AXA

XL Risk Consulting

Severe weather planning guide

Helping you prepare for the unpredictable

Planning ahead for severe weather conditions

For those who have encountered the effects of a severe storm, it's an experience that they will never forget. Because severe storms don't occur every day, it is easy to get complacent and dismiss the possibility that your facility will someday be affected by damaging wind, rain or storm surge. Whether you are a multi-billion dollar company or a small company with just a few employees, companies can benefit from having a well thought-out Severe Weather Emergency Response Plan.

Case studies have shown that action in emergencies is seldom effective unless it has been carefully developed, documented, practiced and frequently revisited prior to its implementation. Preparing at your own pace throughout the year will greatly reduce last-minute scrambling. It will also reduce employee stress and reassure customers that contingency plans are in place to help minimize potential business interruptions. If your facility is exposed to hurricanes, cyclones, or typhoons, this brochure will help you prepare for the worst.

We consider the information in this brochure to be the key elements of a good plan. We recognize that no single plan will be perfect for all facilities. The size and scope of your own Severe Weather Emergency Response Plan will depend directly on the purpose of your business. Use this as a tool to develop standard operating procedures (SOP) catered to the needs of your facility and occupancy.

Our risk consultants are always available to assist you in your preparations.

Use the links below to access the resources you need to prepare for severe weather conditions.

Severe weather emergency response team

First, consider establishing a Severe Weather Emergency Response Team. Each major sector of your business should be represented. The team's primary responsibilities should include the following:

- Develop, implement, and review the Severe Weather Emergency Response Plan to protect the facility against the effects of strong winds, windblown debris, storm surge, and flooding.
- Include key personnel with the authority to decide when various levels of alerts are to be announced, and to initiate facility shut down procedures.
- Include contact information for each member, local law organizations, utility companies, emergency contractors, vendors, and recovery / restoration companies.
- Monitor weather conditions using the National Weather Services on television, commercial radio, weather radio, and websites that track and monitor storms.
- Provide team members who may volunteer to remain on-site during the storm with all necessary provisions.
- Determine a safe Operations Center location.
- Designate an Incident Commander.

Severe weather emergency response plan

Each major sector of your business should have a documented checklist of functions and responsibilities.

Communications

- Provide the Severe Weather Emergency Response Team with compatible and tested communication equipment including: land lines, cell phones, satellite phones, short wave radios, NOAA weather radios, email access through hand held devices, walkie- talkies, etc.
- Assess the potential of hindered communications prior to, during, and after the severe storm due to damaged cell phone towers, overloaded circuits, downed power lines, etc.

Computer Systems / Information Technology

- Guarantee that all computer information, electronic filing, customer information, billing, payroll records, and any other data that is important to your business, is backed up offsite at a location that is not in the path of the storm.
- Ensure that business interruption is minimized by providing provisions to operate from portable equipment, sister facilities, hot sites or equivalent.
- Conduct testing / dry runs of the business interruption mitigating provisions.

Operations/production

- Label and document process flows, critical fuel supplies, and any other important aspect of your operation that might need to be shut down by those unfamiliar with the property, etc.
- Minimize impact of lost operations through inventory control, retaining available replacement parts for anticipated damaged equipment, identifying sister facilities or outsourcing that can duplicate operations, fill orders, maintain customer service, or any other function your facility may conduct.

Maintenance/security

- Conducts a large percentage of physical activities to reduce potential damage to facility.
- Ensure documented training in full and partial shut down / start up procedures in accordance with manufacturer's specifications.
- Coordinate activities and responsibilities for maintenance and security including fire protection, security systems, alarms, and securing the site.
- Acquire and maintain physical protection materials. See attached Materials Checklist.
- Organize efforts with local law officials, mutual aid organization, etc. to anticipate challenges accessing the property.

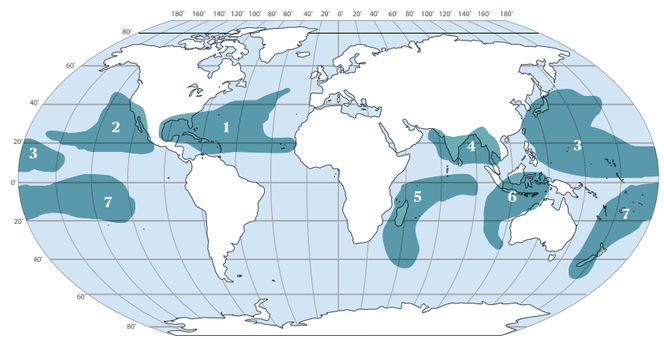
Shut down/start up

- Complete tasks meeting the needs of each alert level leading up to full or partial plant shut down and start up etc. Key personnel may include: maintenance, electrician, pipe fitter, plumber, boiler operator, refrigeration system operator, etc.
- Identify unique tools or apparatuses that would be needed to isolate key valves or repair ruptured control lines, etc.

Severer Weather Season Dates - General Guidance

Basin	Basin Area	Severe Weather Season[1]	Storm
1. Atlantic	North Atlantic Ocean, Gulf of Mexico, and Caribbean Sea	June 1 to November 30	Hurricane
2. Northeast Pacific	Mexico to the dateline	May 15 to November 15	
3. Northwest Pacific	Dateline to Asia including South China Sea	All year round (least activity February to early March)	Typhoon
4. North Indian	Includes Bay of Bengal and the Arabian Sea	April 1 to December 30	Cyclone
5. Southwest Indian	Africa to 100E	October 15 to May 10	
6. Southeast Indian/Australian	100E to 142E		
7. Australian/ Southwest Pacific	142E to 120W		

Note 1: Dates are based on historical data for a period of 100 years, and should be used as estimates only.
Note 2: Storm strength classifications differ from country to country. Refer to your national weather service organization for details.



Resources for tracking real-time conditions and general information

Please note that AXA XL does not control, support, endorse or determine accuracy of materials that are posted on any non-AXA XL site.

National Hurricane Center:
http://www.nhc.noaa.gov

Federal Emergency Management Agency:
http://www.fema.gov

NASA Earth Observatory:
http://earthobservatory.nasa.gov

Hurricane Maps Enterprises:
http://www.hurricanetrack.com

National Weather Service Terms:
http://www.weather.gov/glossary

National Weather Service Climate Prediction Center:
http://www.cpc.ncep.noaa.gov/

Key national weather service terms

Cyclone:
An atmospheric closed circulation rotating counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Flood:

Minor Flood	Minimal or no property damage, but possibly some public threat.
Moderate Flood	Some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations.
Major Flood	Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
Record Flood	Flooding which equals or exceeds the highest stage or discharge at a given site during the period of record keeping.
Flood Watch	Identifies areas where there is a risk of flooding, but flooding is not certain.
Flood Warning	Flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage (level) forecasts.
Flash Flood Watch	Rapid developing flooding is possible or is close to the watch area
Flash Flood Warning	Rapid developing flooding is in progress, imminent, or highly likely.

Gale Warning:
A warning of 1-minute sustained surface winds in the range 34 kt. (39 mph or 63 km/hr) to 47 kt. (54 mph or 87 km/hr) inclusive, either predicted or occurring and not directly associated with tropical cyclones.

High Wind Warning:
A high wind warning is defined as 1-minute average surface winds of 35 kt. (40 mph or 64 km/hr) or greater lasting for 1 hour or longer, or winds gusting to 50 kt. (58 mph or 93 km/hr) or greater regardless of duration that are either expected or observed over land.

Hurricane / Typhoon:
A tropical cyclone in which the maximum sustained surface wind (using the US 1-minute average) is 64 kt. (74 mph or 119 km/hr) or more. The term hurricane is used for Northern Hemisphere tropical cyclones east of the International Dateline to the Greenwich Meridian. The term typhoon is used for Pacific tropical cyclones north of the Equator west of the International Dateline.

Hurricane Warning:
A warning with sustained winds 64 kt. (74 mph or 119 km/hr) or higher associated with a hurricane are expected in a specified coastal area in 24 hours or less. A hurricane warning can remain in effect when dangerously high water or a combination of dangerously high water and exceptionally high waves continue, even though winds may be less than hurricane force.

Hurricane Watch:
An announcement for specific coastal areas that hurricane conditions are possible within 36 hours.

Knot:
Unit of speed used in navigation, equal to 1 nautical mile (the length of 1 minute latitude) per hour or about 1.15 statute miles per hour, or 0.5 meters/sec). Abbreviation is kt.

Monsoon:
A thermally driven wind arising from differential heating between a land mass and the adjacent ocean that reverses its direction seasonally.

Saffir-Simpson Scale:
This scale was developed in an effort to estimate the possible damage a hurricane's sustained winds and storm surge could do to a coastal area. The scale of numbers is based on actual conditions at some time during the life of the storm. As the hurricane intensifies or weakens, the scale number is reassessed accordingly. The following table shows the scale broken down by central pressure, winds, and storm surge:

Category	Central Pressure (mb)	Wind Speed (mph)	Storm Surge (ft)
1	980 or >	74 – 95 (33.1 – 42.5 m/s)	4 – 5 (1.2–1.5 m)
2	965 – 979	96 – 110 (42.6 – 49.2 m/s)	6 – 8 (1.8 – 2.4 m)
3	945 – 964	111 – 130 (49.3 – 58.1 m/s)	9 – 12 (2.7 – 3.7 m)
4	920 – 944	131 – 155 (58.2 – 69.3 m/s)	13 – 18 (4.0 – 5.5 m)
5	< 920	> 155 (> 69.3 m/s)	> 18 (>5.5 m)

Severe Thunderstorm:
A thunderstorm that produces a tornado, winds of at least 58 mph (50 knots), and/or hail at least ¾" (19mm) in diameter. Structural wind damage may imply the occurrence of a severe thunderstorm. A thunderstorm wind equal to or greater than 40 mph (35 knots) and/or hail of at least ½" (13mm) is defined as approaching severe.

Storm Surge:
An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the cyclone. Storm surge is usually estimated by subtracting the normal or astronomic high tide from the observed storm tide.

Tropical Cyclone:
A warm-core non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center. Once formed, a tropical cyclone is maintained by the extraction of heat energy from the ocean at high temperature and heat export at the low temperatures of the upper troposphere. In this they differ from extratropical cyclones, which derive their energy from horizontal temperature contrasts in the atmosphere (baroclinic effects).

Tornado:
A violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena.

Tropical Depression:
A tropical cyclone in which the maximum sustained surface wind speed (using the US 1-minute average) is 33 kt. (38 mph or 62 km/hr) or less.

Tropical Disturbance:
A discrete tropical weather system of apparently organized convection – generally 100 to 300 nmi in diameter – originating in the tropics or subtropics, having a nonfrontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field.

Tropical Storm:
A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 34 kt. (39 mph or 63 km/hr) to 63 kt. (73 mph or 118 km/hr).

Tropical Storm Warning:
A warning that sustained winds within the range of 34 to 63 kt. (39 to 73 mph or 63 to 118 km/hr) associated with a tropical cyclone are expected in a specified coastal area within 24 hours or less.

Tropical Storm Watch:
An announcement for specific coastal areas that tropical storm conditions are possible within 36 hours.

Materials Checklist

Keep an inventory of these items and hold in a secure, easily accessible location in preparation for a severe weather event.

- ☐ Batteries
- ☐ Bedding
- ☐ Blankets
- ☐ Bleach
- ☐ Boots
- ☐ Bottled drinking water
- ☐ Bug repellent
- ☐ Bungee cords
- ☐ Cash
- ☐ Canned and non-perishable foods
- ☐ Cleaning supplies:
  - ☐ Buckets
  - ☐ Disinfectants
  - ☐ Shop vacs
  - ☐ Mops
- ☐ Coolers
- ☐ Cutting tools/razor blades
- ☐ Digital camera
- ☐ Dust masks
- ☐ Eating utensils
- ☐ Electrical Lock Out /Tag Out kits
- ☐ Extension cords
- ☐ Fire extinguishers
- ☐ Fire Protection Impairment kits
- ☐ First Aid kits/Medical supplies
- ☐ Flashlights
- ☐ Floor drain plugs
- ☐ Fuel cans
- ☐ Gas wrench
- ☐ Generators
- ☐ Generator fuel
- ☐ Gloves:
  - ☐ Leather
  - ☐ Nitrile
  - ☐ Rubber
  - ☐ Latex
  - ☐ Hand sanitizers (Waterless)
- ☐ Hand tools (battery operated where possible):
  - ☐ Circular Saw
  - ☐ Screw Drivers
  - ☐ Hammers
  - ☐ Pliers
- ☐ Utility knives
- ☐ Hard hats
- ☐ Hoses
- ☐ Hot Work Permit kits
- ☐ Ladders
- ☐ Lighters
- ☐ Megaphone
- ☐ Plastic bags
- ☐ Plastic sheeting
- ☐ Rain gear
- ☐ Ropes
- ☐ Safety goggles/Glasses
- ☐ Safety harness
- ☐ Sand
- ☐ Sand bags
- ☐ Sealants (expandable polyurethane, caulk, caulk guns)
- ☐ Shovels
- ☐ Spill kits
- ☐ Spot/Flood lights
- ☐ Steel cables
- ☐ Sump pumps
- ☐ Straps
- ☐ Tape:
  - ☐ Caution tape
  - ☐ Duct tape
  - ☐ Electrical tape
- ☐ Tarpaulins
- ☐ Waterproof fire retardant
- ☐ Tie down kits/Ground anchors
- ☐ Tie wraps
- ☐ Toiletries
- ☐ Turn buckles
- ☐ Tree trimmers
- ☐ Yard equipment: Blowers, trimmers
- ☐ Waterproof matches
- ☐ Weather/Portable radios
- ☐ Whistles
- ☐ Wood:
  - ☐ Plywood
  - ☐ Lumber

Notes

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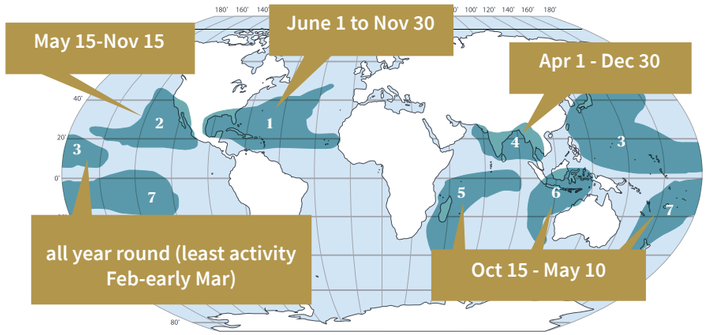
Off Season Checklist

Use this checklist prior to the severe weather season in your area to keep on top of areas that face risk of damage during a storm.



Review/Audit/Training/Exercises

- ☐ Audit the Severe Weather Emergency Response Team (SWERT) and Severe Weather Emergency Response Plan (SWERP), and update as needed.
- ☐ Conduct training.
- ☐ Conduct at least one exercise with defined scope, objectives, and feedback.
- ☐ Determine site security plans.

Materials acquisition

- ☐ Acquire all needed materials. See the Materials Checklist insert for assistance.
- ☐ Inspect condition of stored materials, including plywood for warping and sand bags for deterioration. Replace as needed.

Establish proactive agreements with service recovery contractors

- ☐ Develop blanket order contracts with pre-agreed terms and conditions and/or retainer fees to ensure that your businesses will get the highest priority response after an incident. Having these agreements will help avoid delays and speed up the process for repairs and recovery.

Establish "Authority to Act" agreements at local level

- ☐ Develop agreements that empower local level managers to take action in severe weather situations (i.e. hurricane, flooding, windstorm, hail etc.) Identify, document, and agree upon the key actions to take in these situations such as who to call, how to make temporary repairs, and how to authorize shut down if needed.
- ☐ Be sure to document the specific actions local managers should take in initiating the response from contractors and identify the specific money/budget they can spend in initial response/recovery efforts.

Review plant shut down/start up procedures

- ☐ Include all operations/production lines, utilities, fire protection, electrical, boilers, compressors, and gas systems.
- ☐ Ensure personnel are trained in proper shut down/start up procedures in accordance with manufacturer's specifications.
- ☐ Review plant load analysis to ensure proper back-up supplies can meet existing plant loads, noting renovations/additions.
- ☐ Ensure satisfactory contracts exist with two diesel fuel suppliers for emergency deliveries.
- ☐ Physically inspect facility for repairs.
- ☐ Repair roof leaks, loose flashing, gutters, down spouts.
- ☐ Check for corrosion and securement of roof equipment.
- ☐ Install / replace / repair tie down cables / straps securing roof equipment.
- ☐ Ensure window protection materials / systems are in proper working condition.
- ☐ Inspect perimeter conditions and determine what steps may be needed immediately prior to a storm's arrival.
- ☐ Inspect warehouse doors for securement.
- ☐ Identify possible water entry points and determine mitigation procedures. See Sandbagging Procedures insert.
- ☐ For metal buildings, replace corroded/loose metal roof/wall panels & bolts.

Severe Weather Season Checklist

Monitor weather conditions for storm developments using the local national weather services on television, commercial radio, NOAA Weather Radio, or any reliable websites that track and monitor storms.

If the projected path of the storm is near your facility, follow these procedures:

Storm conditions expected within 72 hours

- ☐ Activate Severe Weather Emergency Response Plan (SWERP) and schedule Severe Weather Emergency Response Team (SWERT) meetings.
- ☐ Inspect and repair loose flashing, clogged drains, gutters, downspouts.
- ☐ Inspect air conditioning (AC) equipment, AC drain lines, antennas, vents, piping, ductwork, satellite dishes, lightning aerials, and any other roof mounted equipment for proper foundation securement. Check all equipment panels. Replace missing screws on panels and add extra screws to foundations if possible.
- ☐ Remove all loose roof equipment and debris. Ensure all contractor materials are removed if roof work was in progress.
- ☐ Check skylight base securement and cracks. Make any necessary repairs.
- ☐ Fill emergency generator and fire pump fuel storage tanks.
- ☐ Contact diesel fuel suppliers alerting them to your anticipated needs based on severity of storm.
- ☐ Inspect all fire protection and detection systems to be sure they are in service.
- ☐ Trim and dispose of any landscaping that threatens to become wind-blown debris.
- ☐ Remove, secure or strap any loose yard equipment, storage, etc.
- ☐ Notify customers, suppliers, vendors of potential plant shut down and contingency plans.
- ☐ Begin shipping out / reducing finished goods storage.

Storm conditions expected within 24–48 hours

- ☐ Notify local fire department and follow Impairment System Guidelines if sprinkler system, fire pump, detection systems, fire alarm systems are to be taken out of service.
- ☐ Protect or relocate vital records.
- ☐ Close and secure any wall vent louvers.
- ☐ Install window protection.
- ☐ If no window protection is provided, close perimeter office doors.
- ☐ Use tarps or plastic sheeting to cover computer equipment, machinery, and stock susceptible to potential water damage caused by broken windows and roof leaks.
- ☐ If prone to flooding:
  - ☐ Elevate stock/equipment.
  - ☐ Seal water entry points.
  - ☐ Install flood gates if applicable.
  - ☐ Sand bag where needed.
- ☐ Conduct full or partial shut down procedures if needed.

During the storm if volunteers remain on site

Note: During the height of the storm volunteers should remain in a safe area. If safe conditions permit, the following activities may be conducted:

- Monitor areas for leaks in roofs, windows, walls, and vent openings.
- Mitigate water damage by providing buckets or plastic sheeting over affected areas, or by squeegeeing or mopping.
- Document items needing repair.
- Monitor critical equipment that has been left operational.

Post storm activities

Recovery and start up

- ☐ Assess facility's overall conditions immediately following the storm.
- ☐ Notify the Severe Weather Emergency Response Team (SWERT) of the property damage and overall conditions.
- ☐ Take measures to secure access to the property such as repairing fencing and posting security guards until normal conditions can be restored.
- ☐ Inspect critical utility lines for damage including electrical, flammable liquids, gases, ductwork, water, etc.
- ☐ Complete building repairs.
- ☐ Remove debris from roofs, roof drains, and sewer drains.
- ☐ Once conditions are satisfactory, begin general startup activities such as fire protection systems, utilities, electrical, boilers, compressors, gas systems, refrigeration systems, operations/production lines.

Review and feedback

- ☐ Review plan effectiveness.
- ☐ Obtain detailed feedback from all involved.
- ☐ Implement changes to improve plan.

Sand Bagging Procedures

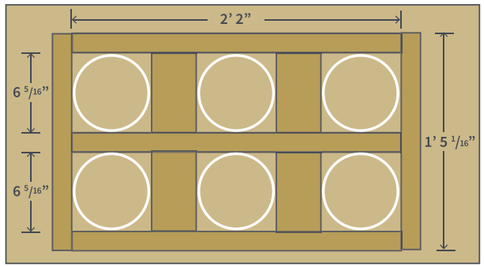
Bags must be filled, tied off, and placed properly to give the best protection. Bags are available in different types and sizes, but it is easier to handle if weight is limited to less than 35 pounds (16 kg). Need to create a large number of bags? Build a sandbag filler station to make the process much easier.

Parts needed:
- One 6” x 10’ thin walled sewer pipe
- Two 8’ 2x4s
- 1 ⅝ construction screws (for attaching tubes)
- 3” construction screws or nails (for frame assembly)
- 2’ 5” x 1’5” ¼” or thicker plywood (for top – optional but recommended)

Tools needed:
- Saw to cut the tubing and 2x4s
- Drill bit to pre-drill the holes for screws (right angle drill is easier)
- Powered screwdriver
- Handheld jigsaw or router for cutting plywood (for optional top)

Build a Sandbag Filler Station

1. Cut the sewer pipe into 6 sections (each 19 ⅞” long)
2. Cut the lumber into the following sections
   - (3) 2’ 2”
   - (2) 1’ 5 1/16”
   - (4) 6 5/16”
3. Assemble the wood as shown in the diagram at right, using the 3” screws (or nails) to hold the boards together.

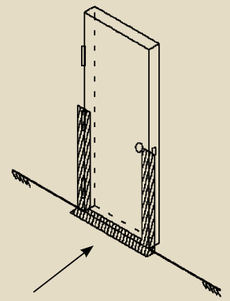


4. Once you have your frame, you can see how you will slide the tubes into each hole. You will need to put the 1 ⅝ screws through the tube and into the sides where it touches the boards on all four sides. There should be two screws at each spot. First, take your drill and pre-drill the 8 holes on each tube; one at 1” from the top and one at 2.5” from the top every 90 degrees. Now put the tube in the frame and put screws in each hole. The easiest way is with a right angle drill.

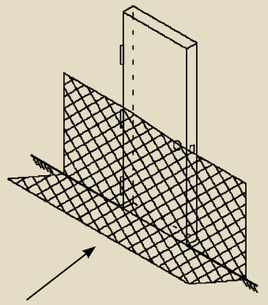
5. When all 6 tubes are screwed on, the tubes are usable. At this point, you can put on the optional top. The advantage of putting on the top is that it will prevent sand from falling down next to the tubes and pushing the bags down. If you are going to put the top on, cut the top to fit over the frame. Screw the top onto the frame boards. Now drill a hole and then using either a router or a hand jigsaw, cut the holes out for each tube.

Thanks to: https://www.instructables.com/id/Filling-Sandbags-the-Easy-way-with-Sandbag-Tubes/

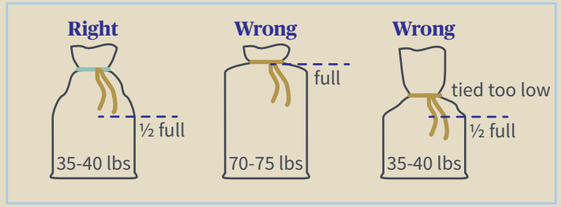
Step 1
Seal entrance way such as doors with expandable polyurethane foam several feet above the ground, well above the expected water height.

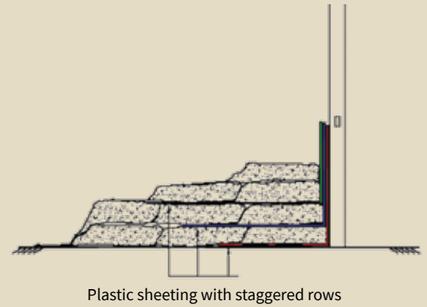


Step 2
Use duct tape to secure plastic sheeting to the walls around the doorway. Attach it several feet wider than the door and lay it out several feet on the ground.



Step 3
Place 3 rows of sand bags in front of the door on the sheeting. Place them tight against the door as well as extending beyond the sheeting. Continue alternating plastic sheeting with staggered rows of sandbags until complete.





Plastic sheeting with staggered rows

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