



FIGURE 9.7 The explosion of the *Challenger* killed seven astronauts, including the first civilian in space, Christa McAuliffe. (Courtesy of NASA)

9.6.1 Morton Thiokol/NASA

On January 28, 1986, the space shuttle *Challenger* lifted off from Cape Canaveral. On board were seven astronauts, including schoolteacher Christa McAuliffe, the first civilian to fly into space. Just 73 seconds after liftoff, hot gases leaking from one of the booster rockets led to an explosion that destroyed the *Challenger* and killed everyone on board (Figure 9.7).

Engineer Roger Boisjoly was in charge of inspecting the O-rings on the boosters recovered after launches of the space shuttle. The O-rings were supposed to seal connections between sections of the booster rockets. On two occasions in 1985, he had seen evidence that a primary O-ring seal had failed. Boisjoly presented a report on his findings to NASA officials at the Marshall Space Flight Center. Frustrated that NASA officials were not giving sufficient attention to the problem, he wrote a memo to vice president for engineering Robert Lund, stating that an O-ring failure could lead to the loss of a shuttle flight and the launch pad. Despite Boisjoly's persistent efforts to get the seals redesigned, the problem was not fixed.

On January 27, 1986, Boisjoly and a group of Morton Thiokol engineers met to discuss the proposed launch for the following day. Florida was in the middle of an unusual cold snap; the weather forecast for northern Florida called for an overnight low

of 18 degrees Fahrenheit. The engineers knew that frigid temperatures greatly increased the probability that an O-ring would fail, allowing hot gases to escape from a booster rocket. They prepared a set of 14 slides that documented their concern about a low-temperature launch.

The evening of January 27, Morton Thiokol had a teleconference with the Marshall Space Flight Center and the Kennedy Space Center. Morton Thiokol's presentation ended with the engineers' recommendation that NASA not launch the *Challenger* if the temperature was below 53 degrees. NASA asked Morton Thiokol vice president Joe Kilminster for a go/no-go decision. Kilminster said his recommendation was not to launch.

NASA officials were displeased to get this recommendation from Morton Thiokol. The launch had already been delayed several times. They were eager to launch the space shuttle before the president's State of the Union address the following evening, so that the president could include the mission in his speech. After NASA officials expressed their dismay with the recommendation, Kilminster asked for a five-minute break in the proceedings.

During the recess, Morton Thiokol's four top managers huddled away from the engineers. Senior Vice President Jerald Mason and Vice President Calvin Wiggins supported the launch, while Vice Presidents Joseph Kilminster and Robert Lund were opposed. However, Lund changed his mind after Mason "told him to take off his engineering hat and put on his management hat" [8]. (More than half of Morton Thiokol's profits came from its work for NASA.)

When Morton Thiokol rejoined the teleconference, Kilminster told NASA officials that Morton Thiokol recommended the launch go ahead. NASA officials at the Marshall Space Flight Center prevented the engineers' negative recommendation from being communicated to the NASA officials with final authority to approve or delay the launch.

A month after the loss of the *Challenger*, Boisjoly testified before a presidential commission appointed to investigate the disaster. Morton Thiokol lawyers had advised Boisjoly to reply to every question with a simple yes or no. Instead, Boisjoly shared with the commission his hypothesis about how the cold temperature had caused the failure of an O-ring. In later meetings with commission members, he presented documents that supported his hypothesis, including his 1985 memo. Boisjoly's testimony and documents contradicted the testimony of Morton Thiokol management. The company responded by isolating Boisjoly from NASA personnel and the O-ring redesign effort [8, 9].

Distressed by the hostile environment, Boisjoly stopped working for Morton Thiokol in July 1986. Two years later, he found work as a forensic engineer.

9.6.2 Hughes Aircraft

In the 1980s, Hughes Aircraft manufactured military-grade hybrid computer chips at its Microelectronic Circuit Division in Newport Beach, California. (A hybrid computer chip contains both digital and analog circuits.) The division produced about 100,000 hybrid chips per year. The military put these chips in a variety of sophisticated weapons

systems, such as fighter planes and air-to-air missiles. Manufacturing these chips was a lucrative business for Hughes Aircraft; the government paid between \$300 and \$5,000 for each chip.

In return for paying these high prices, the government insisted that the chips pass stringent quality assurance tests. Hughes Aircraft technicians made two kinds of tests. First, they ensured the chips functioned correctly. Second, they checked the chips for resistance to shocks, high temperatures, and moisture. About 10 percent of the chips failed at least one of these tests. A common problem was that a chip would have a defective seal, which let moisture in. These chips were called “leakers.”

Margaret Goodearl and Donald LaRue supervised the testing area. The company hired Ruth Ibarra to be an independent quality control agent.

In August 1986, floor worker Lisa Lightner found a leaker. Donald LaRue ordered her to pass the chip. Lightner told Goodearl, and Goodearl reported the incident to upper management. Hughes Aircraft management threatened to fire Goodearl if she didn't reveal the identity of the worker who had complained.

Two months later LaRue ordered Shirley Reddick, another floor worker, to reseal lids on some hybrid chips, in violation of the required process for handling leakers. Reddick reported the incident to Goodearl, who relayed the report to upper management. Again, Goodearl was told she might be fired if she kept up this pattern of behavior.

In the same month, LaRue asked tester Rachel Janesch to certify that a defective hybrid chip had passed the leak test. Goodearl played a role in reporting the incident to Hughes Aircraft management. In this case the chips were retested.

Goodearl and Ibarra found a box of hybrid chips with blank paperwork, meaning the necessary tests had not been performed. When Goodearl reported this discovery to her superiors, they told her she was no longer part of the team. Goodearl filed a formal harassment complaint. A midlevel manager in personnel called her into his office, tore up her complaint, threw his glasses at her, and said, “If you ever do anything like that again, I will fire your ass” [7].

Goodearl's performance evaluations, which had been excellent, dropped sharply as soon as she began complaining about irregularities in the chip testing facility. In late 1986, Goodearl and Ibarra contacted the Office of the Inspector General, part of the US Department of Justice. A joint decision was made for Goodearl and Ibarra to find a clear-cut case of fraud.

One day LaRue put two leaky hybrid chips on his desk, planning to approve them after Goodearl had gone home. Goodearl and Ibarra made photocopies of the documentation showing the chips had failed the leak test. After the chips were shipped from Hughes Aircraft, the Department of Defense tested them and found them to be leakers. As a result of this incident, the Office of the Inspector General began a formal investigation of fraud at Hughes Aircraft.

Hughes Aircraft fired Goodearl in 1989. Ibarra had left Hughes Aircraft in 1988 “after being relieved of all meaningful responsibilities and put in a cubicle with nothing to do” [10]. In 1990 Margaret Goodearl and Ruth Ibarra (now known under her married name, Ruth Aldred) filed a civil suit against Hughes Aircraft, claiming that Hughes

Aircraft had violated the False Claims Act by falsifying records in order to defraud the government. This civil suit was put on hold until the end of the criminal trial.

The inspector general's criminal investigation led to a trial in 1992. The jury found Hughes Aircraft guilty of conspiring to defraud the government. Hughes Aircraft appealed the verdict, but the verdict was upheld. Since a criminal conviction can be used as evidence in a civil trial, the verdict nearly assured that Goodearl and Aldred would prevail in their civil suit. Hughes Aircraft began negotiating a settlement in the civil suit.

Four years later, Hughes Aircraft was ordered to pay \$4.05 million in damages. Goodearl and Aldred received 22 percent of the settlement, or \$891,000. In addition, Hughes Aircraft was required to pay their legal fees, which amounted to \$450,000 [7, 11].

Goodearl and Aldred paid a high price for whistle-blowing. Both were unemployed for an extended period of time. Aldred and her husband went on welfare until they could find work. Goodearl and her husband had to file for bankruptcy, and they eventually divorced. Despite these hardships, both whistle-blowers said they "would do it all again" [12].

9.6.3 US Legislation Related to Whistle-Blowing

Whistle-blowers are usually punished for disclosing information that organizations have tried to keep under wraps. If they do not lose their jobs outright, they have probably lost all chances for future advancement within the organization. Whistle-blowers and their families typically suffer emotional distress and economic hardship.

Nevertheless, whistle-blowers often serve the public good. For this reason the US government has passed two pieces of legislation to encourage whistle-blowing: the False Claims Act and the Whistleblower Protection Act of 1989.

The False Claims Act was first enacted by Congress in 1863 in response to massive fraud perpetrated by companies providing supplies to the Union Army during the Civil War. The law allowed a whistle-blower to sue, on behalf of the government, a person or company that was submitting falsified claims to the government. If the organization was found guilty and forced to pay a settlement to the government, the whistle-blower received half the settlement.

In 1943 Congress amended the False Claims Act, drastically reducing the share of the settlement a whistle-blower would receive and limiting the evidence or information a whistle-blower could use in the lawsuit. As a result, the law fell into disuse.

In the mid-1980s, the media carried numerous stories about defense contractors perpetrating fraud against the government. Congress responded by amending the False Claims Act once again, making it easier for people to put together a successful lawsuit and allowing whistle-blowers to receive between 15 and 30 percent of settlements. The False Claims Act also provides certain protections to whistle-blowers against retaliation by their employers.

The Whistleblower Protection Act of 1989 establishes certain safeguards for federal employees and former employees who claim negative personnel actions have been taken against them for whistle-blowing. Whistle-blowers can appeal to the US Merit Systems Protection Board.