Chernobyl
A Case Study

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Breakdown

- Nuclear power plant with 4 reactors
- near city of Chernobyl in the former USSR
- Reactor 4 exploded on April 26 1986
- The only nuclear accident in a civilian nuclear power plant ever
Breakdown con’t

- Caused 31 deaths instantly
- May have caused 300,000 deaths
- Upwards of 20 million people exposed to radioactivity
- Will cost $400 billion and 200 years to totally clean up
Experiment started April 25 to determine how long turbine would spin and produce power after a loss of electrical power

- Reactor was known to be unstable at power levels lower than 700 MW(t)
Accident Con’t

- Power levels brought down to 500 MW(t)
- 12:30 - power dropped to 30 MW(t)
- Most control rods raised to increase power levels
- 1:23 - reactor out of control
- Emergency shutdown initiated
- Power surged to 100 times acceptable limits
Explosion

- April 26, 1:24 am - plant exploded
- 8 tonnes of fuel were ejected into atmosphere including plutonium, graphite moderator, iodine-131, and cesium-137
- $12 \times 10^{18}$ Bq of radioactivity were released
- May 2-3, 45,000 people were evacuated
- May 4, 169,000 people were evacuated
- Later another 219,000 evacuated, to comprise 4,300 square kilometers of contaminated area
С подготовкой и охраной огнестрельных Чернобыльской АЭС

По инициативе в ИЧ СССР были организованы отдельные участки огнестрельного оружия. Внутри зданий Чернобыльской атомной электростанции имеются залы огнестрельного оружия, в которых производятся стрельбы с оружиями различного назначения. Также на территории станции расположены залы огнестрельного оружия, в которых проводятся стрельбы с оружиями различного назначения. Оборудование для стрельбы имеет конструктивно-техническую защиту, позволяющую производить стрельбы с оружиями различного назначения. Оборудование для стрельбы имеет конструктивно-техническую защиту, позволяющую производить стрельбы с оружиями различного назначения.
deviations and violations of construction and assembly technology are occurring… these could lead to mishaps and accidents
- The structural pillars of the generator room were erected with a deviation of up to 100 mm from the reference axes
- Wall panels have been installed with a deviation of up to 150 mm from the axes
- Crane tracks and stopways have vertical drops of up to 100 mm and in places a slope of up to 8 degree
- As a result of inadequate monitoring of the condition of safety equipment, in the first three quarters of 1978, 170 individuals suffered work-related injuries, with the loss of work time totaling 3,366 worker-days.
Philosophy

- in a recent Hollywood movie it was said a man flew in space before Yuri Gagarin, but wasn’t patriotic enough to hold his breath when life support stopped so he was erased from the history books.
- The soviet system put national pride over human life, the following story is an example of that.
Introduction

• April 23 1986 Ciobanu family vacationed at cabana on the Carpathian mountains.
• Cabana was at 2200 m. (7200 ft.)
• Brought food since little food available on the mountain
• One week vacation
Vacation

- It was raining all day
- TV on mountain
- Nobody listens to radio during the day
- 9:00 pm rogue station from Germany announced radioactivity in air from Chernobyl
- Cloud went over Romania 2:00 p.m.
- Me and Father were visiting a cave at the time.
Panic

- Radio station said not to be outdoors, not at high altitude, careful of rain
- Raining all day and everybody thought of days activities, all outdoors
- Everybody in group Chem. Eng. Realized severe problem
- Romanian news said nothing panic arose
- Decided to leave next morning to lower ground
The run

- Morning men checked gondola to get down.
- Turned off so nobody climbs mountain
- One family had car on mountain, unpaved road
- 4 kids + 4 mothers + 1 driver in a mid-size car
- Men 20 – 30 km. hike down the mountain
Aftermath

- That morning Romanian government declared the emergency with news from Sweden
- Car stopped at the first medical centre and waited 2 hours for children to take Iodine
- Men walked 4 -5 hours in radioactivity down to train station
- All season no leafy greens could be consumed, or most vegetables
- Most lawns were radioactive all summer
Conclusion

- This is a great example of the risks of research with volatile materials
- This is also a great example of the policy of secrecy and its impact.
- An excellent case study of what not to do
- A constant reminder of the failures of the past and a lesson for future
Thank You

Have a great day
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- The Ciobanu family