What's up with Nuclear Disaster?

Technological Disaster

Reactor Design Safety

- Pressurized Water Reactors vs. Boiling Water Reactors
- Enriched uranium vs. natural uranium vs. plutonium
- Water coolant vs. heavy water vs. others
- Graphite moderator vs. water vs. heavy water

- Cesium 137 half life - 30.1 years
- Strontium 90 half life - 28.8 years

Three Mile Island - 1979

- Malfunction with the cooling system
- Relief valve stuck open
- a few days later releasing into air
  - not more than background levels
- Average level of exposure was 0.08 mSv, which is about the same as an x ray

  - 10 mile radius

Cont’d

- No long term health effects found
- TMI-2 essentially boarded up as long term monitoring site.
  - (TMI-1 coincidentally has had amazing reviews since the accident, in part because of measures taken as a response).
- Largest concern with the way the disaster was handled was the communication between plant and government

Chernobyl - 1986

- Combination of reactor design and operator
  - Testing and safety valves
- RBKM - Soviet design to include plutonium production
  - Roof blew up, main cause of easy release and damage
- Air-born - Belarus, Ukraine, and Russia
  - Traces found all over Europe
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Death Toll

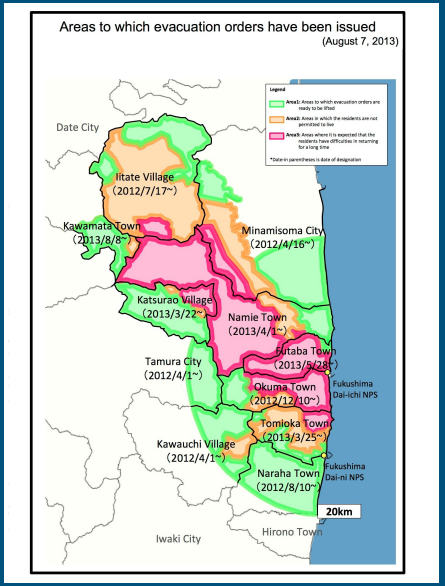
- 28 deaths from ARS immediately after
- 19 died between 1987-2004
  - Unclear on cause, potentially from radiation
- High childhood thyroid cancer
  - from drinking milk from exposed cows
- Difficult to track cancer deaths
  - People moving from evacuation

Evac and Sarcophagus

- Total evacuated from site estimate around 346,000
  - (both initial and subsequent)
  - Led to a lot of mental health issues
- Currently resettling the evacuated area
- Sarcophagus and New Safe Confinement

Fukushima Daiichi Meltdown - 2011

- After earthquake the reactor started emergency shutdown
  - tsunami destroyed backup generators that were keeping the reactors cool
- Deaths caused by tsunami and EQ
  - no recorded of deaths from ARS
  - many deaths recorded from maintaining evacuation conditions
  - Emergency workers exposed to highest radiation, but residents in towns exposed to additional amounts less than average background
- About 160,000 moved



Lasting Concerns

- Resettlement
  - Evacuation conditions
  - Safety concerns of returnings
  - Compensation of housing
    - Government perhaps less than ethical in attempt to bring people home
- Contaminated Water
  - Held in tanks
  - Cesium 137 found in water across Pacific

International Nuclear Event Scale