

U.S. Chemical Safety and Hazard Investigation Board



Large Tank Failure Investigation:

Allied Terminals

Chesapeake, VA

November 12, 2008

**Presented to the National Agronomic
Environmental Health and Safety School**

August 19, 2009

Mary Nikityn, Investigator



Overview

- **The CSB**
- **Allied Terminals**
- **Incident Description**
- **Tank Modification**
- **Tank Inspection**
- **Regulatory Coverage and Industry Standards**
- **Other Fertilizer Tank Failures**
- **Incident Causes**
- **Recommendations**



The CSB

- **Mission**
- **Incident Selection**
- **Investigation Process**
- **Recommendations**
- **Safety Videos**



Allied Terminals

- **Fertilizer Tank Failure
November 12, 2008**
- **Incident Overview**
- **Selection for Investigation**
- **Field Investigation**



Allied Terminals

- **Independent Liquid Terminals**
- **Chesapeake, and Norfolk, Virginia**
- **Store Petroleum Products and Liquid Fertilizer**
- **Urea Ammonium Nitrate 32% (UAN 32)**



Allied Terminals – Chesapeake





Allied Terminals – Chesapeake

- **Purchased and Combined Three Terminals**
- **200 Field Fertilizer Tanks Purchased 2000 from Star Enterprises**
- **Four Tanks—201, 202, 205, 209— Same Modifications, UAN Service**



Incident – Summary

- **2:20 pm November 12, 2008**
- **Catastrophic failure of 2-million-gallon fertilizer tank**
- **Seriously injured two contractors**
- **Flooded portions of South Hill community**



Incident – Tank 201





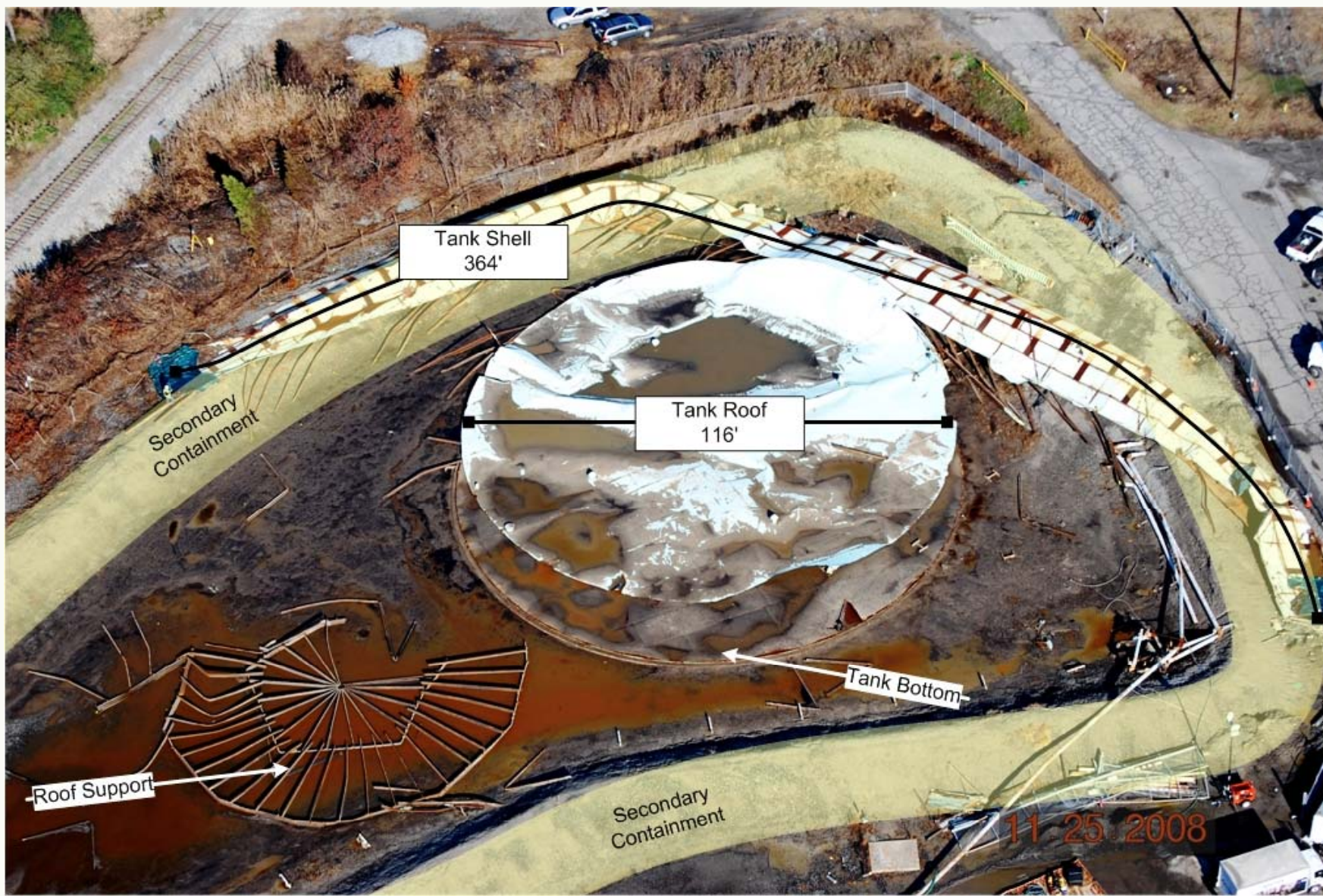
Incident – Tank 201

- **2-million gallon capacity**
- **Constructed circa 1929**
- **In petroleum service prior to 1990**
- **Modified (riveted to welded) 2001**



Incident – Tank 201







Incident – South Hill Community





Investigation

- **Began December 1, 2008**
- **Faulty welding responsible for failure**
- **Three other tanks at risk**
- **December 8, 2008: CSB issued Urgent Safety Recommendations**
- **December 22, 2008: Chesapeake Fire Marshal condemned tank adjacent to South Hill community**

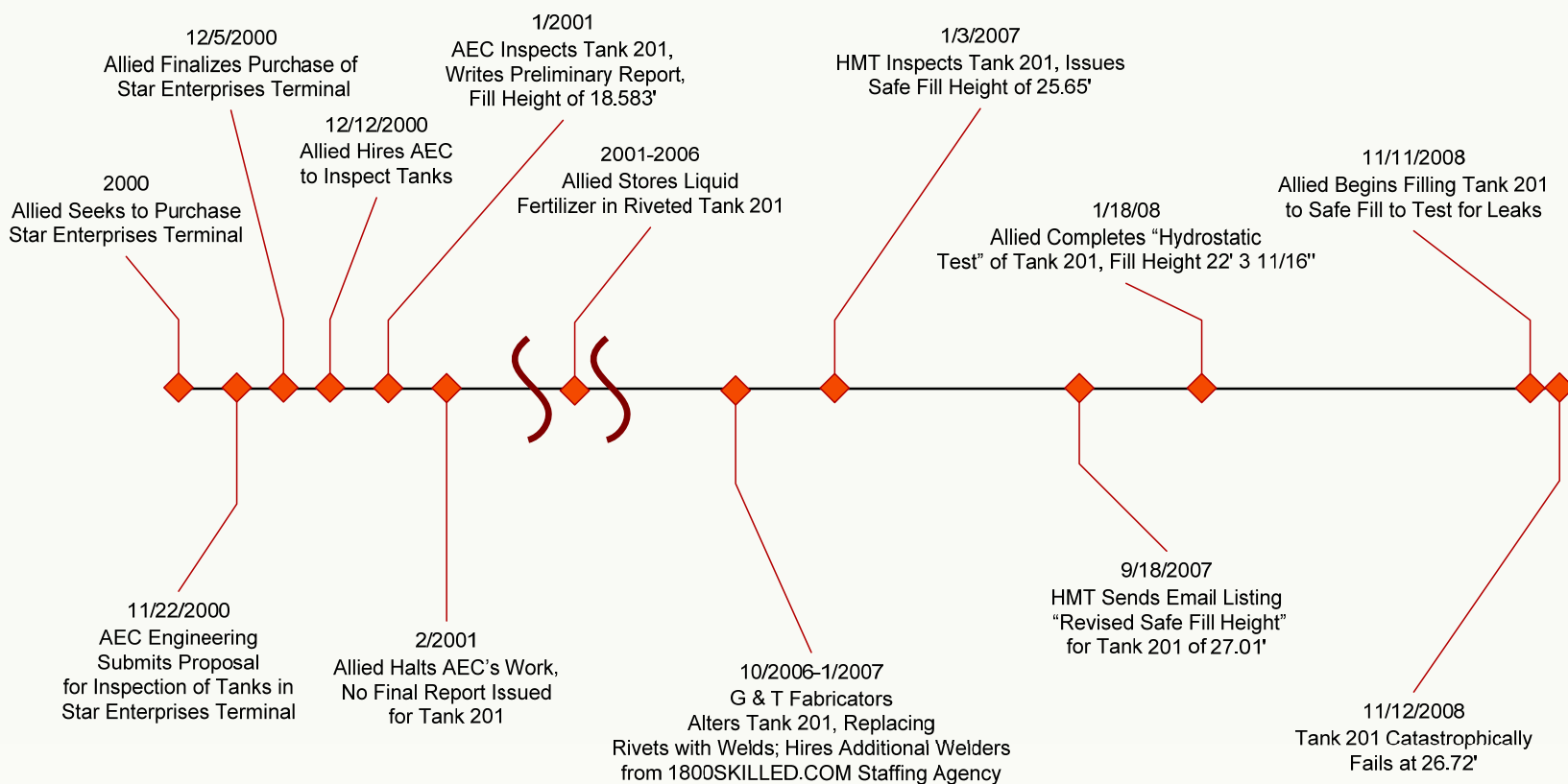


Investigation – Condemned Tank



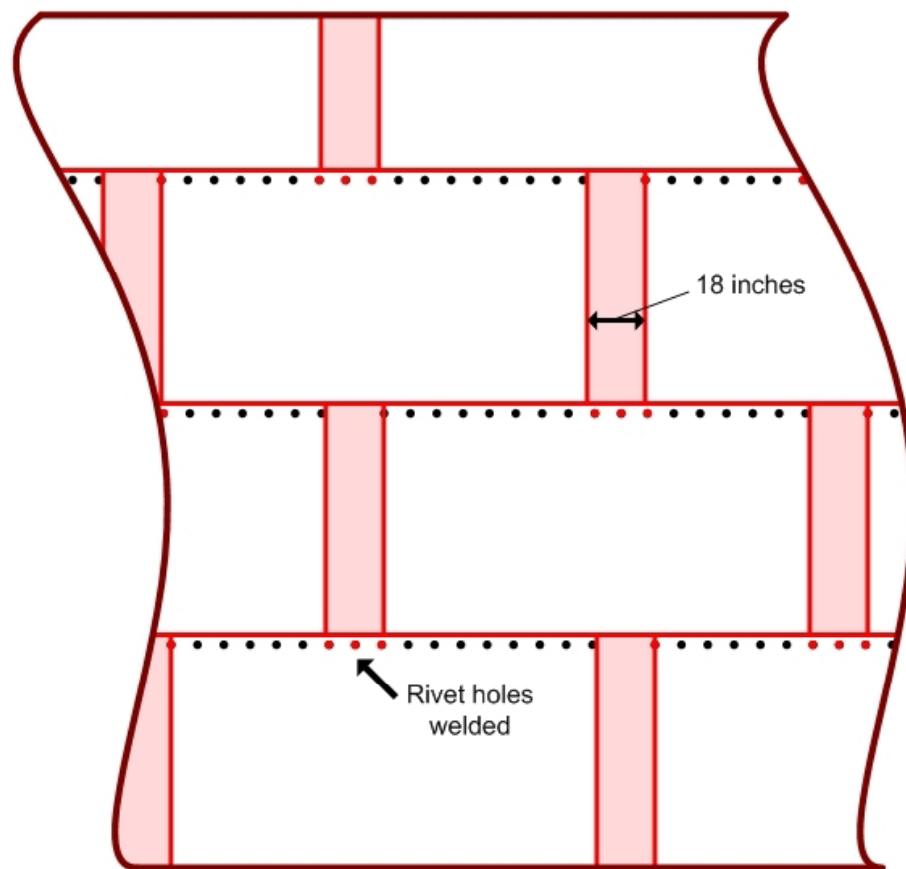
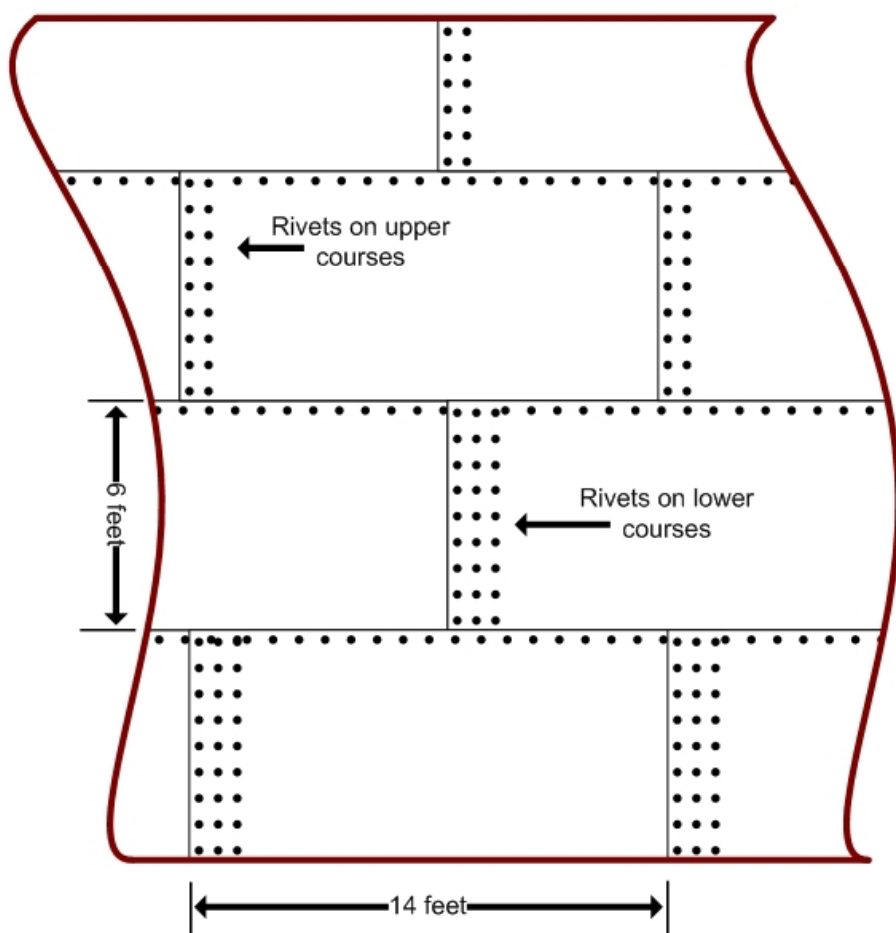


Tank 201 Timeline





Tank 201 Modifications





Investigation - Welding

Collapsed Tank 201
Defective Weld







Tank Inspection

- **American Petroleum Institute (API)**
 - **API 650**, Welded Steel Tanks for Oil Storage
 - **API 653**, Tank Inspection, Repair, Alteration, and Reconstruction
 - **API 579**, Fitness-For-Service
- **The Fertilizer Institute (TFI)**
Aboveground Storage Tanks of Liquid Fertilizer, Recommended Inspection Guidelines



Tank Inspection – Allied

- **HMT Inspection**
 - National tank inspection firm
 - Perform API 653 Out-of-Service
 - Allied contract requirements



Tank Inspection – Allied

- Calculate maximum liquid level (“safe fill height”)
- Shell thickness
- Shell material
- Joint type (welded or riveted)
- Weld inspection (radiography)
- Specific gravity of product



Regulatory Analysis

- **EPA Regulations**
 - Not regulated as a listed hazardous material
 - 2001 *Rupture Hazard from Liquid Storage Tanks*
- **OSHA Regulations**
 - Only covered by General Duty Clause
- **State Regulations**
 - Not regulated by Virginia DEQ
 - 17 states regulate fertilizer tanks



Additional Incidents – Since 1995

- **Sixteen failures at nine facilities**
- **One fatality**
- **Four injuries requiring hospitalization**
- **Two community evacuations**
- **Two releases into waterways**



Findings

- Allied unaware of TFI guidelines
- “Safe fill height” calculated based on spot radiography that was not done
- No safety procedures for first fill
- Release to community, Elizabeth River
- Defective welds



Incident Causes

- **Allied did not ensure that welds met accepted quality standards.**
- **Allied had not performed post-welding inspection (spot radiography).**
- **Allied had no safety procedures or policies for work on or around tanks being filled for the first time**



Recommendations

- **U. S. Environmental Protection Agency**
 - Revise and Reissue *Rupture Hazard*
- **Commonwealth of Virginia**
 - Require state or local regulation



Recommendations

- **The Fertilizer Institute**
 - Review maximum liquid levels for all tanks
 - Implement worker safety procedures

- **HMT Inspection, Inc.**
 - Implement TFI guidelines
 - Revise procedures to verify radiography



Recommendations

- **The Fertilizer Institute**
 - **Recommend member companies require inspection guidelines in storage contracts**



Disclaimer

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Questions?