

Part – 4

The IXTOC-I Well Blowout:

The Gulf of Mexico

Mexico, 1979

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The IXTOC-I Well Blowout: Campeche Bay, Mexico

The Gulf of Mexico, 1979

Geography of the Gulf of Mexico

The Gulf of Mexico¹ is a partially landlocked ocean basin largely surrounded by the North American continent and the island of Cuba as shown in the map below. It is bounded on the northeast, north and northwest by the Gulf Coast of the USA, on the southwest and south by Mexico, and on the southeast by Cuba. The shape of its basin is roughly oval and is approximately 1,500 km (810 miles) wide and filled with sedimentary rocks and debris. It is connected to the Atlantic Ocean through the Florida Straits between the U.S. and Cuba, and with the Caribbean Sea via the Yucatan Channel between Mexico and Cuba. The size of the Gulf basin is approximately 1.6 million km² (615,000 mi²). Almost half of the basin is shallow intertidal waters, but it has a deep trough called the Sigsbee Deep stretching more than 550 km (300 miles) long that plunges to a depth of 4,384 metres (14,383 ft). The basin contains a volume of roughly 660 quadrillion gallons (2.5×10^{15} m³). It was probably formed approximately 300 million years ago as a result of the seafloor sinking.

Given the size of the Gulf and the volume of water in it please try the exercise of working out what percentage say, 170 million gallons is as a proportion of 660 quadrillion gallons.



Geography of the Gulf of Mexico

The IXTOC-I Oil Spill

On 3rd June 1979, the two mile deep exploratory well, IXTOC-I, blew out in the Bahia de Campeche, (Campeche Bay) 960 km (600 miles) south of Texas in the Gulf of Mexico.² The water depth at the wellhead site is about 50 m (164 feet). The IXTOC-I was being drilled by the SEDCO 135F, a semi-submersible drilling platform on lease to Petroleos Mexicanos (PEMEX). Reports then state that mud circulation was lost (mud is, in essence, a densely weighted drilling fluid used to lubricate the drill bit, clean the drilled rock from the hole and provide a column of hydrostatic pressure to prevent influxes). The decision was made to pull the drill string and plug the well. Without the hydrostatic pressure of the mud column, oil and gas were able to flow unrestricted to the surface, which is what happened as the crew were working on the lower part of the drill string. The BOP (Blowout Preventer) was closed on the pipe but could not cut the thicker drill collars, allowing oil and gas to flow to surface where it ignited and engulfed the SEDCO 135F in flames. The burning platform collapsed into the wellhead area hindering any immediate attempts to control the blowout.

PEMEX hired blowout control experts and other spill control experts including Red Adair, Martech International of Houston, and the Mexican diving company, Daivaz. The Martech response included 50 personnel on site, the remotely operated vehicle TREC, and the submersible Pioneer I. The TREC attempted to find a safe approach to the Blowout Preventer (BOP). The approach was complicated by poor visibility and debris on the seafloor including derrick wreckage and 3,000 metres of drilling pipe. Divers were eventually able to reach and activate the BOP, but the pressure of the oil and gas caused the valves to begin rupturing. The BOP was reopened to prevent it from being destroyed. Two relief wells were drilled to relieve pressure from the well to allow response personnel to cap it. Norwegian experts were contracted to bring in skimming equipment and containment booms, and to begin the cleanup of the spilled oil. The well was initially flowing at a rate of 30,000 barrels per day (1 barrel = 42 US gallons = 159 litres). This means that 1,260,000 gallons (4,770,000 litres) per day were flowing into the shallow waters of Campeche Bay. After some complex engineering work this was reduced to around 10,000 bpd as a result of the initial attempts to plug the well.

The two relief wells relieved the pressure and the well was eventually plugged nine months later on 23rd March 1980.



The IXTOC-I Well Blowout Burning & Spilling³

Prevailing winds caused extensive damage along the US coast with the Texas coast suffering the greatest. The IXTOC-I accident spilled an estimated 3.3 million barrels of oil (147,000,000 gallons = 524,000,000 litres).⁴

The Environmental Damage to the Gulf of Mexico

The fact that the blowout happened in warm offshore waters made the effects of the IXTOC-I spill less than many alarmist experts predicted. Warm air and water temperatures accelerated the evaporation, weathering and microbial consumption of the oil. Much of the oil stayed offshore, evaporating or becoming saturated and sinking to the sea floor.

"We were surprised there were so relatively few effects," said Olof Linden of the World Maritime University in Malmö, Sweden and part of a United Nations expert group that assessed the IXTOC-I spill.

There is a rule of thumb that for every 10 degrees Celsius increase in water temperature, chemical and biochemical reactions happen twice as quickly. As we have already seen from the Kuwaiti spill natural forces quickly dealt with what was essentially an extensive food source being force fed into a benign environment for microbes and chemical reactions.

"That means if you compare the recovery time of the Exxon Valdez, where you had average temperatures of, say, 5 degrees, with those in the Mexican Gulf where the temperature is about 25 degrees, you have two doublings. What will happen in 20 years in Alaska will take five years in the Gulf," said Arne Jernelöv, who led the U.N. team.

"The damage caused by the IXTOC spill was huge," he wrote recently. "Beaches, mostly in Mexico but to some extent also in the United States, were hit, and birds succumbed in large numbers, despite the dispersion efforts. Because of the dispersion, shrimp, squid, and some fish populations suffered, with fisheries hit even harder."

The use of surface dispersants did help reduce bird kills, he said, but it took a heavier toll on small animals living in the water. Fish and octopus catches reportedly dropped by 50-70 percent that year from 1978 levels in some places, according to Jernelov and Linden's report. Fisheries in the area closed for a period, including the shrimp fishery. Despite the similarities of the IXTOC-I and Deepwater Horizon spills, there is one major difference: the Louisiana wetlands. Of these Linden recently commented: *"We didn't have the extensive wetland contamination we are talking about now."*



IXTOC-I Oil Contaminating the South Texas Coast, August 1979⁵

Wetland contamination is difficult to reverse as it is not as fluid as oil moving around in open water. As wetland plants' roots suffocate and degrade, the sediments they hold in place wash away, leaving nothing for new growth to anchor in. A few mangrove areas were lost due to the IXTOC-I spill.

"The oil hit sandy beaches mostly," Linden said, "and was therefore easier to clean up, though some of the cleanup in those days was not very carefully done."

The IXTOC-I spill killed thousands of birds, Jernelöv said. *"Maybe up to 10,000, which is a large number if you see them in one spot, but spread over a large distance. It was not like the Exxon Valdez."* (Researchers estimated 250,000 seabirds were killed by the Valdez spill.)

The IXTOC-I Cleanup and Recovery

Some oil on the beaches was bulldozed under, but long stretches of beach were left alone where the oil soon weathered to tar and then to asphalt, said Jernelöv.

"Five years later, most of this was covered with sand," he added. "But where it was exposed, crabs were crawling over it and oysters and mussels were settled on it. The toxicity of it was gone. It looked like an asphalt road."

By August 1979, oil from the spill reached the Texas shoreline. Erich Gundlach, an independent consultant with E-tech International, Inc, who assessed shorelines and clean-up for IXTOC I said, *"I never believed it would reach that far, but it did."* Fortunately a tropical storm did much to reduce that damage. *"We had a tropical depression come in and raise the water level and it eroded the shore a little bit," Gundlach said. "It removed 80 percent of the oil that was on the shore of Texas."*

Long Term Effects on the Coastline of the Gulf of Mexico

Jernelöv, now of the Swedish Institute for Future Studies reviewed the long-term effects and concluded there was none of significance. As with the Exxon Valdez spill many marginal businesses and fishing industries ceased, but this was compensated for by the creation of high-paying alternative jobs in cleaning up or in supporting the oil industry. On the positive side Jernelöv said, "*The much-reduced fishing pressure on fisheries that are normally over-fished meant that the fisheries' recovery went quite quickly. A few years down it was difficult to see any effect on the organisms. The damage the oil did was, to a significant extent, compensated or even overcompensated by the fact that you didn't have fishing.*"

Within 5-years the effects of this huge spill were undetectable on the environment.

Endnotes Part-4

¹ http://en.wikipedia.org/wiki/Gulf_of_Mexico

² <http://www.incidentnews.gov/incident/6250>

³ <http://www.incidentnews.gov/entry/517477>

⁴ <http://www.incidentnews.gov/incident/6250>

⁵ <http://www.incidentnews.gov/entry/517522>