Hurricane Harvey’s Marine Supply Chain Disruption

Exercising Business Continuity in a Post-Damian Environment

Mary Luke
Coral Range Company

How’s the weather?
- Houston
- Planning for the most unlikely
- Ensuring business continuity
- Designed identity of disaster-prone areas

2017 Hurricane Harvey in all its glory:
- Unprecedented storms
- 360+ fatalities
- 17 trillion gallons of rain
- Over 150,000 rescues
- 1 million people

2021 North Carolina Floods:
- On pace for a $30 billion disaster
- At least 20 people dead
- 120,000+ people impacted
- 100,000+ people without power

Coral Range Company

Weathering the Storms

End of presentation

Thank you!
Hurricane Harvey's Marine Supply Chain Disruption

Exercising Business Continuity in a Post Storm Environment

Mason Eustis
Canal Barge Company
How's the weather?

- Preparation
- Planning for the uncontrollable
- Exercising business continuity
- Dampen volatility of disruptive events

Simple Question - Big Impact
2017 Hurricane Season
An active year in the tropics

- 15 named storms
- 5 major hurricanes
- Harvey, Irma, Jose, Maria, Nate
Canal Barge Company

- Canal Barge Company is an inland marine boat and barge operator
- Core business in liquid cargo transportation
  - Fuel components, lube oils, chemicals, black oils
- Niche in long haul affreightment services

- US Gulf Coast is critical segment of our operations
- High volume of our cargoes originate between Corpus Christi, Tx. and Lake Charles, La.
- "Solutions Provider" to our customers
Hurricane Harvey
Harvey

- Landfall in Rockport, Tx August 25th
- Characteristics
  - Surge and wind impacts to communities in immediate cone
  - Stalled system with substantial rainfall

Cumulative rainfall of 42-60 inches
Latest observed value: 15.41 ft at 4:46 PM CDT 27-Aug-2017. Flood Stage is 10 ft
SAN JACINTO RIVER NEAR SHELDON

Universal Time (UTC)

Latest observed value: 27.17 ft at 5:31 AM CDT 29-Aug-2017. Flood Stage is 10 ft

Record: 32.9'

Flow (kcf/s)

Stage (ft)

Major: 15.0'
Moderate: 13.0'
Minor: 10.0'
Action: 8.0'

Site Time (CDT)

Graph Created (5:51AM Aug 29, 2017) - Observed - Forecast (issued 2:35AM Aug 29)
Latest observed value: 25.73 ft at 5:31 PM CDT 30-Aug-2017. Flood Stage is 10 ft.
Canal Barge Company Storm Prep

- In advance of Harvey some 20% of our tank barge fleet and 23% of our boat fleet were in the path of the storm
- 15% of our workforce lives in the storm zone

Business Continuity Plan
- Implemented in advance of the storm - maintained until normal operations were restored
- 2 x daily internal coordination calls
- ICS model
  - Clearly designated authority, specifically allocated responsibilities
Inland Waterway Closures

- Port of Houston completely closed for 7 days
  - 'Port Stage Zulu' - no ships in or out, no cargo transfers, no barge or tow movement
- Intercoastal Waterway closed from Houston to Lake Charles for 9 days
- Intercoastal Waterway closed at Colorado Locks - Houston to Corpus - Aug 25 until September 27

No inland marine access to Corpus for a month
Hurricane Harvey
Marine Casualties
Sunken MV Signet Enterprise
USCG rescued 4 crew aboard, all survived
Grounded Drillship - Corpus Christi Ship Channel
Grounded Tank Barges
Sunken Drydock at Southwest Shipyard
CBC Deck Barge Salvage Operation
Waterways Restoration

In a post storm environment - major impediments to restoration of navigation are:

- Shoaling - sandbar formation reducing water depth
  - Colorado Locks - 4 week dredging op
- Debris in waterways
  - Requires salvage ops
    - Dry dock at Brady Island
    - Barges in Greens Bayou Houston - Salvage ops ongoing into October
Coordinated Response

- USCG and USACE maintain legal responsibility for restoration of the waterway
- Industry participants, regulators, shipper stakeholders work together
- Industry Participant embedded in USCG VTS
- Coordination conference calls
  - Sharing waterway condition information
  - Prioritization of vessel movements
Hurricane Harvey Impact to Shippers
East Texas
A Critical Refining and Transportation Hub
US Gulf Coast Refinery Corridor
The following plants have been shut down:

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Capacity (b/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ExxonMobil</td>
<td>Baytown, TX</td>
<td>560,500</td>
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<tr>
<td>ExxonMobil</td>
<td>Beaumont, TX</td>
<td>362,300</td>
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<tr>
<td>Citgo</td>
<td>Corpus Christi, TX</td>
<td>157,500</td>
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<tr>
<td>Magellan</td>
<td>Corpus Christi, TX</td>
<td>50,000</td>
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<tr>
<td>Buckeye**</td>
<td>Corpus Christi, TX</td>
<td>50,000</td>
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<tr>
<td>Shell</td>
<td>Deer Park, TX</td>
<td>340,000</td>
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<tr>
<td>Petrobras</td>
<td>Pasadena, TX</td>
<td>112,229</td>
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<tr>
<td>Motiva</td>
<td>Port Arthur, TX</td>
<td>603,000</td>
</tr>
<tr>
<td>Total</td>
<td>Port Arthur, TX</td>
<td>225,500</td>
</tr>
<tr>
<td>Valero</td>
<td>Port Arthur, TX</td>
<td>335,000</td>
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<tr>
<td>Phillips 66</td>
<td>Sweeny, TX</td>
<td>247,000</td>
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</tbody>
</table>

Total capacity closed 3,043,029
Share of US capacity 16%

- Valero, Citgo and Flint Hills Corpus Christi offline 8/24
- Exxon Baytown closed dock 8/25 and shut down production 8/27
- Motiva Pt Arthur implemented a phased shut down starting 8/29
- Exxon Beaumont shut down production 8/30 after running at reduced rates from 8/28
- Also offline – Shell Deer Park, Petrobras Pasadena
- Partially offline – Marathon Texas City, LyondellBasel

22% of US refining Capacity offline

*The following plants have reduced rates or are returning:

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Capacity (b/d)</th>
<th>50% of Capacity (b/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flint Hills***</td>
<td>Corpus Christi, TX - West</td>
<td>230,000</td>
<td>115,000</td>
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<tr>
<td>Flint Hills***</td>
<td>Corpus Christi, TX - East</td>
<td>70,000</td>
<td>35,000</td>
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<tr>
<td>Valero***</td>
<td>Corpus Christi, TX</td>
<td>293,000</td>
<td>146,500</td>
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<tr>
<td>Valero***</td>
<td>Three Rivers, TX</td>
<td>89,000</td>
<td>44,500</td>
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<tr>
<td>Lyondell***</td>
<td>Houston, TX</td>
<td>263,776</td>
<td>131,888</td>
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<tr>
<td>Valero</td>
<td>Texas City, TX</td>
<td>225,000</td>
<td>112,500</td>
</tr>
<tr>
<td>Marathon***</td>
<td>Galveston Bay, TX</td>
<td>459,000</td>
<td>229,500</td>
</tr>
<tr>
<td>Marathon***</td>
<td>Texas City, TX</td>
<td>86,000</td>
<td>43,000</td>
</tr>
<tr>
<td>Valero</td>
<td>Houston, TX</td>
<td>191,000</td>
<td>95,500</td>
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Total capacity reduced 953,388
Closed + reduced capacity 3,996,417
Share of US capacity 22%

***Returning
Houston Dock Schedule
Disrupted Shipping Patterns

- Storm Contingencies implemented
  - Sourcing away from Houston
  - Inventory management - how much is enough?
- Fuel Feedstocks - High Priority shipments - out of the ordinary directions
  - Fuel shipped from Chicago to blender in St Louis that had not received a barge for decades - lack of pipeline capacity
  - Seagoing barge to inland barge jet fuel lightering in NOLA
  - Supporting resumption of airline ops at IAH
- Reports of a shipper with a single sourced material in Corpus trucking cargo to keep plant running - through a 30 day closure
Common Theme

- Plants across the country running at reduced capacities due to lack of inbound feedstocks
- Explicit design — integrated plants run on an interdependent basis — one site consumes production of another

Houston impacted — explicitly and directly — but due to the interconnected transportation network the impacts extended across the country and world

- Two barges that were held up east of Corpus when the storm hit will be delivered into Chicago this weekend
Lost Time Value

Consider those barges and boats that spent a month waiting on waterway to re-open at Colorado Locks
• 1/12th of that asset's 2017 earning potential was destroyed

No recovery of that opportunity - the lost time cannot be recouped on the asset

Minimal recourse with shippers
No major spills, injuries or loss of life

A Human Story about resiliency - binding together to achieve and re-establish normalcy for a city, a region and our country

Questions?
Thank You!