

1 Problem

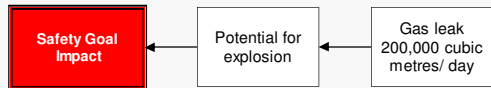
What	Problem(s)	Gas release from well casing
When	Date	March 25, 2012
	Time	?
	Different, unusual, unique	Well ceased production a year ago
Where	State, city	North Sea east of Aberdeen
	Facility, site	Elgin field/platform
	Task being performed	Pumping in heavy mud to plug, abandon well

Impact to the Goals

Safety	Potential for explosion
Environmental	Gas leak of 200,000 cubic metres/day
Customer Service	Loss of value of stock shares
Production-Schedule	Shutdown of production
Property, Equip, Mtls	Potential for catastrophic damage to platform
Labor, Time	Full evacuation of platform

2 Analysis

Basic Level Cause Map - Start with simple Why questions.



Basic Cause-and-Effect

A leak from the Elgin platform in the north sea near Aberdeen has the potential to cause an explosion due to the proximity of the leak to the still-lit flare on the platform. However, the wind is currently blowing gas away from the flare. The potential for environmental damage is not as great as that of Deepwater Horizon

More Detailed Cause-and-Effect

Workers on the now-evacuated Elgin rig noticed the leak on March 25, 2012. The rig was partially, then later fully, evacuated. We can examine the causes of the environmental leak, as well as the potential for further damage, in a visual root cause analysis in the form of a Cause Map. The Cause Map lays out the cause-and-effect relationships in a clear, intuitive way.

We begin with the impacts to the goals. The safety goal is impacted because of the potential for an explosion. The environmental goal is impacted due to the gas leak, estimated to be approximately 200 cubic metres per day. The customer service goal is impacted due to the loss of value of the owner corporation stock shares. Production is currently shut down on the rig, leading to an impact to the production goal. The potential for an explosion could also cause catastrophic damage to the platform, which is an impact to the property goal. Lastly, the evacuation of the platform is an impact to the labor goal.

In order for an explosion to occur, there must be fuel, oxygen, heat and confinement. In this case, the oxygen is provided by the atmosphere, and the confinement is provided by the well itself. The fuel is provided by the gas leak, believed to be entering from another non-producing well through a crack in the outer casing of the well, which was in the process of being plugged and abandoned. The heat likely to cause the explosion is a flare on the platform. The flare burns off excess gas from the platform and was not extinguished during the evacuation, as the priority was to remove the workers.

3 Solutions

The flare is unable to be turned off remotely, but options for extinguishing the flare are being evaluated. Other options being evaluated to stop the leak and reduce the potential for explosion include digging a relief well or killing the well that is currently leaking. All options have the potential to be very expensive.

SURFACE GAS LEAK

Still-operating flare leads to explosion potential Cause Map

The combination of gas from a leaking well and a still-burning flare that can't be turned off remotely could be disastrous for a well in the North Sea.

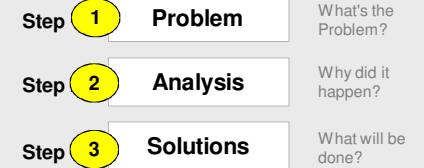
"If that finds a source of ignition, there will be a fire."

- David Hainsworth, Health, Safety & Environment Manager

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



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

