

Ethics in Engineering

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In your presentation please include the following:

- What was the main disaster or problem presented in this case study ?
- What ethical issue led to the disaster or problem? Be specific and provide details relating to the decisions that the engineers made that ultimately led to the main disaster or problem
- If the problem was solved how would the outcome be different?
- **Please be sure to include pictures/videos and appropriate text in your powerpoint!**



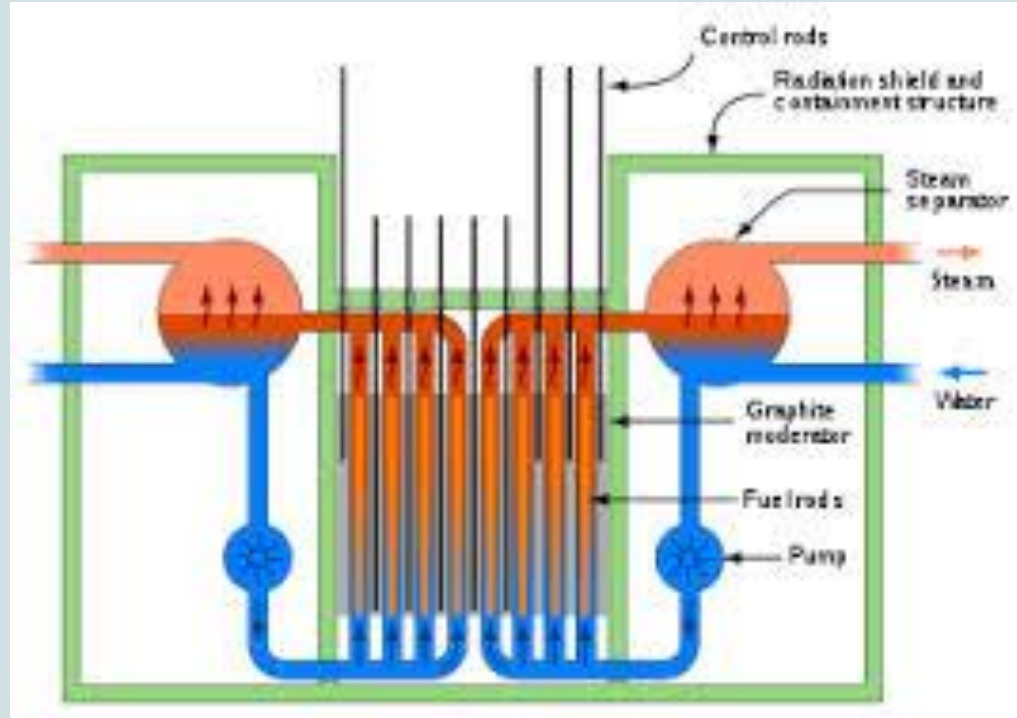
Chernobyl Nuclear Power Plant

- Located about 81 miles north from the city of Kiev, Ukraine
- Made up of four reactors
- The two closest towns were Pripyat (population 50,000) and Chernobyl (population 12,000)



RBMK-1000 Reactors

- Soviet-designed reactors
- Used U-235 uranium dioxide to heat water, which created the steam (which powers the turbines) and in return generates electricity
- Used graphite instead of water as the cooling system, which made the core more reactive



The Experiment

- Operators were trying to test the electrical systems while important control systems were off
- Designed to show that - while waiting for the diesel generators to start - the coasting turbine would be safe enough to rely on for cooling



Main Factors

1. The reactor was used in a way that it had never been used before
2. The violation of safety regulations
3. There was a positive void coefficient (the reactor is unstable at low power)
4. The staff wasn't aware of the functions of the reactor
5. Poor design of the control rods



Unethical Decisions

- The engineers who were in charge of the test didn't know enough about the physics of the reactor
- They were behind in their schedule, so they rushed the reduction of the reactor's power level which poisoned the reaction
- They withdrew the majority of the control rods and couldn't get the power up to safety standards
- An immediate increase in power was ordered, even though they should've waited 24 hours for the poison to dissipate
- Every important safety system had been disconnected
- Every backup electrical system had been disconnected
- Finally, at 1:23AM, they shut down the turbine generator

The Alternative Outcomes

- If the engineers were properly educated on the physics behind the reactor, then they would have made more rational decisions
- If they had put public safety as their top priority, like all engineers should, then they would have stopped the test as soon as problems arose
- When the explosion occurred, 2 people died immediately, 50 people died shortly after due to radiation poisoning, and an expected 4,000 more are likely to die by radiation exposure
- Had the engineers been less concerned about their test and more concerned about others, they would've been alive