

Chemical Engineering Safety To Reduce The Likelihood Of Mishaps

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Industrial Accidents and Nuclear Safety

All industries are susceptible to accidents, but they learn from them. In the gas and chemical industries, major mishaps result in enhanced safety. The high energy density of nuclear power implies that it is not infallible to hazards, and this has been considered when designing nuclear plants (Maggelet & Oskins, 2010). The few disasters have been newsworthy and enormous, yet of trivial ramifications regarding human casualties. The novelty worth and the newsworthiness of nuclear accidents remain high when compared to other industrial mishaps that attract little news coverage (Weil, 2017). However, nuclear accidents like the 1980 Titan II, regardless of their severity, are indicators of the need to improve safety measures to minimize the likelihood and impacts of mishaps.

The 1980 Titan II Missile Accident

The Titan II was the United States' biggest trans-continental ballistic missile ever constructed, measuring 100ft in length and 10ft in diameter, with a nine-megaton thermo-nuclear warhead in its nose-cone. It was "in position, cocked, and set to go". Eighteen of them were scattered around rural Arkansas, buried near small towns, little farms, and off back-country roads (Maggelet & Oskins, 2010). The one that exploded was located at Launch Complex 374-7 near Ozark Hills in Damascus. In view of Schlosser (2013), the missiles were leaky and old, almost like a disaster waiting to occur. The facility's employees were very young, overworked, and undertrained. The incident was a horrific tale of recklessness, bad design, and short-cutting, with a lot of indecisiveness from the control centre and the bravery of the personnel at the site (Weil, 2017). The Titan II was launched after a number of missteps that started with a repairman dropping a wrench that pricked a fuel tank.

Safeguards Against Nuclear Mishaps

In light of the Titan II incident, safeguards are needed to minimize the possibility of nuclear mishaps. According to Perkins (2014), tactical nuclear warheads scattered around the world have minimal security; lost tools and unsuccessful repairs precipitated grave accidents; insufficient safety structures and lack of oversight have resulted in numerous close brushes with nuclear detonations. In his book, *Command and control*, Eric Schlosser mentions that the "the push to control atomic weapons – to guarantee that one does not go off accidentally" is undermined, repeatedly by military demands for bombs they can expect to detonate. The inconsistency is often one of "attitude" –

military personnel are accustomed to danger and are happy with taking risks that most people cannot accept (Schlosser, 2013). In any case, fundamentally, it has to do with how remarkably deadly atomic weapons are, and the essentially complex security measures that accompany them – the blend of human imperfection and mechanical complication that can prompt tragedy”, and most of the time does.

Organisational Secrecy and Safety Culture

A culture of denial concerning atomic safety issues prompted a level of carelessness and unawareness of the weapons that extended deep into the firms intended to deal with them. The record of how that culture was kept up clarifies a portion of the logical inconsistencies that people often uncover in the official reports of nuclear mishaps (Maggelet & Oskins, 2010). At the back of their walls of secrecy and bureaucratic silos, the nuclear engineers and US Air Force were not looking at similar evidence. In light of these aspects, the basic goal of nuclear safety pertains to protecting the public and plant operators and ensuring there is minimal harm to the environment (Schlosser, 2013). As such, safety ought to be guaranteed in all stages, from the construction of the plant to its commissioning as well as decommissioning.

Reactor Design Radiation Protection and Emergency Planning

The first feature concerning nuclear plant safety is the building – nuclear reactors have exothermic reactions taking place in the core, which implies that the plant housing must be constructed using suitable materials that have the ability to shield the external environment during accidents and normal operations (Weil, 2017). At the core where fission takes place, adequate measures should be put in place to ensure there are perfect conditions via core cooling and control rods. Besides the plans, persons working in the plants should be continually monitored for any exposure to radiation. The laid work processes ought to be followed entirely, and the workplace should be consistently checked for radiation (Perkins, 2014). Nobody needs a mishap to happen, but things do get out of control often because of human error, machine failure, or nature’s fury. In such cases, it is essential to have properly trained staff and the requisite gear to tackle the situation successfully.

Conclusion on Technological and Human Risk

Overall, nuclear safety issues have never been resolved. A mix of technological complexity and human frailty still represents a grave hazard to humanity. While the impacts of global warming progressively lead the news, the similarly risky yet more urgent danger of atomic weapons has been, to a great extent, overlooked. The 1980 Titan II and recent incidents like the 2011 Fukushima meltdown are lessons that the world’s nuclear stockpiles are not as safe as they ought to be. As such,

relevant authorities should not take delight in their aptitude and good luck in averting an atomic calamity but desperately extend their efforts to guarantee that nuclear warheads do not go off unintentionally, by miscalculation, or by mistake.

References

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