

SAFETY ALERT



U.S. Chemical Safety and Hazard Investigation Board

AFTER HARVEY: Precautions Needed During Oil and Chemical Facility Startup

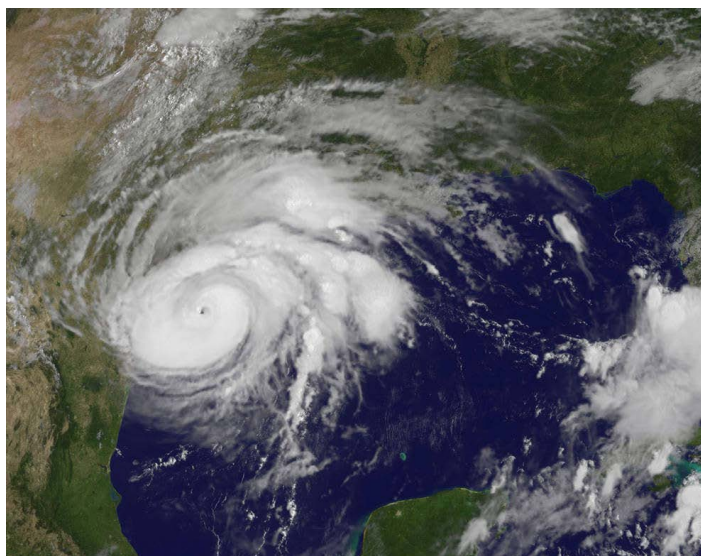


Photo courtesy of NOAA's GOES East satellite on Aug. 25 at 10:07 a.m. EDT

Introduction

The startup of major processes is a hazardous phase in the operation of oil refineries and chemical plants. Hurricane Harvey has now disrupted production at numerous petrochemical facilities in the Gulf Coast region and caused extensive water and wind damage to facilities in hard-hit areas.

Over the coming weeks and months, these facilities will be restarting. This is a time to make sure no lives are needlessly claimed by this tragedy and no further delays occur in the production of essential transportation fuels and chemicals. Facilities should pay particular attention to process safety requirements during this critical period to assure a safe and expeditious return to operation.

As the industry recognizes, starting up a complex petrochemical process requires establishing stable flows, levels, temperatures, and pressures within large-scale equipment. Startup requires and receives a higher level of attention and care than normal processing, because numerous activities are occurring simultaneously and many automatic systems are run under manual control.

CSB accident investigations underscore the hazards of startup even under "normal" conditions. In the wake of the hurricane, adhering

"We urge facilities to follow established procedures and checklists prior to restarting. This is a time for diligence, so that no lives are claimed by fires and explosions at refineries and ensure the production of essential transportation fuels and chemicals."

– Chairperson Vanessa Allen Sutherland

to appropriate safety management systems can mean the difference between a safe and uneventful startup and a serious incident.

Rely on Established Safety Systems

As facilities resume operations, it is important to follow established startup procedures and checklists and carefully perform pre-startup safety reviews. In addition, facilities should remember to:

- Use appropriate management-of-change (MOC) processes before modifying any startup procedures, equipment, or staffing arrangements due to the impact of the hurricane.
- Make sure that adequate staffing and expertise are available before starting up, recognizing that human performance may be compromised due to crisis conditions.
- Use up-to-date startup procedures and ensure that the available staff are trained in how to execute them.
- Evacuate nonessential personnel (including personnel in trailers) from the vicinity of process units that are starting up.

Check Process Equipment Thoroughly

Equipment, tanks, and instrumentation should be thoroughly evaluated for damage prior to startup. In particular, facilities should remember to:

Examine large bulk storage tanks for evidence of floating displacement or damage

- ✓ Foundation, chime ring, undertank voids
- ✓ Overturning, shell shifting

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- ✓ Floodwater leakage into tanks
- ✓ Piping connections distortion or damage
- ✓ Piping and component support displacement or damage
- ✓ Ladder support displacement or damage
- ✓ Floating roof submersion or damage
- ✓ Fixed roof distortion from support damage
- ✓ Debris impact damage
- ✓ Test grounding integrity

Examine pressure vessels and small storage tanks for evidence of floating displacement or damage

- ✓ Support structure or foundation damage
- ✓ Floodwater leakage into vessels or tanks
- ✓ Piping connections distortion or damage
- ✓ Debris impact damage

Examine insulation systems for piping, vessels, and tanks

- ✓ Floodwater trapped in insulation
- ✓ Damaged or missing insulation

Examine sewers and drains

- ✓ Debris and silt obstruction

Examine furnace systems

- ✓ Damaged or missing refractory
- ✓ Damaged or missing insulation

- ✓ Floodwater trapped in refractory or insulation
- ✓ Debris impact damage
- ✓ Fuel system and control damage
- ✓ Debris in firebox

Examine electric motors and drives

- ✓ Floodwater leakage into housing
- ✓ Drive component damage
- ✓ Debris impact damage
- ✓ Test motors for ground faults (megohmmeter testing)
- ✓ Verify lubrication systems are functional on associated equipment

Examine switchgear, conduit, electrical boxes, electronic and pneumatic instrumentation, emergency warning systems, emergency equipment (e.g. eyewash stations, fire detection and suppression systems)

- ✓ Floodwater leakage into devices and conduit
- ✓ Debris impact damage
- ✓ Conduct infrared scans to detect hot-spots in equipment upon energizing.

This list is not exhaustive and is not intended to substitute for any other procedures or checklists regularly used or developed in response to Hurricane Harvey. For further information on CSB investigations and safety recommendations, visit www.csb.gov.



CSB Safety Alerts offer advisory information on good practices for managing chemical process hazards.

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