rely on protective layers of galvanizing and/or paint to protect corrosion. Plan to replace these materials if exposed to heat, even if they were not in direct contact with flames.
- ◆ *Wood.* Light charring of wood will not significantly affect its strength. Replace wooden supports which have been deeply burned.
- ◆ *Metal truss plates.* Many roof trusses are fabricated with metal truss plates. The metal truss plates may lose more strength in a fire than the adjoining wood supports. Use a reliable contractor or engineer to determine the extent of damage at these critical joints.
- ◆ *Concrete and mortar.* These materials will flake off and/or turn to powder when exposed to heat. The thickness of the damaged concrete will be determined by the intensity and duration of heat exposure. Tap concrete with a hammer to test its integrity. A dull thud implies heat damage. A ringing sound means the concrete may be in reasonable condition.

SALVAGING EXISTING STRUCTURES

Once the value of the remaining structure is established, assess how the remnants can be rebuilt to meet your current and future needs. This is a good opportunity to consider updating or upgrading of facilities. For example:

- ◆ *Livestock buildings.* Consider livestock resting, water and feeding space needs; update ventilation, preferably using natural ventilation; install moisture-proof wiring and an equipotential plane to protect against stray voltage; install freeze-protected water systems; consider animal traffic and manure handling.

- ◆ *Milking facilities.* Consider a milking parlor or flat barn milking system; upgrade wiring and equipotential plane; improve lighting and ventilation; upgrade milking equipment and energy-conserving devices, such as air injectors, bulk tank heat exchangers and well-water precoolers.
- ◆ *Silos.* Consider horizontal feed storage for its improved rate of filling and emptying and lower cost of construction and operation; size new silos according to daily feeding needs.
- ◆ *Storage sheds.* Consider access doors; consider a shop; use proper wiring design and installation; consider size of items to be stored; consider separate pesticide storage.

BUILDING NEW STRUCTURES

If the remnants cannot be economically reworked to satisfy your needs, consider building a totally new structure. Be especially critical of the remnants when making this assessment. Consider:

- ◆ *Location.* Locate animal structures so odors blow away from the house and neighbors' houses; locate to take advantage of wind for natural ventilation in livestock buildings; consider space needs for future structures.
- ◆ *Drainage.* Locate on high ground to shed water from the site and to avoid flooding from upland areas.
- ◆ *Traffic patterns.* Consider how equipment, animals, feed, grain and manure will be routed around the farm.
- ◆ *Current size of structure and future expansion needs.* Develop a farmstead drawing of how your farmstead will look in 10 to 20 years.
- ◆ *Expense.* Before deciding on a final option, consider the economics of several options. Make your decisions based on lower annual cost options — not the lowest initial investment; consider your long-term needs when making a short-term decision.

Additional resources:

Your county agricultural agent, Midwest Plan Service

Related publications:

UW-Extension publications—

“Contracting for Agricultural Construction,” (A3490);

“Farmstead Planning—Zoning and Regulations Checklist,” (A2725).

Northeast Regional Agricultural Engineering Service publication, “Fire Control in Livestock Buildings.”

FIRE CONTROL MEASURES

Be sure all new construction features fire-retardant material and design concepts that result in fire safety. Early warning devices such as smoke detectors and heat detectors should be part of new designs, as well as ventilation systems that shut down during a fire.