STS-51L Case Study Report

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Abstract

The Challenger Disaster was a result of faulty O-rings in the solid rocket booster being overlooked. Larry Mulloy, Jerald Mason, and Joe Kilminster decided to push forward with the launch despite the data and warnings from the top engineers that worked on the project. They violated Code of Ethics rules 1b, “Engineers shall approve only those engineering documents that are in conformity with applicable standards (Code of Ethics, n.d)” and 2c, “Engineers may accept assignments and assume responsibility for coordination of an entire project and sign and seal the engineering documents for the entire project, provided that each technical segment is signed and sealed only by the qualified engineers who prepared the segment (Code of Ethics, n.d).” This was a gross breach of conduct that cost the lives of 7 astronauts and the public’s trust in NASA.

Keywords: Challenger Disaster, Larry Mulloy, Jerald Mason, Joe Kilminster, Code of Ethics, 1b, 2c.

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The Challenger Disaster was one of the greatest tragedies of NASA’s 61-year history. On January 28, 1986, all 7 brave men and women died on board as the world watched the rocket boosters streak across their television screens in haphazard directions and the bright orange ball of fire lit the sky over Kennedy Space Center. The event led to an ethical investigation the likes of which NASA had never seen. Unbeknownst to the public or astronauts preparing to board the shuttle, the engineers at Morton-Thiokol, the Utah-based contractor that built the solid rocket boosters (SRBs), were aware and concerned about the O-ring seals in their boosters. They were only cleared to operate at temperatures exceeding 53℉ and the temperature at Kennedy Space Center was expected to drop into the low 20’s (The Space Center Challenger Disaster, n.d). A teleconference was held the night before the fateful day where the top engineers and management from Morton-Thiokol, Marshall Space Flight Center, and Kennedy Space Center came together to discuss the issue and decide whether it was worth postponing or not. While many engineers, notably Robert Ebeling, Arnie Thompson, and Roger Boisjoly, insisted that it was too cold and that the O-ring wouldn’t properly seal and thus let the propellant escape from the booster and possibly cause a chain reaction that would destroy the vehicle, most managers and Morton-Thiokol executives, such as Larry Mulloy, Marshall's Solid Rocket Booster Project Manager, and Jerald Mason, a senior executive at Morton-Thiokol, argued that the data was inconclusive and that the engineers could not prove that the O-rings would fail under 53℉. As the argument became more divided, Joe Kilminster, another manager present, called for a five-minute meeting to allow the engineers to review their data. Despite their objections and pleas, the management still thought that the data was inconclusive, and Joe Kilminster drafted a go-ahead recommendation for launch. Alan McDonald, Director of the Solid Rocket Motors Project for Morton-Thiokol, appealed to the managers to postpone the launch, but he was ignored, and NASA went ahead with the launch. The temperature dropped to 8℉ overnight. 0.06 seconds after ignition, the O-ring did not seal, and superheated gas escaped from the SRB. Luckily, the oxides formed by the burnt propellant sealed the gap and prevented any more loss; however, 59 seconds into the flight, the Challenger experienced severe wind sheer that stripped the oxides from the booster and allowed the propellant to continue to leak from the SRB. Hundreds of tons of propellant were simultaneously ignited and blew apart the shuttle (The Space Center Challenger Disaster, n.d). As the Failure Analysis Team was formed and more information began to become public knowledge, the ethics of the NASA and Morton-Thiokol administrators came into question. How much risk is justifiable for the advancement of science and technology?

# Conduct Analysis

Dan Goldin, a former NASA Administrator, once said,

The best way to honor the memories of the crew of the Challenger, and of all the men and women who have given their lives to explore the frontiers of air and space, is to continue their bold tradition of exploration and innovation. That's what the people of NASA do every day. They push the boundaries of knowledge and human endeavor to improve and enrich life on Earth today and secure a better future for all of us tomorrow. I've said many times that safety is the highest priority at today's NASA. We will not waiver from that commitment. But human beings have always taken great risks to reap great rewards. Space flight is inherently dangerous, and every member of the NASA team understands those risks. (NASA Administrator on Tenth Anniversary of Challenger Accident)

He talks about how NASA must always strive to be at the cutting edge of science, but we must always hold the public welfare at the highest standard. This sentiment is echoed as the first Fundamental Canon of the NPSE Code of Ethics: “Hold paramount the safety, health, and welfare of the public.” In the case of the Challenger mission, while there was something to be gained by launching on the 28th, it was minuscule compared to what was at stake if it went wrong. It was an inexcusable error of judgment by the managers at NASA and Morton-Thiokol.

One of the foremost perpetrators was Larry Mulloy. Mulloy was the Marshall Space Flight Center’s Solid Rocket Booster Project Manager. When presented with the data by Arnie Thompson and Roger Boisjoly, he was one of the first to call into question the data’s integrity. He breached the Code of Ethics Rule 1b: “Engineers shall approve only those engineering documents that are in conformity with applicable standards (Code of Ethics, n.d).” By approving the new recommendation that the shuttle is safe to launch, even though he knew that the O-rings were below their operating temperature, he was endangering the lives of the astronauts and compromising the mission. He should’ve delayed the launch because they did not know enough to defend either side. One must always move forward based on solid information and not the lack thereof.

Mulloy also breached the Code of Ethics Rule 2c: “Engineers may accept assignments and assume responsibility for coordination of an entire project and sign and seal the engineering documents for the entire project, provided that each technical segment is signed and sealed only by the qualified engineers who prepared the segment.” While the management staff did bring in multiple qualified engineers, like Thomson, Boisjoly, McDonald, and Ebeling, none of them signed the recommendation to launch. They were all still skeptical and were following Rule 1b. Mulloy should have followed suit and looked further into the matter. These were all highly qualified engineers whose job it was to analyze these sorts of issues. Mulloy was not. This was a technical issue that needed technical specialists, not managers. Mulloy tried to bypass the engineers by asking for the opinion of Joe Kilminster. While Kilminster had an engineering background, he was not a specialist in the area and, thus, less qualified to speak on the matter than the engineers present. They should have listened to the people who were the most well versed in the area and had the most up-to-date information.

Jerald Mason was a major part of the same issue. He told Bob Lund, the Vice President of Engineering to “take off your engineering hat and put on your management hat” when Lund tried to defend the engineers and wanted to delay the launch. Mason disregarded the risks attached to the launch for better PR for his company. It was unprofessional and narrow-sighted.

The Challenger Disaster will always be a grave reminder of why these decisions mean so much, regardless of how small they seem. One wrong choice can abruptly end the lives of 7 of America’s best. Engineers must always follow the Code of Ethics to ensure that their missions are in the best interests of the public. People like Mulloy, Mason, and Kilminster are prime examples of great power bringing great responsibility. Their first responsibility is public welfare. They gambled on the astronauts’ lives and lost dearly. This was a gross breach of conduct that would’ve never happened if they had taken a step back and considered the situation. They could have waited for more data, new O-rings, or a warmer day and those astronauts might still be alive to tell the tale.

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