

**Step 1. Outline**

**International Space Station Supply Ship Crash  
August 24, 2011**

<b>What When</b>	Problem(s)	Rocket failure, crash
	Date	August 24, 2011
	Time	9:05 a.m. EDT
<b>Where</b>	Different, unusual, unique	Last American space shuttle mothballed in July
	Country	Siberia
	Equipment	Unmanned Progress 44 supply ship
	Task being performed	Resupplying International Space Station
<b>Impact to the Goals</b>	<b>Safety</b>	None - vehicle unmanned
	<b>Environmental</b>	?
	<b>Customer Service</b>	Potential for evacuating space station
	<b>Production-Schedule</b>	Manned Soyuz flights grounded
	<b>Property, Equip, Mtls</b>	Loss of two tons of cargo
	<b>Labor, Time</b>	?

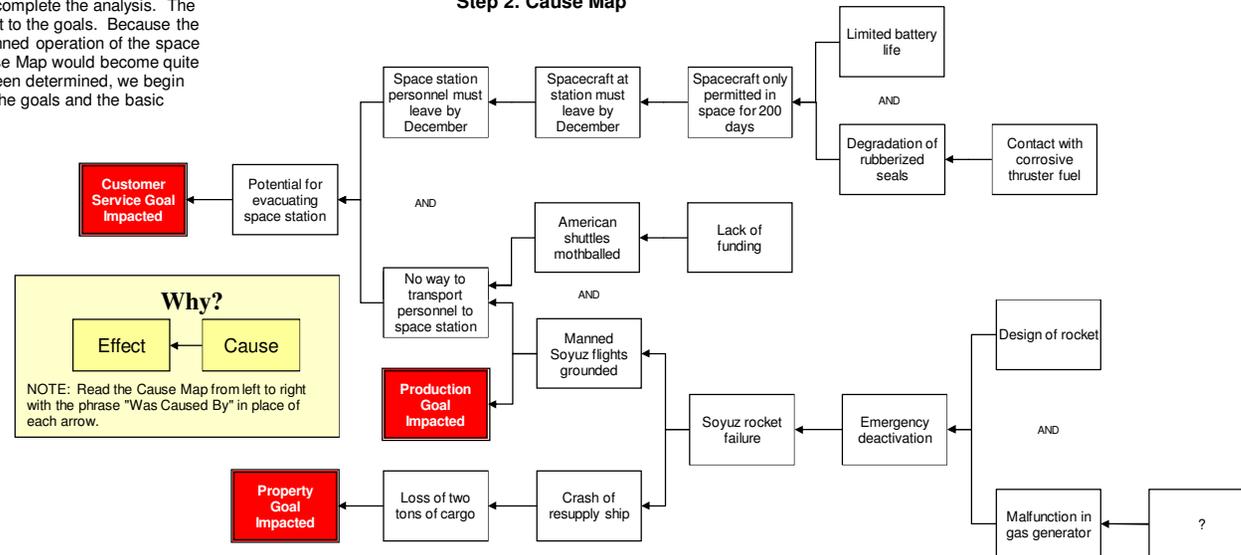
On August 24, 2011, a supply ship heading to the International Space Station (ISS) crashed in Siberia, losing two tons of cargo. However, the impact of this loss was much more than the two tons of cargo - it may lead to an evacuation of the ISS, which would become unmanned for some unknown period of time.

The crash of the unmanned Progress 44 supply ship, which was on its way to resupply the ISS, was caused by the emergency deactivation of the Soyuz rocket when a gas generator malfunctioned. Until the specific causes of the malfunction are determined, manned Soyuz flights are grounded. That means that a new crew cannot get to the Space Station to relieve the current crew. Although the current crew has enough supplies for the time being, they cannot remain on the space station past December. The spacecraft already at the station (their "guaranteed ride home") are only allowed in space for 200 days - due to limited battery life and

concern for degradation of rubberized seals from contact with thruster fuel. Because of a lack of funding, American shuttles are now all mothballed, leaving the Russian Soyuz rockets the only way to and from the space station. Finding another way to get there by December is unlikely, leaving the attempt to determine and fix the problems with Soyuz the only hope for continued manning of the ISS.

We can examine this incident in a Cause Map, beginning with the impacts to the goals. For example, although there were no safety goal impacts resulting from the crash of the unmanned ship, the customer service goal is impacted due to the potential of evacuating the ISS. The production goal is impacted because of the grounding of manned Soyuz flights, and the property goal is impacted due to the two tons of lost cargo meant for the space station. We begin our Cause Map with these impacts to the goals, asking "Why" questions to complete the analysis. The amount of detail in the map is determined by the impact to the goals. Because the crash may lead to the evacuation and continued unmanned operation of the space shuttle, once specific causes are determined, this Cause Map would become quite detailed. For now, because the causes have not yet been determined, we begin with a simple map, which does capture the impacts to the goals and the basic information now known.

**Step 2. Cause Map**



**Why?**

Effect ← Cause

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

