

HURRICANE PROCEDURE

A. Hurricane Threat.

A hurricane is a tropical cyclonic storm in which winds reach constant speeds of 74 mph or more, and blow in a large counter-clockwise spiral around a relatively calm center of low barometric pressure which is known as the eye of the hurricane. Maximum velocity winds extend 20 or 30 miles outward from the rim of the eye and may gust in excess of 200 mph.

The most dangerous part of a hurricane, causing the most damage and causing nine of ten hurricane fatalities, is the storm surge. The storm surge is a great dome of sea water, often 50 miles wide, that sweeps across the coast line as the eye makes landfall. During extreme hurricanes such as Hurricane Camille in 1969, the storm surge is as much as 25 feet above mean sea level.

Hurricane winds, above 74 mph, are the most familiar danger. The high winds are particularly destructive to temporary buildings, signs, trees, power lines, windows, etc. Debris flying from the destruction is a great threat to personal safety. Some hurricanes spawn tornadoes which inflict major destruction.

The torrential rains of a hurricane, 6 to 12 inches and more, and the resultant flooding are another very dangerous part of a hurricane.

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The six-month period from June through November is considered the Atlantic hurricane season. The storms originate in the Gulf of Mexico, the Caribbean Sea, and the Atlantic Ocean as far east as the Cape Verde islands just west of the African coast. There is an average of six Atlantic hurricanes per year but there have been as many as eleven and as few as zero. During the 1893, 1950, and 1961 seasons, four hurricanes were observed in progress at the same time.

Storm movement forward is slow in the tropical latitudes, 15 mph or less. Moving north away from the equator a storm will tend to accelerate moving forward 50 mph in extreme cases. A storm with hurricane force winds 100 miles from its center and moving north at 25 mph would require approximately 8 hours to pass.

Tropical storms and hurricanes are not totally predictable; but with satellites, weather planes, radar, and other modern surveillance techniques, the forecasts have become reliable and precise enough for the plant to prepare for the storm. In general, the plant will operate during gale force winds and possibly during weak hurricane force winds; but under a significant threat of destructive force winds, the plant will be shut down with enough lead time, approximately 4 hours, to allow non-essential personnel to be with their families during the emergency.

B. Hurricane Information

The National Weather Service began a new system for advising the public of the threat of approaching hurricanes or tropical storms in 1983.

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Besides information about storm intensity and location, NWS advisories now predict the percent probability for eye landfall at coastal cities.

These new forecasts will require careful interpretation in order to begin protective actions early enough and to begin planning emergency operations. They will be issued as much as 72 hours in advance of landfall and will be updated at six-hour intervals by NWS. When a storm is in the Gulf, the Lake Charles weather bureau will issue 3-hour local advisories, and if the storm is within 100 miles, the local advisories will be increased to 2-hour intervals.

The NWS advisories will predict the eye landfall probabilities within a 65-mile radius of 44 coastal towns and cities from Brownsville, Texas, to Eastport, Maine. The plant will key on the Port Arthur, Texas--Cameron, La. (combined) and New Iberia, La. probabilities. The probabilities quoted in early advisories will be low--for instance, a 72-hour advisory will quote a maximum probability for landfall anywhere at only 10%. With shorter approach times (the storm is closer), higher probabilities are predicted as follows:

<u>Approach Time</u>	<u>Max. Probability</u>
72 Hours	10%
48 Hours	13-18%
36 Hours	20-25%
24 Hours	35-45%
Less than 24 hours	60-70%

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Two aspects of the probability forecast are important. If this location has the highest probability when compared to neighboring locations, our hurricane threat is greatest. Also, any threat becomes greater with increasing values from one advisory to the next.

The plant should be placed on official hurricane alert as early as possible. Using the NWS probability forecasts, an alert should be called upon the earliest advisory that predicts a significant percent probability for landfall at this area. Use the following minimum percent probabilities:

<u>Approach Time</u>	<u>Min. Probability</u>
72 Hours	1%
48 Hours	2%
36 Hours	3%
24 Hours	5%
Less than 24 hours	7%

Repeating, we should go on official alert upon the first NWS advisory that predicts landfall in this area by the above minimum significant probabilities.

C. Hurricane Alert

The Shift Superintendent will place the plant on official alert status at the first National Weather Service advisory and that predicts a significant percent probability for landfall at this area (see preceding hurricane information).. When an alert has been issued, each area of the plant

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should follow its specific hurricane alert procedure. The general purpose of an alert is to notify all personnel and to allow all units to prepare for the storm.

1. Shift Superintendent places plant on hurricane alert.

- a. Superintendent informs shift supervisors who inform unit control rooms.
- b. Superintendent informs Emergency Coordinator and Emergency Communicator.

(1) Emergency Coordinator informs:

Works Manager

Plant Managers

Production, Power, and Shipping Superintendents

Medical, Safety, and Fire Protection

Cafeteria Manager

Maintenance Superintendents

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(2) Emergency Communicator notifies the following radio and TV stations:

KPLC - TV 7	439-9071
KADK - AM 1400	436-7541
KEZM - FM 100	527-5202
KLCL - AM 1470	433-1641
KLOU - AM	436-7277
KYKZ - FM 96	439-3300

Request media to make public announcement that plant is on alert, that employees should continue to report to work and stay tuned for later developments.

2. Hurricane Alert General Notification List

The following is a list of commodities and services received by or sent from the plant. Suppliers or consumers must be notified that the plant is preparing to shut down operation if the storm threatens. Responsibility for notification is listed. The emergency coordinator will follow up completion of this phase of the alert.

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Notified

GSU
Conoco Chlorine
Certainteed
Jupiter/Conoco H₂
Texaco, Conoco Fuel
Ethylene Suppliers
Oxygen, Nitrogen Suppliers
Liquid Air, H₂
Olin, CO₂
Sand Suppliers
HCl Pipeline, TUCC, & Olin
Olin, Brine
General Office

Notifier

Power Department
Liquefaction
VCM I
C Chlorine
Power Department
Plant B
Plant B
C Chlorine
Silicas
Silicas
Plant B
Power Department
Production Planning Dept.

3. Hurricane alert general checklist - all units are responsible for the following:

- a. Inspect for and secure all loose material such as scaffold boards and lumber, empty drums, unbraced glass windows, awnings, and Visqueen. Inspect all roof areas and tank tops.
- b. Inspect and anchor down all temporary buildings and work shacks. Tie down the low pressure tanks SRV.
Refer to the special note at the end of this procedure.
- c. Fill empty storage tanks. Most tanks only need a small amount, the heel should be adequate. Use liquid normally stored. A

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tall stand-alone tank should be about 1/3 full. Any volume is better than empty.

- d. Open drain valves in all storage tank dikes.
- e. Check operation of unit isolation valves.
- f. Fuel up all vehicles, portable compressors, pumps, etc.
- g. Check drinking water, rain gear, first-aid supplies, small tools, flashlights and batteries, rags, mops, and other miscellaneous supplies.

D. Shutdown

1. The Decision

The decision to shut down will be made by the Works Manager or his designee. If possible, shut down should be completed approximately four hours before winds reach hurricane force.

Several factors must be evaluated to reach a shut down decision including storm intensity, size, forward movement, landfall probability, and lead time. Although the storm brings a danger of flooding, the destructive force winds are the most dangerous for the plant. In judging the potential impact of an approaching storm, it

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must be remembered that a 100 mph wind has almost twice the destructive force of a 74 mph wind. Therefore, it is very advisable to shut down when the probability of receiving 74 mph winds and stronger gusts is high and urgently advisable when the predicted wind velocity exceeds 100 mph. *Important*

The timeliness of the shut-down decision is crucial. The plant can be crashed down within four hours, but given more lead time there will be less problems with gas releases, spills, and mechanical failures. If at all possible allow 24 hours lead time, but with storms originating in the Gulf there probably won't be that much warning.

2. The Shut-down

All units should shut down completely. "A" Power will provide emergency utility service because it is sheltered and can feed minimum power to all units without using the vulnerable 69 KV power loop.

"A" Power will operate two 600 psig boilers and two Elliott generators to provide minimum emergency service utilities. It has been estimated that the minimum power requirement is 10,700 KW and 325 CFM gas (not including boiler fuel).

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The A Power boilers should be started when the plant is first placed on alert so that A Power will be ready for emergency service when "C" Power and "A" Riverside shut down.

NOTE: As this procedure is being written, the two 69/13.8 KV transformers at C Power have not been re-phased. Until they are, "A" and "C" Power cannot be tied together to line up emergency service from "A" Power. In case the transformers have not been rephased, emergency service will be supplied from "C" Power and "A" Power. "C" Power will operate No. 1 gas turbine for power and No. 1 boiler for steam. "A" Power will run an Elliott generator with steam from "C" for emergency power in Plants A and B. The 69 KV power loop must be de-energized for the storm. This emergency power alignment is much less desirable because C Power is not sheltered from the weather and it would require a full-time operating crew.

3. Shut-down Sequence

This procedure does not propose an absolute sequence of shutdown. That can be determined at the time judging the circumstances.

Operations are grouped into three major categories. Some units can be shut down independently, while others must be coordinated.

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a. Independent Operations

Pels - Will probably dump concentrators, kill Dowtherm furnace fires, and keep dutch oven fire.

Silicas - Will shut down frit reactor, dissolver, dryers, all pumps, and keep furnace on idle.

70% Caustic Concentrators - Can be shut down and pumped out at any time.

Waste Treatment - Shut down everything but incinerators at any time.

b. HCl Dependent Operations

(1) Shut down EC-HCl, then coordinate VC I and II and OHC.

(2) Coordinate TEII, etc.

(3) Coordinate Per-Tri - For Effluent pH control.

(4) Coordinate incinerators for effluent pH control.

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c. Cl₂ Dependent Operations

- (1) Mercury Cells, EDC-gas, A Riverside Power down together.
- (2) A- Elec., Liquefaction units.
- (3) C - Chlorine, Conoco, Liquefaction units.
- (4) A - Caustic, SCl₂.
- (5) C - Caustic, C - Power.

Note: Plants A & C operate brine treatment plants as long as possible to fill treated brine storage tanks.

4. Shutdown Completion

Detailed shut-down instructions must be given at each unit. As progress is made, each unit must report it to the Shift Superintendent and Emergency Coordinator. When a unit is secure, non-essential personnel will be excused upon Shift Superintendent authority.

Each unit will be responsible for reporting any equipment that is operating such as air conditioners or air compressors and the number of employees on duty for surveillance.

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