

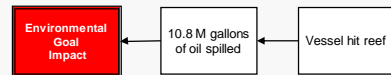
1 Problem

Step 1. Outline the Problem

What	Problem(s)	VALDEZ grounding, oil spill, navigational error
When	Date	March 24, 1989
	Time	12:09 a.m.
	Differences	Icebergs in shipping lanes
Where	Physical Location	Prince William Sound near Valdez, AK
	Work Being Done	Transporting crude oil
Impact to the Goals		
Environmental	258,000 barrels crude oil spilled (10.8M gallons)	
	Clean-up costs \$2.2 B	
Community	Punitive Damages/Settlements ~\$1.5 B	
Material	\$25 M damage to vessel	
	\$3.4 M lost cargo	

2 Analysis

Basic Level Cause Map - Start with simple Why questions.



Basic Cause-and-Effect

Shortly after midnight on March 24, 1989, the VALDEZ, transporting crude oil from Alaska to California, struck Bligh Reef. The damage to the vessel allowed 258,000 barrels (10.8 million gallons) of crude oil to be released into Prince William Sound, in the most ecologically damaging oil spill in North America, and possibly the world.

VALDEZ OIL SPILL

Cause Map

Errors Compounded by Fatigue

People make more mistakes when they are fatigued. When an entire crew is fatigued, the mistakes can be compounded until disaster strikes. This vicious cycle can only be stopped by instituting policies that ensure crewmembers will be rested enough to perform their duties.

North America's Most Ecologically Damaging Oil Spill



Exxon Valdez - grounded on Bligh Reef

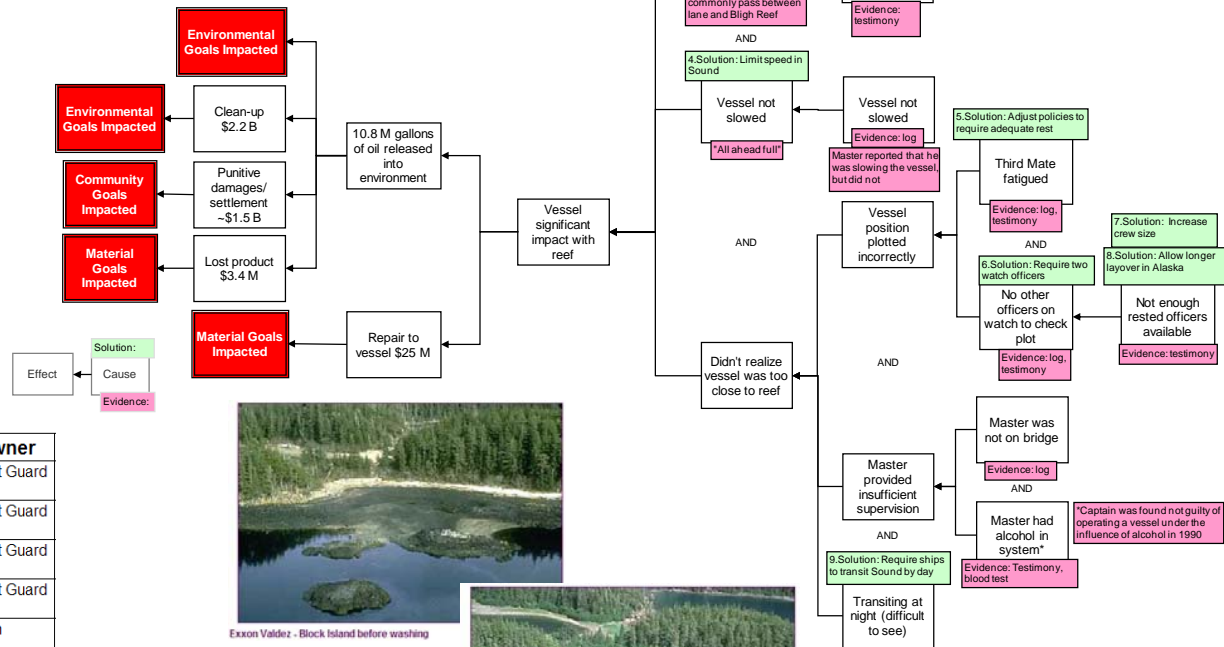
More Detailed Cause Map - Add detail as information becomes available.

More Detailed Cause-and-Effect

The VALDEZ was traveling at "all ahead full" outside all normal traffic lanes in Prince William Sound when it struck Bligh Reef. The crew of the VALDEZ felt it was necessary to travel outside the normal traffic lanes to avoid far-reaching ice. Additionally, the Coast Guard's Vessel Traffic Center did not provide the VALDEZ any warning about being outside of the traffic lanes, as it had lost the vessel on radar and did not follow the procedures for a vessel outside of the lanes.

The Third Mate, who was solely responsible for the navigation watch, plotted the ship's position incorrectly, possibly due to fatigue. Because no other crew members were available (the Master was not on the bridge and had alcohol in his system), the Third Mate's plotting and navigation went unchecked. Because the vessel was transiting at night, the incorrect plot proved to be disastrous.

It's unclear why the vessel was continuing to transit at "all ahead full" during a period of difficult navigation. But it is clear that the crew of the VALDEZ suffered from fatigue, which has been shown to lead to difficulty performing complicated tasks, especially without any assistance.

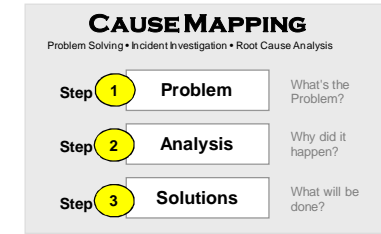


Photos from the NOAA's National Ocean Service Office of Response and Restoration



Exxon Valdez - Block Island after washing

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



3 Solutions

No.	Cause	Action Item	Owner
1	Vessel outside all normal traffic lanes	Modify routes	Coast Guard
2	No warning from Vessel Traffic Center	Give warnings when vessels out of bounds	Coast Guard
3	Vessel Traffic Center lost radar contact	Add radar sites	Coast Guard
4	Vessel not slowed	Limit speed in sound	Coast Guard
5	Third mate fatigued	Adjust policies to require adequate rest	Exxon
6	No other officers on watch to check plot	Require two watch officers	Coast Guard, Exxon
7	Not enough rested officers available	Increase crew size	Exxon
8	Not enough rested officers available	Allow longer layover in AK	Coast Guard
9	Transiting at night	Require vessels to transit sound by day	Coast Guard, Exxon