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 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

“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
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.

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