

U.S. Chemical Safety and Hazard Investigation Board



Public Meeting
April 22, 2014

West Fertilizer / Adair Grain Company
Ammonium Nitrate Fire and Explosion

West, Texas
April 17, 2013



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Investigation Team

- Johnnie Banks, Team Lead
- Jerad Denton
- Rachael Gunaratnam
- Mary Beth Mulcahy
- Samuel Oyewole
- Reepa Shroff
- Lucy Sciallo-Tyler

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Meeting Agenda

- CSB Investigation Team Presentation
 - Incident Description
 - Emergency Response
- Panel Discussion: Emergency Planning and Response
 - Board Questions
 - Public Comment
- Short Intermission (15 minutes)

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Meeting Agenda (Continued)

- Investigator Presentation
 - Land Use Planning
- Panel Discussion: Land Use Planning and Zoning
 - Board Questions
 - Public Comment
- Investigation Path Forward
- Closing Comments

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Investigation Team Presentation:
Incident Description



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CSB Objectives

- Mission
 - Conduct independent investigation
 - Interview key eyewitness and officials
 - Photo-document scene
 - Collect physical evidence
 - Conduct community walk-through survey
 - Develop root causes for incident
 - Create recommendations
 - Add to key findings previously released

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Previously Released Key Findings

- Wooden construction of warehouse
- No sprinkler system
- Firefighters had little time to make snap decisions
- Texas has not adopted a statewide fire code

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Incident Description

- At 7:30 pm on April 17, 2013, a fire erupted in the AN fertilizer storage building
 - Intense flames were observed and recorded
- West VFD and mutual aid from nearby counties responded
 - Four units from West VFD on scene

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Incident Description

- About 20 minutes after reports of a fire, a violent explosion occurred at 7:53 pm



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Incident Description

- Materials were ordinary combustibles
 - Seeds
 - Wood bins
 - Asphalt shingles
- No sprinklers
- Decomposition of AN

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Consequences

- 14 fatalities
 - Two members of the public
 - 12 volunteer firefighters and EMTs
- 236 documented injuries
 - Surrounding community and emergency responders
- Widespread community damage
- Undocumented long-term effects

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Previous AN Incidents

- AN is not classified as an explosive
 - There is a history of incidents involving AN explosions
 - No one can predict when or if AN will explode when exposed to conditions that would be present during a fire.

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Previous Incidents

Incident	Location	Date	Consequences
BASF Explosion	Germany	Sept 1921	500-600 fatalities, 2,000 injuries Widespread community damage
Port of Texas City Explosion	Texas	Apr 1947	581 fatalities, 5000 injuries Triggered subsequent explosions of nearby ships and storage facilities
Terra Industries Explosion	Iowa	Dec 1994	4 fatalities, 18 injuries 5700 tons anhydrous ammonia released
AZF Factory Explosion	France	Sept 2001	31 fatalities, 2500 injuries Widespread community damage
Saint Roman Barn Explosion	France	Oct 2003	26 injuries Widespread community damage

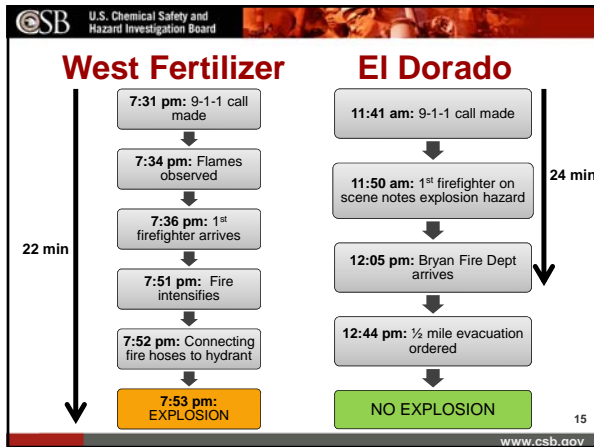
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EI Dorado AN Fire in Bryan, TX

- Ammonium nitrate fire at a similar facility with a different outcome
 - July 30, 2009
 - EI Dorado stored 550 tons of AN
- The AN did not explode

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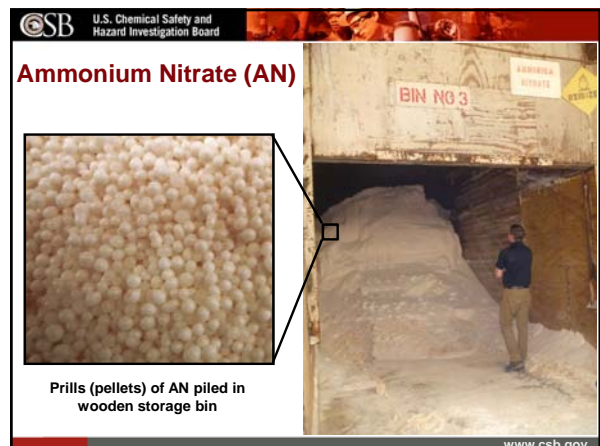


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Lessons Not Learned


- Previous lessons learned from firefighter fatalities and emergency response to AN incidents were not effectively disseminated to firefighters and emergency responders in other communities where AN is stored or utilized.

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Ammonium Nitrate Storage at West Fertilizer



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Process Description

- AN delivered by rail and truck
- Transferred by conveyer belts and elevators
- Custom blending done on site
 - Ammonium Sulfate
 - Diammonium phosphate
 - Potassium sulfate

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Fertilizer and Chemical Storage

- 40-60 tons AN in fertilizer building
- Stored in wooden bins
- Building constructed of wood
- Two, partially full 12,000 gallon anhydrous ammonia tanks
- 100 tons AN in railcar adjacent to plant

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Pure Ammonium Nitrate Not Classified as an Explosive in US Regulations

<p>NOT CLASSIFIED EXPLOSIVE Fertilizer Grade AN Technical/Explosive Grade AN</p>	<p>CLASSIFIED EXPLOSIVE AN blended with a fuel source to make an explosive mixture</p>
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Emergency Planning and Response

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Emergency Response

- The explosion fatally injured emergency responders and nearby residents.

Organization	Casualty
West Volunteer Fire Department	5
Abbott Volunteer Fire Department	2
Navarro Mills Volunteer Fire Department	1
Dallas Fire Department	1
EMT (West Volunteer Fire Department)	1
Members of the public	4

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Preliminary Findings – Emergency Response

- The conditions that cause AN to detonate in a fire situation are not clearly understood.
- No firefighter is safe when fighting AN fires.

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Preliminary Findings – Emergency Response

- The volunteer firefighters at West, TX were not fully aware of the risk of an AN explosion due to:
 - No federal requirements for fire department to conduct pre-incident planning at AN storage facilities
 - Vague and inconsistent guidance for responding to AN fires
 - Non-mandatory requirements for training of volunteer firefighters

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Preliminary Findings – Emergency Response

- Pre-incident planning: foundation for decision making during an emergency
 - NFPA 1620 Standard for Pre-Incident Planning, 2010 Edition
- Guidance on the development of incident response planning method
 - NFPA 471 Recommended Practice for Responding to Hazardous Materials Incidents, 2002 Edition

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Preliminary Findings – Emergency Response

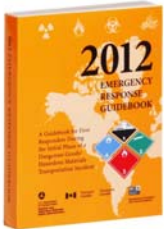
- Firefighters must be able to rapidly 'size-up' any fire situation and make quick and informed decisions.
 - NFPA 472, Standard for Professional Competence of Responders to Hazardous Materials Incidents, 2013 Edition.

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Preliminary Findings – Emergency Response

- Firefighting measures and detonation hazards listed on the AN Material Safety Data Sheet (MSDS) and DOT Emergency Response Guidebook (ERG) are vague and subjective.



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Firefighting Measures

CF Industries MSDS	Large AN Manufacturer MSDS	DOT Emergency Response Guidebook (ERG) - 2012
May undergo detonation if heated under confinement.	May explode under confinement and high temperature.	May explode from heat or contamination.
Flood fire area from a distance .	Fires should be fought from a protected location .	Flood large fire with water from a distance .
For massive fires, use unmanned fire nozzles or withdraw from area and let burn.	A major fire may involve a risk of explosion.	For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

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Preliminary Findings – Training

- In Texas, the general certification and training requirements for career and volunteer firefighters are the same.
 - Mandatory for career firefighters
 - Not strictly enforced for volunteer firefighters

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Preliminary Findings – Regulations for Emergency Response

- About 95% of volunteer firefighters are located in small cities (fewer than 25,000 people)
 - More than half are located in towns of less than 2,500 people
- No federal requirements for volunteer fire departments to develop site-specific pre-incident plans with businesses handling and storing hazardous materials.

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Preliminary Findings – Emergency Planning

- Residents unaware Ammonium Nitrate would detonate.
- No official evacuation order or an alert was issued during emergency response.
- No pre-planning occurred for West Fertilizer prior to April 17th.

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Preliminary Findings – Emergency Planning Regulations

- EPA's Emergency Planning and Community Right-to-Know-Act (EPCRA)
- EPA's Risk Management Program (RMP)

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Preliminary Findings – EPCRA

- EPCRA Framework
 - Emergency Planning
 - Emergency Release Notification
 - Hazardous Chemical Storage Reporting
 - Toxic Chemical Release Inventory

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Preliminary Findings – Company Reporting

- Extremely Hazardous Substances (EHS)
 - West Fertilizer reported Anhydrous Ammonia.
 - Ammonium Nitrate not listed.
- OSHA “hazardous chemicals”, >10,000lbs
 - West Fertilizer reported Ammonium Nitrate in 2012.

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Preliminary Findings – Company Reporting (Cont.)

- Companies report to local Fire Department, LEPC, and State agency.
- West Fertilizer reported in 2012 to West Fire Department, McLennan County LEPC, and State of Texas.

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Preliminary Findings – Emergency Response Plan

- LEPC develops emergency response plan.
 - Plan includes procedures, evacuation plans, training programs for emergency responders, schedules drills.
 - McLennan County LEPC emergency response plan did not include West Fertilizer due to EPCRA exemption.

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Preliminary Findings –EPCRA Exemption

- Agricultural Use Exemption applies to substances used in “routine agricultural operations or is a fertilizer held for sale by a retailer to the ultimate customer.”
- Federal EPA doesn’t apply this exemption to companies like West Fertilizer: “retailers should report the amounts...held for blending to produce the new fertilizer.”

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Panel Discussion: Emergency Planning and Response

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Panelists

- Chris Barron, Texas State Firemen’s and Fire Marshals Association
- Elizabeth M. Harman, International Association of Fire Fighters
- Frank Patterson, McLennan County LEPC
- Glenn P. Corbett, The City University of New York

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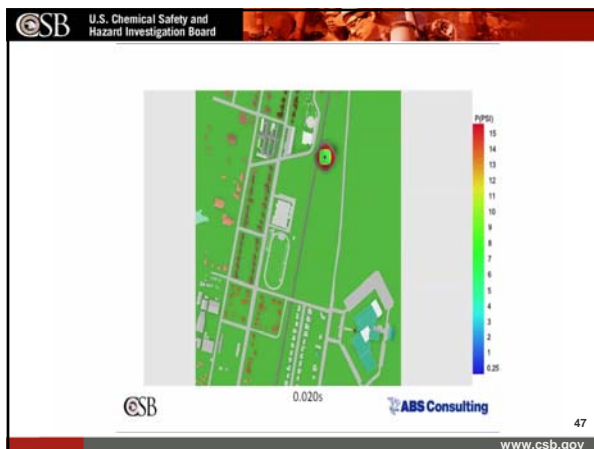


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Offsite Consequences

- Fatalities and injuries to members of the public and first responders
- Widespread property damage
 - Over 350 homes (~ 150 destroyed)
 - Apartment complex
 - Three schools
 - Nursing home
 - Hospital
 - Nearby Park

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West Intermediate School

beam deformation

Gymnasium

Fire damage

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Apartment Complex

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Fertilizer Facility Overview

- Built in 1961
 - At the time, the facility was largely surrounded by open fields
- Over the years the city of West began to slowly built residences, schools, and other occupied buildings within close proximity to the facility.

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West Through the Years

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Fertilizer Facility 2013

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West, Texas – Before and After

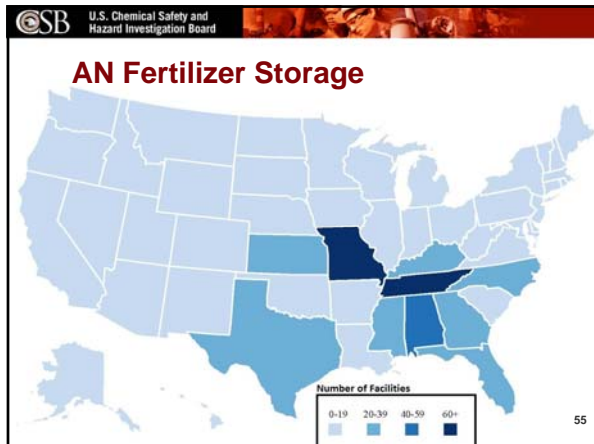
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Land Use Planning

- The issue of locating AN facilities near the community is not limited to the West Fertilizer incident.
- There are over 1,350 of facilities across the country that store AN

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Land Use Planning

- Zoning codes are typically adopted as ordinances at the county or local level.
- However, at all levels of government there has been a failure to adopt codes concerning the siting of many types of hazardous facilities near communities
 - This includes FG AN facilities

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Land Use Planning

- Land use planning and zoning codes typically do not apply to existing AN storage facilities.
- Facilities that are covered:
 - Facilities constructed after zoning codes haven been enacted.
 - Existing facilities which undergo significant modifications after code enactment.

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Land Use Planning

- Texas does not require the adoption of a fire code.
 - Only populated counties may adopt a fire code.
 - Since 2003, the CSB has recommended the adoption of fire codes in TX

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Panelists

- Bruce Johnson, International Code Council
- Mark Roberts, International Code Council
- James C. Schwab, American Planning Association
- Chris Connealy, Texas State Fire Marshal

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Board Questions
Public Comment

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Path Forward

- AN explosion blast modeling and impacts analysis
- Laboratory testing of AN
- Fire Code Analysis
- Regulatory Analysis
- Recommendation Development
- Report development
- Final Public Meeting

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Public Comment

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Board Questions

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