FERTILIZER PLANT EXPLOSION

Cause Map

Much of town destroyed

An explosion at a fertilizer plant in West, Texas, destroyed much of the town and killed between 5-15 people. (Search and rescue is still ongoing.) At least 160 were injured but that number may increase.

"It looks like a war zone with all the debris."
- McLennan Conty Sheriff Parnell McNamara

Cause Mapping is a Root Cause Analysis method that captures basic cause-and-effect relationships supported with evidence.

CAUSE MAPPING

Problem Solving • Incident Investigation • Root Cause Analysis

Step 1	Problem	What's the Problem?
Step 2	Analysis	Why did it happen?
Step 3	Solutions	What will be done?

1 Problem

What	Problem(s)	Fire, explosion
When	Date	April 17, 2013
	Time	~8:00 pm
	Different, unusual, unique	Cause of fire unknown
Where	State, city	West, Texas
	Facility, site	Fertilizer retail facility
	Task being performed	Battling fire at plant

Impact to the Goals

Safety	5-15 killed (preliminary estimates)
	More than 160 injured
Environmental	Release of anhydrous ammonia
Customer Service	Evacuation of 8-10 blocks
Production-Schedule	Destruction of plant
Property, Equip, Mtls	Destruction of >100 families' homes
Labor, Time	Search & rescue, firefighting operations

Frequency	17 unintended explosions with casualties of ammonium nitrate since 1921

2 Analysis

Basic Level Cause Map - Start with simple Why questions.

Capturing the impacts to the goals as a result of an issue is essential to understanding the true effect. In this case, the fatalities and injuries were severe. The property damage was also extensive. An environmental impact resulted from the release of ammonia. The evacuation can be considered an impact to the customer service goal. Search & rescue, and firefighting operations impact the labor goal.

These goals were all impacted due to the explosion at the fertilizer plant. Ammonium nitrate can explode when ignited at very high temperatures. In this case, a fire provided the high heat. The cause of the fire itself is as yet unknown.

What is known is that efforts to prevent explosion were ineffective. The plant did not believe that an explosion was possible. It is fairly rare that ammonia nitrate explodes; only 17 known cases of unintended ammonia nitrate explosions resulting in fatalities have occurred since 1921. Firefighters were on scene fighting the fire when the explosion occurred, leading to many responder fatalities and injuries. Oversight at the facility was limited; OSHA has not inspected the facility for at least the last five years.

It is worth exploring why large amounts of ammonium nitrate were present. Ammonium nitrate is an inexpensive, effective fertilizer. However, the benefits must be considered alongside the risk and certainly in the future more oversight of these types of facilities may be needed to protect the public from the process as they benefit from the results.

For a free copy of our Root Cause Analysis Template in Microsoft Excel, used to create this page, visit our web site.

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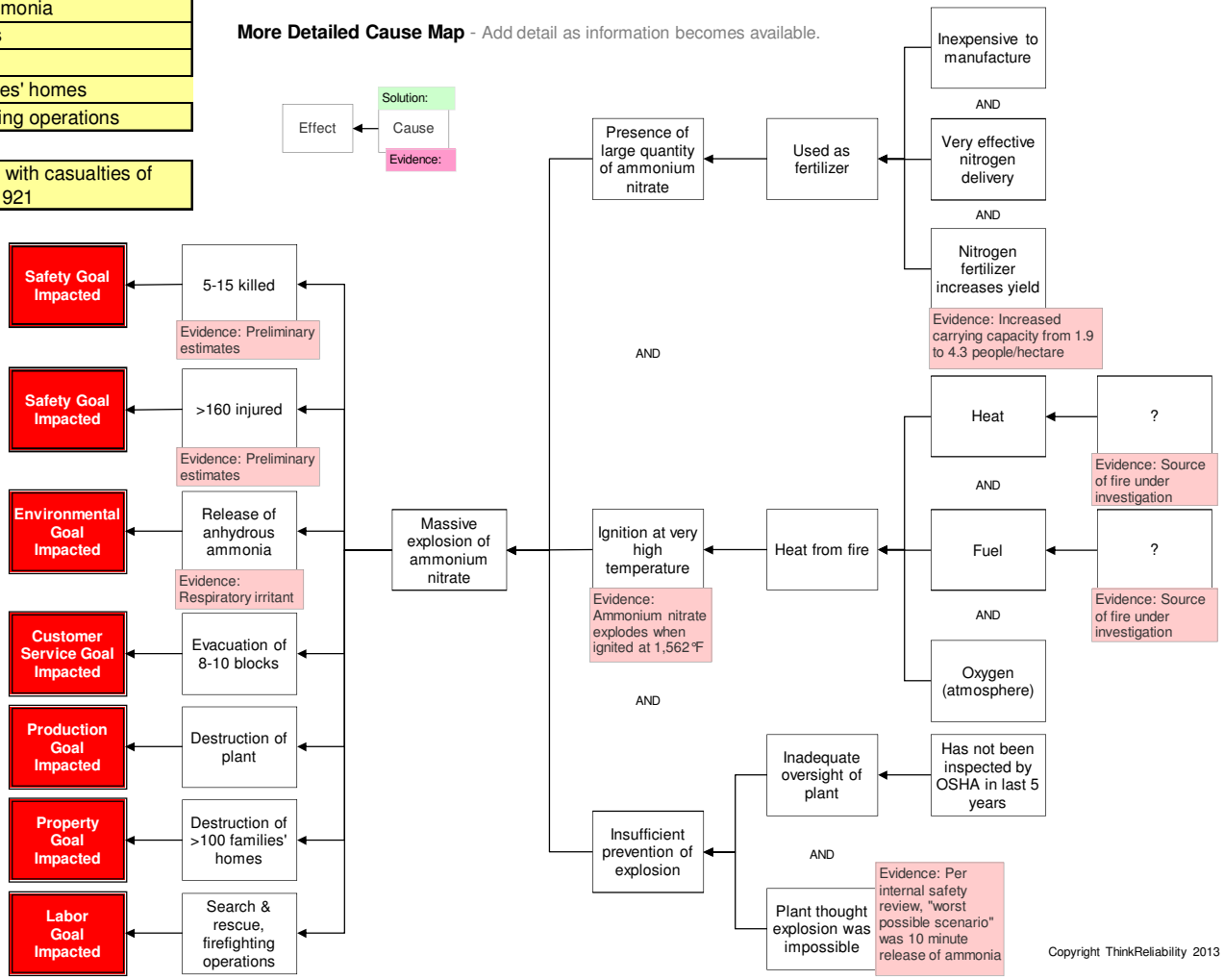
More Detailed Cause Map - Add detail as information becomes available.



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