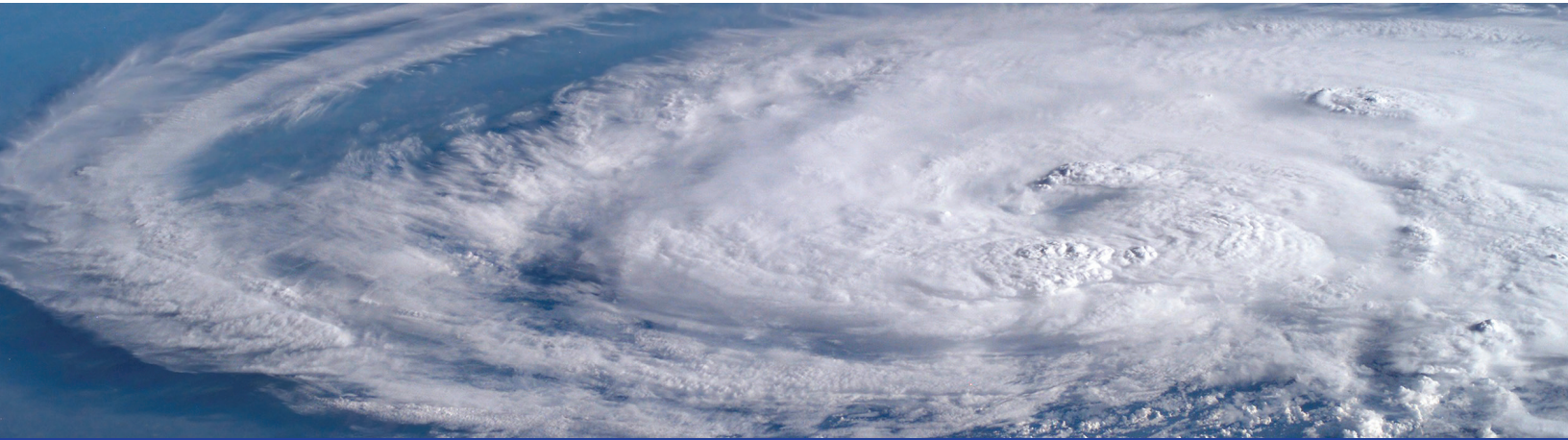




Hartford Steam Boiler



Risk Solutions

PLC Technical Bulletin Hurricane Pre-Plan Key Points

Hartford Steam Boiler
One State Street
P.O. Box 5024
Hartford, CT 06102-5024
Tel: (800) 472-1866
www.hsb.com

Businesses may be located in a flood zone and not be aware of it, though businesses located along the US coastlines, especially Gulf of Mexico and Atlantic Ocean, are likely to be aware of the hurricane exposure. However, they may not appreciate how the intensity of a hurricane can make a big difference in the level of property damage. Damage to property may be reduced and the likelihood of business continuity may be improved with good planning and efficient preparation. The following information is provided as a resource to identify the type and level of potential damage from a hurricane and assist your efforts in the planning and preparation for damage mitigation. This information can be used to develop an effective Hurricane Emergency Plan.

Know Your Exposure

Extensive rain predominantly produces a single exposure, water from ponding and overflowing rivers, while hurricanes in addition to rain water can create damage from the exposures of wind and storm surge. In coastline areas, hurricanes are the predominant source of flood from

both rain and storm surge. The extent of water from the storm surge that a hurricane could produce may be projected using NOAA's SLOSH (Sea, Lake, and Overland Surges from Hurricanes) Hazard Maps. These interactive maps provide the potential water height above the surrounding grade for a particular strength of hurricane (see Figure 1). The most public characterization of a hurricane's intensity is the Saffir-Simpson Scale (Categories 1-5) which is based on its wind speed (1-minute average over sea water). The increased exposure to damage from each successive category of hurricane should be matched with increased measures of protection. For the flood exposures created by rain or snow melt see the HSB PLC Technical Bulletin for Flood Pre-Planning and FEMA publications.

Building Exterior

Once the potential exposure is determined, a review of the building exterior should be performed to identify weaknesses in the roof covering and edge attachment as well as identify windows that may need protection. Older

buildings will often have windows that are not storm rated and may need to be protected with shutters or other covering such as plywood. Older rolling overhead doors are also susceptible to wind damage. A review of flat roofs should address loose articles such as ladders, buckets, or other maintenance items and equipment that may not be securely fastened.



Storm shutters

Rooftop Equipment

Equipment such as roof top air conditioner condensing units should be fastened to a building framing member. Ventilators may need metal straps or cables for extra securement. Satellite dishes that are installed in a metal rack with ballast such as cement blocks should be in a rack that is specifically designed for high wind speed areas and provided with the amount of ballast specified by the manufacturer for the wind speed exposure and satellite dish size. The review should also look for potential openings for water entry either as a result of flooding or windblown rain. In addition to windows and doors, other openings such as for utility entry points or below grade ventilation systems should be identified.



Satellite trays with concrete block ballasts

Outdoor Equipment

The review should identify materials located outdoors. This may include raw materials or other items for production activities, finished product, or motorized or portable equipment. Mechanical equipment such as air conditioning units, or electrical transformers mounted on a pad at grade level should be identified. Generally, transformers provided by the local utility will be above flood level; however, depending on when the transformer was installed, local area conditions may have changed and the location may have become part of a flood zone which is indicated on an updated flood map. Outdoor items should be secured or be brought indoors, except items such as LP gas cylinders or gasoline containers should be in a protective outdoor enclosure. Identify items that could fall such as trees or limbs. Awnings and other building ornamentations should be evaluated.



Ventilation system secured to roof

Preventative Measures

Once the review has been completed, physical preventive measures should be identified. Flood protection for doors may consist of sandbags or flood gates which should be professionally designed and fabricated. Low level utility openings in the exterior walls should be sealed. If windows are not storm rated and the property is located in an area which has a wind speed exposure greater than 120-mph, or greater than 110-mph and located within one mile of the coastline, then protection against wind-borne debris should be provided. Window protection may be metal shutters or plywood (1/2-in to 3/4-in depending on local codes). The shutters should be pre-cut, and the means of securement pre-established to facilitate efficient and effective installation. Any roof top items that are not adequately secured should be addressed. Outdoor equipment at grade level, such as HVAC condensing units, should be protected from flood water such as by the construction of a water-tight enclosure around them. If that is not possible, recovery planning may need to account for unit replacement after flood waters recede. Holding areas such as catch basins, drains, and drainage ditches should be identified and continuously maintained. Before an impending flood event all holding areas should be evaluated. Any measures that can be implemented during or soon after plan development should be performed so as to minimize actions needed at the time of an approaching hurricane.

Utilities

Planning will also need to address interruption to utility services such as gas, electricity, data, and communications. Loss of electricity may occur at the utility level, which is likely in the event of a major hurricane, or could be localized to the on-site transformer that becomes submerged in water. Prior to evacuating a building ahead of an incoming hurricane, all equipment should be shut down and circuit breakers opened. Natural gas line valves should be closed. Equipment in the building, such as computers, that can be relocated should be moved above expected flood levels or taken off-site, if appropriate, in the event of water entry into the building in spite of preventive measures. This may apply to hard-copy documents also. If computer operations are essential to business operations, a focused IT Emergency Plan should be developed. Fire protection equipment should be maintained in an operational condition throughout and after the hurricane.

Operational Planning

Operational planning should be undertaken to reduce business disruption. Identify operations, processes, or equipment inside the building that will be most important to business recovery after the event. Identify key employees who are necessary for operational activities and determine their availability to return to the facility after the event. This may be affected by the impact of the event on employee families. Consider assisting employees with family emergency planning. Establish a means of communicating with employees during and after the event. Ensure that arrangements are in place, preferably through emergency contracts, with key vendors and contractors. This may include raw material suppliers, equipment maintenance vendors, and building contractors. If the facility has an emergency generator that will be utilized to maintain emergency power for

essential equipment, ensure a fuel re-supply contractor will be available. Ensure that an electrician will be available to perform emergency repairs and restore electrical systems as well as an HVAC contractor for air conditioning equipment. Many businesses will establish contracts with a flood recovery and clean-up vendor. It may be necessary to develop a separate Business Continuity Plan.

Emergency Supplies

Planning activities should address emergency supplies that may be needed after the event such as emergency lighting, portable generators, water pumps or vacuums, tarps, plywood, duct tape, squeegees and mops, fans and dehumidifiers, shovels, and hand tools.

Pre-storm Activities

At the beginning of hurricane season, May 15 (Pacific) or June 1 (Atlantic), all emergency supplies and equipment should be checked for completeness and operability. At the time of an incoming hurricane it will be necessary to monitor storm conditions and make a determination when to implement physical actions such as installing storm shutters or placing sandbags, clear roof drains, whether it is possible and appropriate to leave critical equipment operational, and when to evacuate the building. Implementation of hurricane preparation activities is commonly staged according to projected landfall as follows (local authorities may have different or additional guidelines):

- 72 hours - ensure all emergency supplies are available and review the hurricane plan with affected personnel. Review the building and grounds for loose materials or debris.
- 48 hours - notify key customers, suppliers, and partners if facility closing is expected. Install storm shutters or other covering if provided. Ensure emergency communication capability is established with key employees.

Determine equipment shut-down activities.

- The National Weather Service (NWS) will issue a tropical storm or hurricane watch for an area 48 hours prior to when it expects such conditions to materialize.
- The NWS will issue a tropical storm or hurricane warning for an area 36 hours prior to when it expects such conditions to materialize.
- 24 hours - secure the building perimeter. Send non-essential employees home. Initiate voicemail and e-mail 'out of office' messages appropriate to circumstances. If flood potential exists, raise exposed equipment or records to higher levels. Disconnect all non-essential electrical equipment and devices. Initiate facility shut-down if a decision has been made to do so.

In many areas the timing and decision-making regarding building evacuation will be determined by local authorities. Depending on the predicted strength of the incoming hurricane (Category 1 through 5) local authorities may order the evacuation of pre-determined areas.

However, if critical or emergency team employees are permitted by local authorities to remain on-site during the hurricane, emergency supplies such as food, water, flashlights, rain gear, and blankets should be available for them.

Recovery and Continuity

When it is safe to return, the site should be secured and a Command Center established to direct recovery operations. The building(s) should be surveyed to assess damage and look for unsafe conditions such as downed electrical wires, leaking gas lines, or structural damage. The appropriate utilities should be promptly notified. It is common in the aftermath of hurricanes for electricity to be interrupted for a few days to a week or more. The building enclosure should be secured as needed; this may include covering roof damaged areas with tarps

or covering broken windows with plywood. Based on conditions found, contractors should be called in for necessary repairs. Key employees should be recalled for restoration of equipment and operations as appropriate. The restart of electrical and gas systems should be closely coordinated with utility service personnel and equipment vendor or contractors. Restarting equipment without proper preparation, such as drying out electrical cabinets and motors, could result in significant damage or personnel injury.

Salvage

Salvage operations should begin as soon as possible and should include relocation of contents and equipment to higher elevations, if flooded, to prevent further damage. Cover building contents with tarps when exposed to rain and weather, and separating damaged goods from undamaged goods will facilitate efficient assessments of damage. Remove standing water then clean and dry equipment. Dehumidification operations may be needed. In many cases mold can already be forming. Check and clean roof drains, storm drains, and retention ponds and remove any debris.

Ensure all fire protection systems are operational. After normal operations have been resumed, the plan should be critiqued and updated to implement lessons learned.

References

National Storm Surge Hazard Maps <https://arcgis.com/arcgis/0rfPmC>

See Every Business Should Have a Plan. <https://www.ready.gov/business/implementation/emergency>
 Department of Homeland Security (DHS) - Ready.gov
 Free Publications www.ready.gov/publications

The National Flood Insurance Program. Federal Emergency Management Administration. www.fema.gov/national-flood-insurance-program

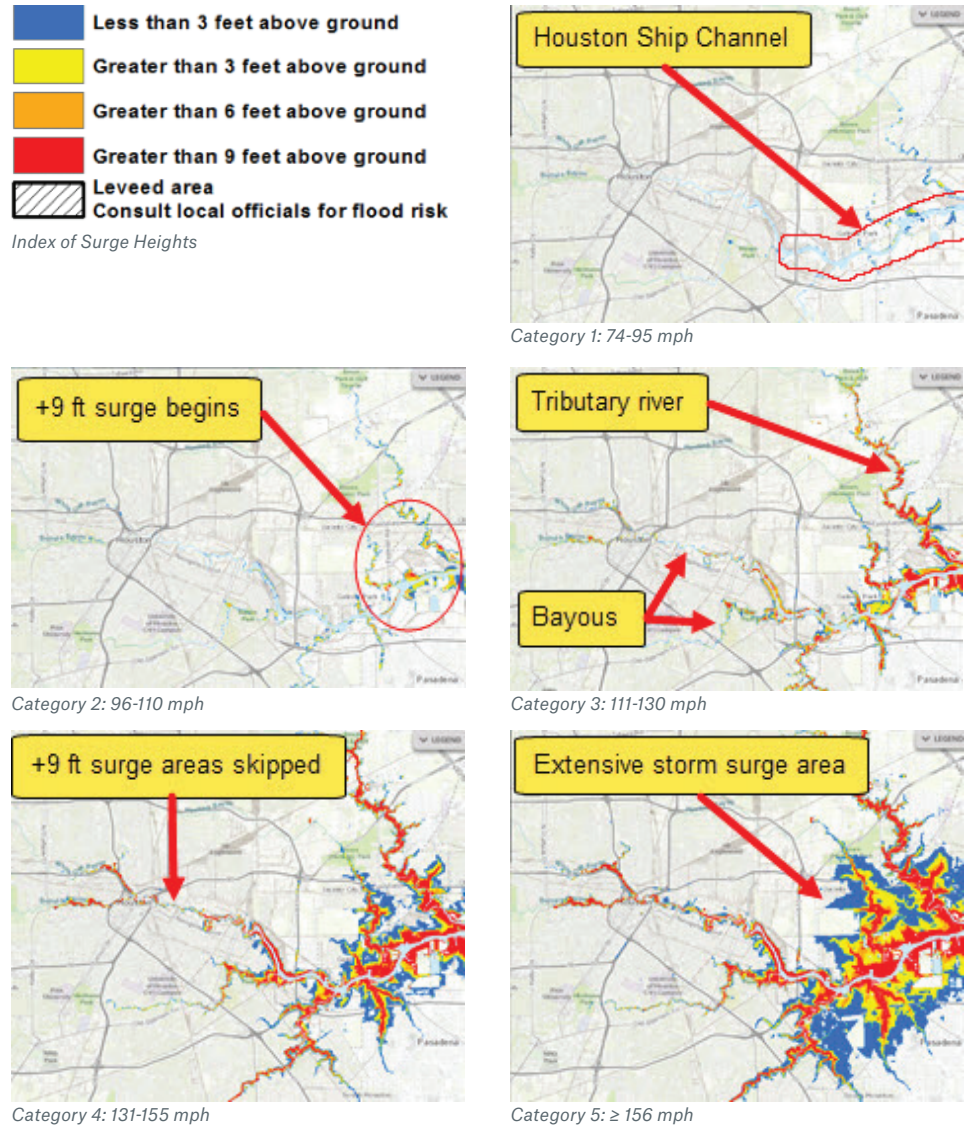


Figure 1 - NOAA's SLOSH Interactive Hazard Maps Example:

The central area of Houston, TX is 6 miles from the termination point of a 15 mile long ship channel that opens to a 35 mile long shallow bay that ultimately opens to the Gulf of Mexico. Despite being 50 miles inland, there is a storm surge exposure that should be identified and a plan established for exposed sites. The notes below correspond with the interactive panels shown on the right. Generally, NOAA SLOSH maps can be zoomed to identify streets.

Category 1 Hurricane has less than 3 feet of projected storm surge and predominate exposure is limited to the ship channel area which terminates on the East edge of Houston.

Category 2 Hurricane is expected to produce greater than 9 feet of storm surge in small areas, still limited to the beginning area of the ship channel.

Category 3 Hurricane could produce storm surge heights greater than 9 feet predominately along the ship channel, however now enters a tributary river and a few bayous in the most Eastern area of Houston.

Category 4 Hurricane is expected to produce storm surge heights exceeding 9 feet throughout all of the ship channel and extending into the bayous more than 5 miles inland from the ship channel. Also note that the +9 foot surge height skips areas, yet exposures exist much further inland.

Category 5 Hurricane with +9 feet surge height is only slightly greater in area than a Category 4 hurricane. However areas exposed to other flood heights is much more extensive.