Tim Tickner – BP Oil Spill Mitigation/Peparedness
Jackson Hill – Japan Mitigation/Preparedness
Jose Del Rio – BP Oil Spill Response/Recovery
Stephen Masceri – Japan Response/Recovery

Disaster Lifecycles

Deepwater Horizon Oil Spill

Mitigation:

Mitigation of oil spills are important because of how much damage they can cause in such a short amount of time. From both an environmental and an economic standpoint, they are one of the worst things that can happen. When an oil spill as large as the Deepwater Horizon occurs, it becomes very challenging to stop because of the depth it occurs. The best way to avoid something like this happening is to overdo absolutely everything in the safety precautions category. The reason that the Deepwater Horizon spill continued spilling for so long was because the blowout preventer was somewhere around 300 PSI of being able to close the burst pipe. It is understood that accidents like happen and they aren't unavoidable so the best way to mitigate is to limit the length that they go on.

Preparedness:

Being prepared for an oil spill is a job for more than just the company whose spill it was. When the Deepwater Horizon Spill happened, they had to bring in external companies at a moment's notice to start the response. At the height of the response in 2010, there were over 48,000 people involved in the cleanup process. This means that many of these companies were on call for something like this to get out there and start skimming oil or cleaning beaches. Being able to respond quickly is one of the most important things in a disaster like this one just because of the sheer damage to habitats that it can cause in a span of just a few days.

Response:

It is important to point at the fact that BP worked with experts from the industry, academia and government to stop the leak, contain the oil and permanently kill the well. In fact, BP stated that:

> "We acted to take responsibility for the clean-up, working under the direction of the federal government to respond swiftly to compensate people affected by the impact of the accident, to look after the health, safety and welfare of the large number of residents and people who helped respond to the spill, and to support the economic recovery of the Gulf Coast's tourism and seafood industries impacted by the spill."

Also, it is important to say that the cleanup and containment of the oil didn't happened due to one solution; there were a lot of people and methods involved in this, all, which solved the problem. There were numerous fail attempts to solve this catastrophic event, especially during their firsts attempts. BP's first attempt consisted on closing the blowout preventer valves. They tried doing this with remotely operated underwater vehicles. Furthermore, they placed a 125-tonne containment dome over the largest leak and piped the oil to a storage vessel, which also failed to contain the leak. Another fail attempt consisted in the pumping of heavy drilling fluids into the blowout preventer. With this they were trying to restrict the flow of oil before sealing it. After numerous attempts and months of leaking, BP finally saw some significant progress in containing the leaking and killing the well. They installed a sealing cap. The sealing cap had the potential to increase oil and pass collection capacity. This new cap assembly was designed to potentially kill the well and aid in the cementing procedures required during the relief well operations.

Recovery:

Even though on April 2014, BP claimed that cleanup was substantially complete, the United States Coast Guard asserted that there was still work to be done. Thus, the details of the cleanup operations are unclear. Nonetheless, in the recovery process, numerous techniques were implemented. Also, oil eating microbes (genetically modified *Alcanivorax borkumensis*) were used to digest the oil. Furthermore, the three main approaches in removing the oil from the water consisted in combustion, offshore filtration, and collection for later processing. Five percent of the leaked oil was burned at the surface and 3% was skimmed.

Japanese Tsunami and Eathquake (Tohoku)

Mitigation and Preparedness:

Japan Had Tsunami walls in cities and towns surrounding the coast and there were also evacuation plans in place that would take citizens to higher ground. Japan was able to prepare for the tsunami by using an Early Earthquake Warning system of over 1000 seismometers. A warning went out only 31 seconds after the first wave of the earthquake occurred allowing citizens to begin evacuation but the early warning system was flawed since the estimated intensities of the earthquakes were actually much smaller than the actual intensities due to miscalculations in the size and shape of the fault plane. The problem with Japan's preparedness and mitigation plans were that they were put in place to handle tsunamis that are much smaller than the one that they actually experienced. The tsunami walls were built to handle much smaller waves. The evacuation plan also did not account for a wave this size as at least 101 evacuation sites were hit by the wave as it moved inland.

Response:

The disaster events of the 2011 Tohoku Earthquake and Tsunami created some unique challenges for the Japanese government and their coordinated response efforts. For one, the event was a multifaceted natural disaster, coupling an earthquake with a tsunami. Already shaken by the earthquake (with some 6,000 Japanese lives lost), the country of Japan was forced to begin emergency response services for the earthquake while also trying to prepare a response to the impending tsunami. Japan has been praised though for having a swift response to the disaster; within the first hour after the earthquake the Japanese government has deployed some 50,000 rescue workers, and would continue to deploy up to 160,000 in the coming days. Along with those deployed the Japanese government provided millions of dollars worth of food, medicine, and other such provisions to those affected. With such a large scale disaster though, it is unsurprising that government personnel alone would not be able to handle the disaster response on their own, which is why the Japanese government readily sought out a coordinated effort with non-government organizations. In the first 48 hours post-disaster, the Japanese government appointed a member of parliament (Ms. Kiyomi Tsujimoto) as a sort of government liaison to NGO/volunteer groups. The Japanese government was also aided by several outside governments, including the United States. Adding even more complexity to the response efforts was the impending meltdown at the Fukushima Power Plant. In this area of response the Japanese government faced more criticism. After already having faced one nuclear disaster in recent history, many Japanese had felt incredibly unsettled about the meltdown of the Fukushima power plant. As such the Japanese government and the Tokyo Electric Power Company (the owner's of the plant) were heavily criticized for a lack of clarity and specificity in their statements to the public during the plants critical moments. In some respects the incident was contained relatively well, resulting in no noticeable damage to the community from nuclear exposure. However the failed cooling systems did cause a meltdown, which means nuclear contaminants will have to be cleared before anybody can return to the area.

In terms of aerospace systems being used in the recovery efforts, the U.S navy deployed a multitude of aircraft to aid in the relief/rescue efforts. The HH-60H Sea Hawk helicopter, the MH-60S Sea Hak helicopter, and the CH-46E Sea Knight helicopter along with the C-17 cargo carrier, and MC-130H Combat Talon II airplanes were utilized by the Navy in assisting the Japanese. These aircraft were used in search and rescue scenarios and to deliver supplies (food, water, medicine) to the affected Japanese citizens.

Recovery:

Like many other large scale disasters, that of Tohoku has entailed a long and disgruntling recovery process. The disaster left 19,000 people dead or missing and more than 300,000 displaced from their homes. To this day, there are still barren towns along the north-east coast of Japan and many displaced and frustrated Japanese. Much of the frustration comes from

residents of the areas surrounding the Fukushima Power Plant, from which more than 160,000 citizens were displaced. Stemming from this was a class action lawsuit from several thousand residents, who sought compensation (50,000 yen a month) for living expenses until the radiation was cleared. Personal expenses from this disaster though cannot compare to the vast funding required on the part of the Japanese government; the government allocated a 25 trillion yen ($262 billion) budget for reconstruction. To this day the Japanese people have not seen a full recovery: many towns still lay barren, many citizens remain displaced, and much of what was destroyed still needs to be rebuilt. The recovery process for a disaster such as this one is unquestionably long, as efforts must be coordinated through government bodies, communities, and engineers alike.

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