

**Mine Explosion
Amaga, Colombia
June 16, 2010**

A coal mine explosion in Amaga, Colombia on June 16, 2010 has left at least 18 dead, 1 injured and at least 53 people unaccounted for, and presumed dead. The deaths and injuries resulted from a fireball caused by an explosion.

Every explosion is caused by four factors: heat, fuel, oxygen and confinement. In this case, the fuel was methane gas that had built up in the mine. Methane is naturally produced as a byproduct of coal mining. The methane was not removed from the mine because the mine lacked a methane ventilation pipe. Additionally, the workers at the mine did not realize that methane levels were high because there was no gas detection system at the mine.

The number of dead and missing is so high because more people than usual were at the mine - the explosion happened during shift change. Rescue efforts have been delayed by the high levels of gas in the mine, further increasing the number of deaths.

Problem Outline

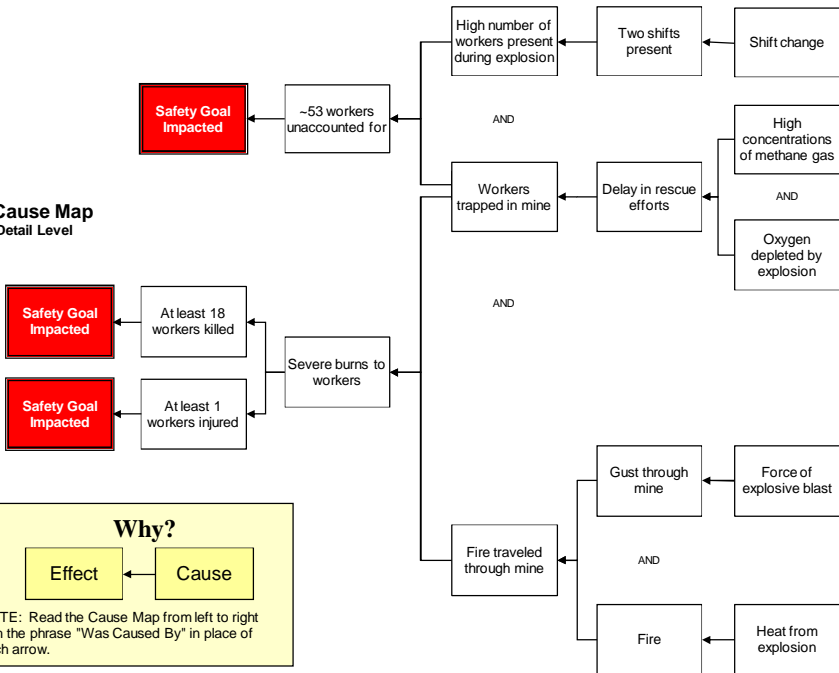
What	Problem(s)	Mine explosion, miners trapped
When	Date	June 16, 2010
	Time	10:45 p.m.
	Different, unusual, unique	High levels of methane
Where	City, country	Amaga, Colombia
	Facility, site	San Fernando mine
	Unit, area, equipment	Coal mine
	Task being performed	Shift change - coal mining

Impact to the Goals

Safety	At least 18 miners killed
	50 miners unaccounted for
	At least 1 miner injured
Environmental	?
Cust. Service	?
Production-Schedule	?
Property, Equip, Mtls	?
Labor, Time	?

Frequency	This incident	?
	Workers last killed at mine in 2008	?
	Annualized Cost	?

**Cause Map
Detail Level**



Why?

Effect ← Cause

NOTE: Read the Cause Map from left to right with the phrase "Was Caused By" in place of each arrow.

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