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Hookers Point Terminal - Tank #8 Fires

LEPC
November 20, 2013

James Teets, P.E., Reliability Manager, Savage Services

Terminal Operations

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- Savage is the operator of the GSS terminals
- We design, operate and maintain solutions that solve unique logistics and materials management challenges
- Savage is a privately held company established in 1946 and currently has 2,500 employees serving Customers at over 150 locations
- Committed to safety of employees, customers, and neighboring communities
- Extensive training programs designed to engage all employees in safety
- Committed to compliance with all governing environmental regulations
- Savage was awarded OSHA VPP status at multiple sites and selected by EHS Today magazine as one of America's Safest Companies

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GSS Sulphur Terminals

- Donaldsonville, LA
- Chicago, IL
- Galveston, Texas
- Tampa, FL (Hooker's Point & Port Sutton)

Sulphur – Critical Element

- Sulphur is a critical component in phosphate fertilizer production
- Sulphur is critical to Mosaic who is both a GSS customer and GSS business partner
- Phosphate fertilizer inputs and products account for approximately 1/3 of the cargo moving in and out of the Port of Tampa

Hookers Point Sulphur Terminal

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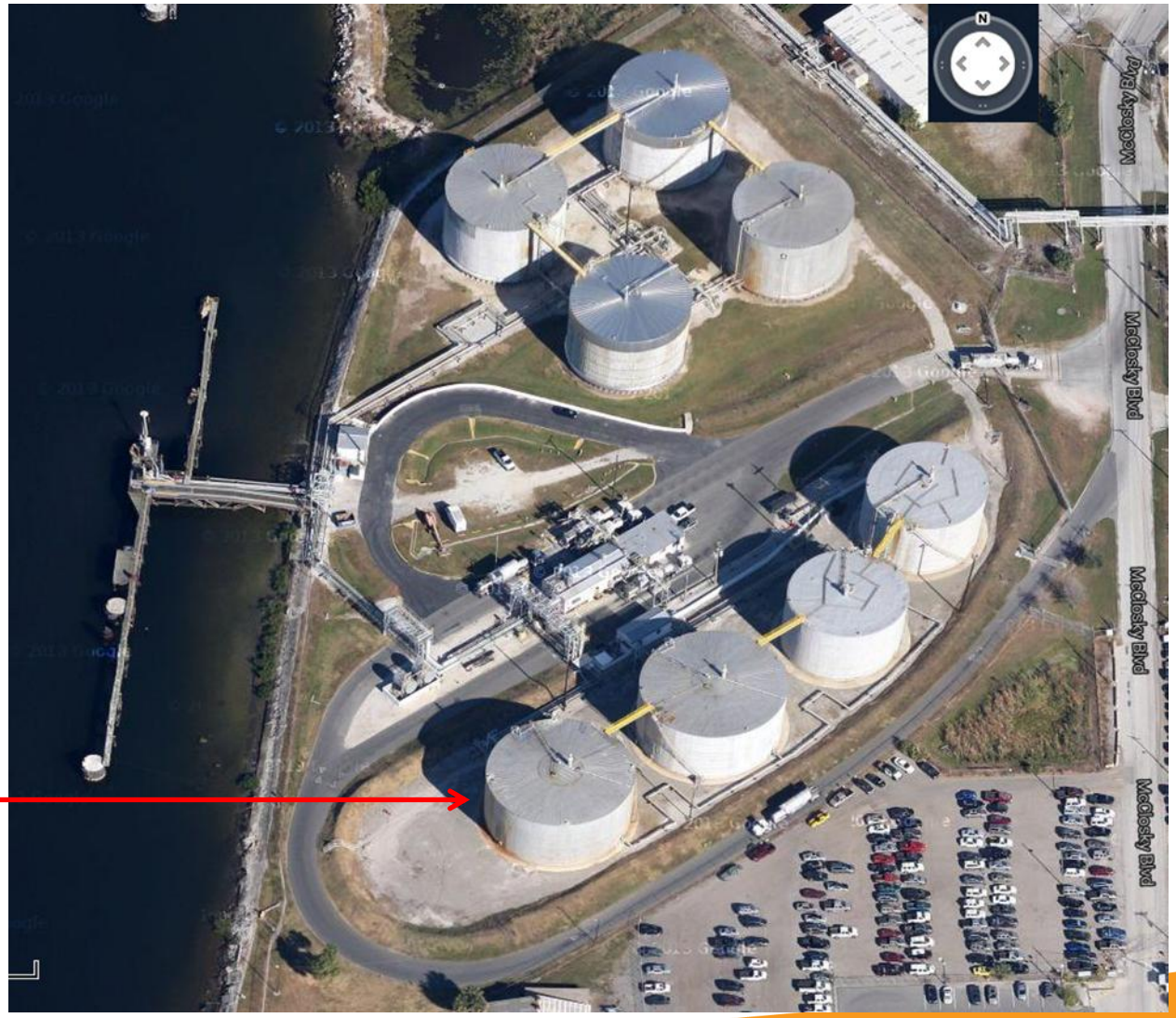
Tank No. 8



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Background

- Late July, 2013: Holes discovered in roof of Tank 8.
  - GSS management immediately ordered Tank 8 to be taken out of service for repairs
  - This included filling the tank and allowing it to cool.
    - In order to minimize the risk of fire, Tank 8 was filled to approximately 3.5 feet from the roof.
    - The filling of Tank 8 was complete on August 4, 2013, when it was taken off-steam to cool.

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Background: Continued

- August 4, 2013, steam was taken off Tank 8 to begin the sulphur solidification process. The tank was locked out & tagged out for maintenance.

- August 7, 2013, forced ventilation was employed to accelerate the cooling of the sulphur and all four peripheral vents were opened

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August 8, 2013 Fire

- 8:10 am: While it was being prepared for decommissioning, a fire ignited inside Tank 8 and we activated the Tank's internal fire suppression system.
  - The steam generated by the fire suppression system combined with the smoke from the fire to produce a cloud that escaped through the holes in the roof.
  - This cloud was visible to the surrounding communities, which alarmed some citizens.
  - The cloud was mostly steam from the fire suppression system, but it did contain a small amount of sulphur dioxide (SO2).
  - Monitoring at terminal perimeter revealed that release of SO2 was within all health & safety regulatory requirements

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August 8, 2013 Fire, continued

- 9:00 am: Shortly after we activated our fire suppression system, representatives of the TPA and the Fire Department arrived on-site.
  - We explained the situation and the Fire Department created what is known as a “water curtain” to help contain the plume.
- 10:30 am: In an abundance of caution, the Tampa Fire Department ordered a “shelter-in-place” for parts of south Tampa.
- 10:57 am: the fire was extinguished and the Fire Department turned off the water curtain.
- 11:15 am: the Fire Department lifted the “shelter-in-place.”

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Immediate Response to August 8th Fire

- Drain and clean the tank for inspection.
  - Fully API 653 Internal out-of-service inspection by an independent API certified inspector.
  - Investigation to determine the root cause of the fire and to develop measures to prevent this from happening again.
- As a precaution, kept Tank 8's Steam Fire Suppression System partially activated 24 hours per day to reduce the chance of re-ignition.
- Scheduled meetings with the TPA, the Tampa Fire Department and the Environmental Protection Commission of Hillsborough County.

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Fire on August 13, 2013

- 2:00 pm to 2:45 pm: GSS personnel were on the roof of Tank 8 to perform a visual inspection.
  - All was normal and there was no signs of fire inside the tank.
  - The tank was still full of sulphur. The tank was under steam but the sulphur had not yet reached sufficient temperature to start draining it yet.
- 4:15 pm: We then discovered that Tank 8 was on fire again and then activated the steam smothering system.

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Fire on August 13, 2013 – continued

- 5:15 pm: We placed a call to the Tampa Fire Department requesting assistance to extinguished the fire.
  - Once again, the large amount of steam generated by the fire suppression system combined with the relatively small amount of smoke from the fire to produce a cloud that escaped through the hole in the roof and was visible to the surrounding communities.
  - Upon arrival of the Tampa Fire Department, the fire was quickly extinguished.
  - Monitoring at terminal perimeter revealed that release of SO2 was within all health & safety regulatory requirements

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Immediate Response to August 13th Fire

- In addition to keeping Tank #8 out of service, GSS took the following steps to minimize the risk of another fire while we continue to drain Tank #8 for inspection and repairs:
  - We hired Southeast Coastal to provide continuous 24 hour per day monitoring of Tank 8 until it was fully drained and ready for inspection.
  - We arranged to have the Tampa Fire Department remain on-site with a fire engine and a crew of fire-fighters as a precaution in the event of a re-ignition, with GSS paying the cost of the engine and fire crew.

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Immediate Response to August 13th Fire

- We hired a contractor to install temporary patches over the holes in the roof in an effort to minimize the risk of further SO2 emissions in the event that another fire ignited inside the tank.

- We kept tank's Fire Suppression System activated until the tank was fully drained and empty

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GSS's Response: Cooperation with EPC and Other Agencies

- Full and Complete Cooperation with EPC and other Government Agencies
- Numerous Meetings with EPC Staff
  - Issues discussed
    - Incident
    - Interim Measures to Prevent Re-Occurrence
    - Root Cause Investigation
    - Corrective Measures
    - Participation in Sulphur Industry Working Group

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GSS's Response: Cooperation with Governmental Entities - Continued

- Meetings with Tampa Port Authority Staff
  - Better Communication and Coordination in Emergencies
  - Participation in the Port's Safety Initiative
  - Cooperation to Develop Improvements to the Port's Public Warning System
- Meetings with Tampa Fire Department

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Root Cause Investigation

- In response to these two events, GSS initiated a Root-Cause-Investigation:
  - Objectives:
    - To thoroughly and comprehensively investigate the two events to determine the root cause, any contributing factors
    - To develop and implement measures to prevent reoccurrence

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Composition of Investigation Team

- Investigation team comprised of independent, third-party experts and in-house engineers with expertise in:
  - Independent, API-Certified Tank Inspection
  - Storage tank design and operation
  - API 653 standards
  - Storage tank maintenance and repair
  - Structural engineering
  - Mechanical engineering
  - Chemical engineering
  - Emergency response
  - Fire suppression
  - Pyrophoric Reactions

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Root Cause Investigation - continued

- Full API 653 Internal Out-of-Service Inspection has been completed by an API certified Tank Inspector
- Third-Party Expert (CTI) has determine cause of the fires.
    - Significant Findings:
        - The fire was caused by a pyrophoric reaction
        - The tank's stream smothering system is marginal and should be improved
        - Holes in the roof impaired the effectiveness of the steam smothering system

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GSS's Root Cause Investigation - continued

- Findings of Root Cause Investigation Team:
  - Significant Finding: External corrosion is the primary cause of roof holes (not product-side corrosion)
  - The Root Cause: Need to repair areas of roof corrosion more quickly before they develop into holes
  - Contributing Factors:
    - API 653 Inspection Protocols not robust enough for sulphur tank roofs
    - Sub-optimal Emergency Response/Communications Plan

Corrective Action Options In Review

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Inspections:

- Non-Destructive Inspection Techniques
  - Thermographic
  - Internal Visual
  - PEC (Pulse Eddie Current)
- Inspect to categorize the current tank condition
- More Frequent
- Better Training
- Corrosion Rate Analysis for Roof

Changes to Existing Systems:

- New Methods to Prevent / Retard Roof Corrosion
  - Coatings - External
  - Improved Insulation
  - Improved Coverings
- Steam Smothering System Upgrade
- Alternative Materials of Construction

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Emergency Response & Communication

- Improve Education & Communications with local agencies (TPA, Fire Department, EPC, LEPC)
  - Education on sulphur operations & hazards
  - Potential Community Impacts
  - Update Emergency Response Procedures & Communication Plan
  - Annual Emergency Response Drills/Site Familiarization Activities
  - Active Involvement – Safety Councils all Ports

Current Status & Path Forward

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- Tank 8 currently out of service, repairs in progress pursuant to findings from API 653 Inspection
- Continue to evaluate Corrective Measures
  - Coordinate with EPC regarding review and implementation of Corrective Measures
- GSS continue to participate on EPC Industry Group
- Implement Corrective Measures consisting of overall process, tank inspection, and tank maintenance improvements
- Implement new Emergency Response Communication & Coordination Plan

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Presentation by the Environmental Commission of Hillsborough County

Mr. Sterlin Woodard, P.E.
Assistant Director
Air Division
Environmental Protection Commission
Of Hillsborough County

Latest Available Technology (LAT) & Reporting Proposal for Molten Sulfur Storage Tanks – EPC Board

Use Existing Rules & Permits to:

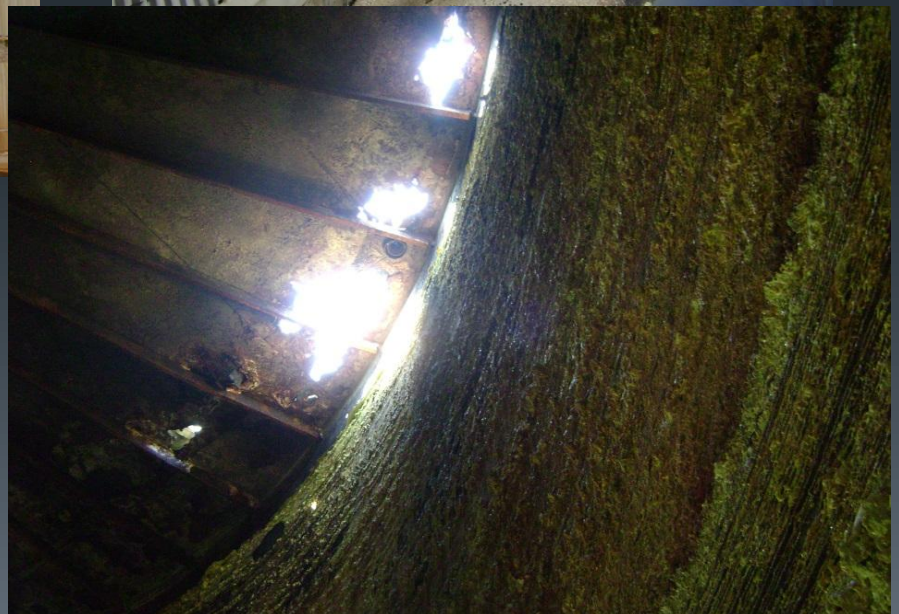
- **Prevent or Minimize Fires**
- **Prevent or Minimize Spills**
- **Prevent or Minimize Excess Emissions**
- **Improve Emergency Response & Notification**

Latest Available Technology (LAT) & Reporting Proposal for Molten Sulfur Storage Tanks – Rules

- Chapter 1-1.07(2), Rules of the EPC – Requires the use of Latest Available Technology if it results in or expected to result in lower or improved emissions
- Chapter 1-3.25(2), Rules of the EPC – Prohibits excess emissions caused entirely or in part by poor maintenance, poor operation during startup, shutdown, or malfunction shall be prohibited
- Chapter 1-1.05, Rules of the EPC – Requires 24-hr notification to the EPC of equipment breakdown which could cause air pollution that has the potential to cause significant harm to the environment or represents an immediate threat to public health

Latest Available Technology (LAT) & Reporting Proposal for Molten Sulfur Storage Tanks – Corrosion Causes Fires - FeS

BMP & Improved Inspection Procedures (API-653) to Prevent Corrosion



Latest Available Technology (LAT) & Reporting Proposal for Molten Sulfur Storage Tanks

Improved Reporting

1. Develop Written Emergency Response Plan (24 hr Notification)
   - **Tampa Port Authority**
   - **SWP**
   - **Fire Rescue**
   - **EPC**

2. Annual Training & Biennial Exercises with Port Authority and Fire Rescue

3. Membership on Tampa Bay Spill Committee & LEPC Facility Disaster Planning Subcommittee

4. Submit copies of API-653 Inspections to EPC

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GSS is committed to safety and being a good neighbor

Discussion and Questions