



# POCKET GUIDE TO Pre-Incident Planning

Fifth Edition





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FM Global has developed this pocket guide to assist firefighting personnel and property owners in implementing a pre-incident plan. The guide is devoted to property conservation and does not address life safety or health issues. It is furnished for informational purposes in support of the insurance relationship between FM Global and its clients. No liability is assumed by or through the use of any information. The liability of FM Global is limited to that contained in its insurance policies.

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## **TERMINOLOGY**

Because the terms *fire department* and *fire brigade* are used differently throughout the world, this guide uses *fire service* to refer to emergency response services and *emergency response teams* (ERT) for on-site, company-trained personnel.

## PURPOSE

A pre-incident plan has a two-fold purpose:

- Combat site-specific fires and explosions at a facility
- Coordinate fire protection equipment and personnel resources *at the site*, with the resources of the responding fire service

The plan specifies the:

- Known deficiencies in the fire protection
- Shutdown procedures for hazardous processes
- Level of response expected from a facility's ERT
- Level of response expected from the fire service
- Availability of site-specific fire protection equipment
- Training of personnel
- Requirements for periodic updates of the plan

Developing the plan must be a team effort between the fire service and the ERT. Together, these two groups will conduct an on-site visit to become familiar with the property, understand the important assets of the site and assess the ability of all involved to respond to emergencies at the facility.



## Why a Site Visit?

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The only way a fire service will know about a facility's building layout, contents, operations or protection features is if it completes an on-site visit. Management and fire officials plan the visit together to eliminate unknowns such as the following:

- **Access routes.** If firefighters are unfamiliar with the property, they have no way of knowing the best access routes. And, during an emergency, if no one meets engine crews at a designated location to escort them to the fire, how will firefighters know for sure where the fire is? A delay in response is certain.
- **Special hazards.** Certain hazards could confront firefighters as they enter the burning building. If fire officials don't know about these hazards, why should they jeopardize the lives of firefighting personnel? Sometimes, their only choice is to let the building burn.

- **Water-supply connections.** Any time firefighters are uncertain of water-supply connections, a delay in response occurs. And, every second lost increases the possibility of total building destruction.

A successful first visit lays the foundation of your pre-incident plan. Then, an annual follow-up visit—or an additional visit when there has been a change in operations, or new further construction—establishes a valuable alliance with the fire service. The larger the complex, the sooner the site visit should be scheduled, especially if operations include a mix of production, warehousing, shipping and/or receiving processes.

## Why a Site Plan?

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An up-to-date plan allows the fire service and the on-site ERT to effectively plan for emergencies. Refer to the example of the Stillwater Company (fictitious name) on pages 18 and 19 for a visual aid. Make sure the plan is current and does the following:

- Illustrates operations and special hazards
- Shows business changes that have taken place since the plan was prepared
- Explains or illustrates warehousing, storage (inside and yard), ignitable liquid and machinery operations
- Shows important locations for water supplies (color coding and symbols on drawings or schematics are recommended; they clearly show public fire service connections, hydrants, hose connections, valves, fire pumps, fire doors, firewalls and utilities)
- Includes a separate sketch showing the pump house, tank capacity, type of pump and flow capability

## CHECKLIST

A good checklist is like a road map guiding your team through the facility tour, helping you to review and identify potential problem areas. It's helpful if the checklist provides ample space for taking notes and summarizing the visit after the tour. Keep it as a record for future visits.

Feel free to reformat and expand the following checklist to fit your company's needs.

### Building Layout and Access

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Use the site plan and related drawings to discuss the layout of your facility, including storage and access routes.

- Determine the best internal and external access routes for each area of the complex.
- Review locations of the alarm system annunciator panel and each main utility connection.
- Provide signage showing key locations. Signage can include such information as normal hours of operation and number of employees.

- Discuss alternatives to potential problems.  
Examples:
  - » Is there only one point of entry? Could it be blocked by traffic or weather?
  - » Could railroad tracks or bridges impede emergency response actions?
  - » What adverse situations exist? Weather, for example, can involve snow, ice or high water.
- Appoint a contact person for firefighters to meet when they first respond to an emergency. Also, determine a meeting place.
  - » Is there a formal plan for opening gates and directing the firefighters to the correct area?
  - » What happens during plant shutdown?

## **Building Construction**

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Use the site plan to discuss building construction features, such as area measurements of floors, roof decks and walls. Room dimensions, ceiling heights, and building entry and exit points should be described and shown clearly.

- **Combustible and noncombustible construction areas,** as well as types of roofing, walls and floors. Firefighters want to know how much combustible material they might be dealing with.
- **Building insulation.** Some types of material, namely plastic, melt and burn like ignitable liquid. Burning insulation can propagate fire rapidly on the wall panels and roof assemblies. What protection is provided?
- **Roof covering.** Some types of roofing material propagate fire on surfaces faster than others. Is the covering treated with a fire-retardant material?
- **Location of firewalls and fire doors.** If these doors operate properly, they can help firefighting efforts greatly; if they don't, fire severity likely will be worse.
- **Interior finishes,** like fabric wall coverings, non-fire-rated painted surfaces and wood paneling. Such finishes can increase the spread of fire.

- **Exterior finishes**, like exterior insulation finishing systems (EIFS), asphalt-coated metal and certain roof insulation systems. These finishes can increase vertical firespread and expose other buildings to fire.
- **Concealed spaces**, which can harbor sparks and smoldering fires. If a fire enters a concealed space, the fire becomes hard to find.
- **Confined spaces**. These areas can require special training for entry and slow down firefighters.
- **Aging buildings or poor maintenance**. Such characteristics can trigger early structural collapse in a fire.

## Building Services

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- **Electrical main disconnects and motor control centers**. They may need to be operated or shut down during or after a fire.
- **Location of shutoff valves**. Process liquid piping systems can begin leaking ignitable or combustible liquid, while gaseous material piping systems can leak flammable material.

- **Shutoff switches** for heating and ventilating systems. Firefighters may need to operate them during a fire.
- **Emergency systems**, such as emergency exhaust systems, electrical generators and other alternate power sources.

## Public Utilities

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- Discuss the utilities that serve the facility and the resources available to handle shutdown or repairs.
- Review facility and fire service emergency response procedures in case a fire starts during a power outage. For an electrically driven fire pump, determine how a power outage will affect firefighting.

## Water Supplies

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- Review water-supply sources, available pressure and quantity of water at the highest outlets.
- Show water-supply feed connections from a hydrant or static source, such as a pond or tank.



- Review location of water supplies for handlines and alternate water supplies. Discuss how to make sure water-supply demand by handlines will not compete with sprinkler demand.

## Occupancy (Personnel, Operations and Building Contents)

### **Human Factors**

- **Number of personnel** working in each building (all shifts) and number of employees needing special assistance.
- **Security personnel** and patrols on all shifts, especially those who will be working with firefighters at the scene of a fire.

## Physical Features (Operations and Contents)

- Hazardous material. Firefighters need to know the location of:
  - » Safety data sheets (SDS)
  - » Ignitable/combustible liquid
  - » Combustible metal
  - » Dust subject to explosion
  - » Toxic material
  - » Corrosive material
  - » Flammable gas
  - » Radioactive material
  - » Water-reactive material
  - » Other reactive material
- **Computer room.** Identify high-value items that may require quick salvage or waterproof covers (or both).
- **Manufacturing.** Identify ignition sources and combustible material, including special hazards such as hot-oil-transfer systems, ignitable-liquid storage, and operations involving heat, friction and open flames.

- **Storage or warehousing.** It is extremely important to identify the type of storage, quantity and material-handling methods used. These affect the severity and behavior of fire. Burning aerosol can explode or rocket. Burning plastic develops very high temperatures and emits thick smoke. Ignitable liquid such as alcohol, acetone and gasoline, emits flammable vapor at room temperature and can ignite easily resulting in a large burning pool of liquid. Very high rack storage—60 to 100 ft. (18.3 to 30.5 m)—could hamper access and visibility. Some storage, such as roll paper, could collapse during a fire and create sudden obstacles for firefighters.
- **Cleanrooms** and other similar areas subject to nonthermal damage from heat and smoke.
- **Office areas.** Identify office equipment, such as computers and printers. Evaluate common items stored. This includes paper supplies and ignitable liquid, such as copier fluid, ink and cleaning solvent.
- **Vital records.** Identify their location so firefighters can remove them if necessary.
- **Shutdown schedules.** Identify times when buildings are normally unoccupied.

## Fire Protection

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### **Automatic Sprinklers and Special Protection Systems**

- Review the types and locations of sprinkler systems, special protection or extinguishing systems, and fire extinguishers. This includes:
  - » **Type of system**, such as wet-pipe, dry-pipe, preaction or deluge.
  - » **Sprinklered and unsprinklered areas.**
  - » **Locations of special protection systems**, such as foam, carbon dioxide, dry chemical, water-mist and gaseous agents.
  - » **Fire extinguishers.** Firefighters must know the location and type of all extinguishers.
  - » **Location of sprinkler control valves.** This includes the areas they control, whether the valves are inside or outdoors, and whether they would be accessible during a fire. Are valves normally locked? Where is the key located?

- » **Location of fire service connections.** They enable a pumper to pump water from a public hydrant, pond or stream to the yard system at increased pressure. Increased pressure enables automatic sprinklers to deliver more water over the fire. It's a good idea to label the connections to show whether they supply sprinklers, standpipes or both, and what areas of the facility they supply.
- » **Compatibility of hose threads.** Are fire service hose threads and facility firefighting equipment threads compatible?
- » **Replacement sprinklers.** Extras likely will be needed.
- » **Sprinkler adequacy.** Review any changes (if any) made since the system was installed.
- » **Pressure-regulation devices** installed within the system. Any device that regulates the pressure available to hose lines will be of concern.
- » **Location of pressure-regulation devices** on standpipe systems. Discuss how to adjust these devices so they work properly with attaching hose lines and nozzles. The settings should match hose and nozzles used by firefighters.

- » **Backflow-prevention devices.** They can be installed on the supply line from the public water system to the standpipe system if the water supply is a nonpotable, open-water source.

## **Fire Pumps**

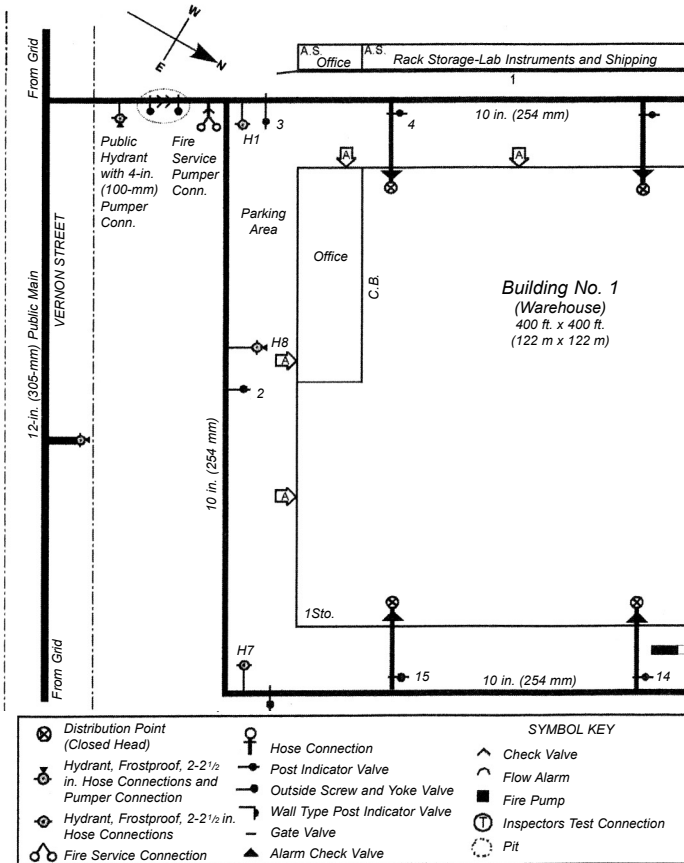
Record:

- Starting arrangement of fire pumps. If pumps are automatic, check actuating pressure; if manual, note startup procedures.
- Flow
- Pressure ratings
- Auto-start mode
- Procedure for manual start
- Starting pressure
- Type of driver (electric, diesel or gas)
- Power supply (if independent from the building)
- Procedures to ensure pump remains running throughout the fire

## Alarm Systems

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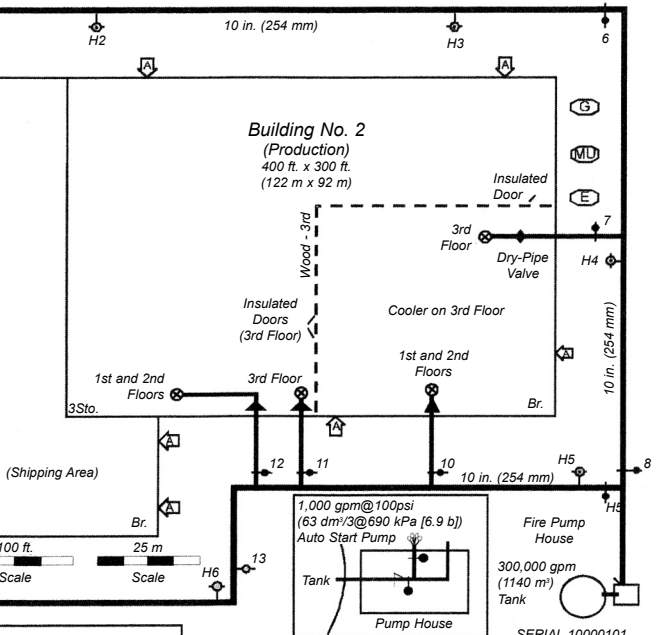
- Check the type of alarm system:
  - » Sprinkler/waterflow alarms
  - » Smoke/heat alarms
  - » Supervisory alarms
  - » Manual-pull stations
- Discuss how the alarm system works and where the signal is transmitted.
- Establish procedures for notifying the fire service when alarms, sprinkler systems or fire pumps are out of service.
- Show firefighters the location of the alarm panel and make sure they know which panels will guide them to a fire's location.
- Plan with firefighters how you want to notify them in case of emergency. If there is no automatic alarm system, using the phone is essential. Even with an alarm system, a company's emergency response plan should back up automatic notification with a phone call to verify the alarm.
- Describe the location of the fire. Identify the person who will be meeting the fire service when it arrives and where they should meet.





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2



- Fire Doors
- Access Doors
- Gas
- Electric
- Water

**STILLWATER COMPANY**

Serial 10000101

Scale: 1 in. = 100 ft.  
(25 mm = 30 m)

Dated	
FM Global	INDEX 12345.67
P.O. Box 7500, Johnston, RI 02919	

## Storage

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- **All areas requiring specific extinguishing agents** and designated firefighting procedures.
- **Spacing between storage aisles.** If aisles are too narrow, firefighters may not be able to access them for manual firefighting. A fire inside storage racks can quickly jump to adjacent racks.
- **Changes in building occupancy.** Changes in storage can compromise sprinkler system protection.
- **Commodities.** It might be wood, paper or, even more volatile, an ignitable/combustible liquid, such as motor oil or solvent. What you store makes a difference in how you fight the fire. Have your commodities changed since the last review?
- **Storage height.** Has the height increased since it was last reviewed or since automatic sprinkler protection was installed?

## Exposures

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- Look at building (and area) separations. If they are too close together, firefighting can be delayed.
- Examine the topography of the surrounding property. Steep terrain can impede firefighting efforts. Ignitable liquid or heavier-than-air gas on higher elevations can flow to lower areas, involving additional buildings. Also, a wind-driven fire traveling upslope toward a property is a greater threat than the same fire moving across a level ground.
- Discuss protection for outdoor storage, tanks and pressure vessels containing ignitable/combustible liquid or flammable gas. These can be a problem if protection is lacking.
- List exposures created during or after an incident. By-products of fire may be a threat to surrounding properties.
- Identify special hazards and their containment with signage. For example: “DANGER: IGNITABLE LIQUID.”

## **Smoke, Heat and Venting Arrangements**

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- Plan ways to ventilate buildings (horizontally and vertically) during and after a fire.
- Discuss ventilation for areas in sprinklered buildings. Premature venting can reduce sprinkler effectiveness.
- Discuss effects of smoke on firefighting response.

## **Emergency Response Training**

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Firefighters can participate with your ERT in training sessions or drills to develop employee-response skills, improve emergency procedures and test the plan. Discuss training for company personnel. The extent of training depends on the size and complexity of the business operations.

Fire officials can help you review fire scenarios and basic tactics for attacking a fire. Response training should include reviewing at least the following with personnel:

- **Emergency response plan.** Describe what it is and how your ERT carries it out. Describe the jobs involved in the ERT. Examples of job functions include starting the fire pump, if the fire pump is safely accessible, and serving as the emergency contact.
- **Consequences of shutting off a sprinkler control valve.** One of the fire service's first-arriving pumpers will boost the water supply to the sprinklers through the pumper connections. *The valve must be open.*
- **Valve supervision.** A closed valve is the most serious impairment during a fire, and one of the main reasons sprinklered buildings burn down. Specify how valves will be supervised in an emergency. Ensure valves will remain locked open. Members of the facility's ERT know where all valves are located; if the valve is safely accessible, this person goes to the valve, makes sure the valve is open, and stands by it until the incident commander orders the valve shut.

- **Procedures for shutting down processes** and equipment during an emergency.
- **Firefighting routines** that company personnel should know about.
- **Dispatch of firefighters.** Firefighters will make the assignments for:
  1. Connecting equipment to the sprinkler systems to increase sprinkler flow
  2. Attacking the fire directly with hose lines
  3. Ventilating areas
- **Conditions** that may require backup or mutual aid.

## Response Above Ground Level

- Discuss how much time is needed to begin firefighting if fire occurs above the reach of ground or aerial ladders. Discuss how this could affect the company's response plan.
- Determine how personnel will communicate between the incident command post and officers fighting the fire. Identify all limitations during the site visit and discuss options for dealing with them. (Portable radios are effective, but also have limitations.)

## TESTING THE PLAN

Based on the work done during the first visit, the team can finalize decisions about:

- **Level of response.** Based on the size of the complex, operations, personnel and on-site firefighting capabilities, your team can determine firefighting response for all potential scenarios and hazards.
- **Fire service capabilities.** The team now can define any limitations, as well as its need for mutual-aid equipment.
- **Availability of site-specific fire protection.** Firefighters quickly can assess the level of response your company can provide.
- **Training of personnel.** Firefighters can assist a company with training programs. After visiting your facility, they will have a much better idea of how many people you need to train to create an ERT, and what that training should provide in the way of handling fire and explosions involving site-specific hazards.

## Maintaining the Plan

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Your team should agree on how often to review the plan (at least annually) and arrange follow-up visits. Increasing the frequency depends on the nature of the operations. Follow-up visits are usually shorter than the first one and will focus only on particular hazards and business changes. Changes include:

- New construction
- Remodeling
- New processes
- New material or equipment
- Downsizing, upsizing and, in essence, any changes in facility, such as ERT membership
- Addition or deletion of any firefighting equipment and systems

Remember, effective response to a fire requires an alliance between your company and the local fire service.



## **ADDITIONAL RESOURCES**

FM Global publications:

- *The Emergency Response Team* (P8116)
- *Fighting Fire in Sprinklered Buildings* (P8708)
- *Ignition Sources: Recognizing the Causes of Fire* (P8610)
- *Pocket Guide to Arson and Fire Investigation* (P7923)
- *Pocket Guide to Emergency Response* (P9914)
- *Reducing the Arson Threat* (P7721)

CDs:

- *Fighting Fire in Sprinklered Buildings* CD-ROM (P9923CD)

Property Loss Prevention Data Sheets:

- 10-1, *Pre-incident Planning*
- 10-2, *Emergency Response*
- 10-6, *Protection Against Arson and Other Incendiary Fires*

Fire service agencies also may wish to consult NFPA 1620<sup>1</sup>, *Standard for Pre-Incident Planning*. Agencies outside the United States should check with their local jurisdictions for applicable documentation.

<sup>1</sup> *A copyrighted publication of the NFPA International, Quincy, Mass., USA, (1)800 344 3555.*

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