# Fukushima Nuclear Disaster

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# Presentation Outline

- Introduction
- Events
- Reactions
- Design Flaws
- Suggestions

# How did the disaster happen?

- Earthquake
- Tsunami
- Equipment failure
- Nuclear meltdown
- Releases of radioactive materials

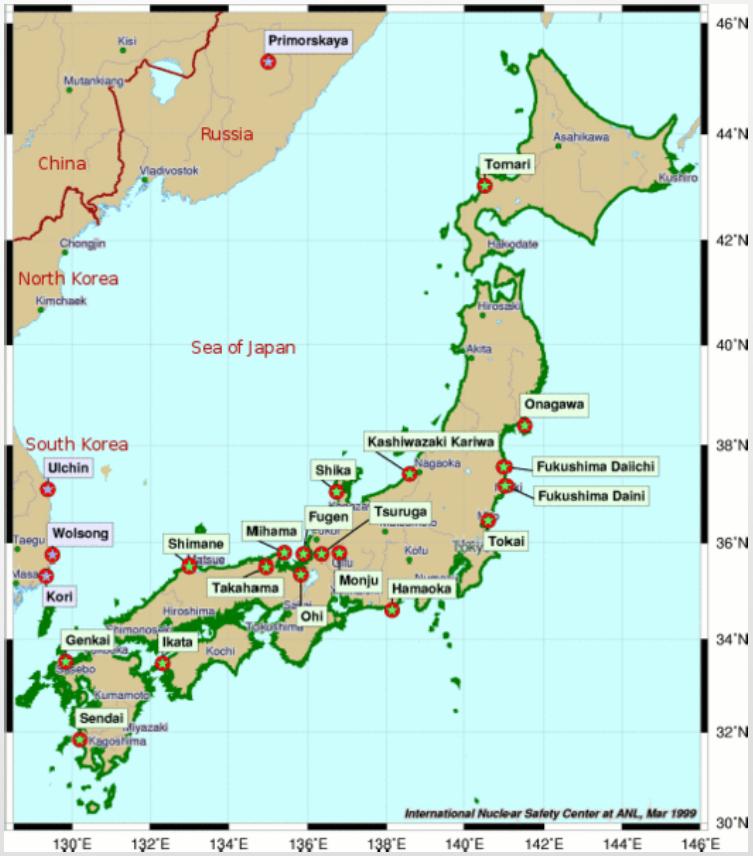


Figure 1. Nuclear Plants in Japan
*(From Wikipedia)*

# Events

- Units 1, 2, and 3 exploded
- Units 4, 5, and 6 shut down
- Central fuel storage was secured
- Contamination

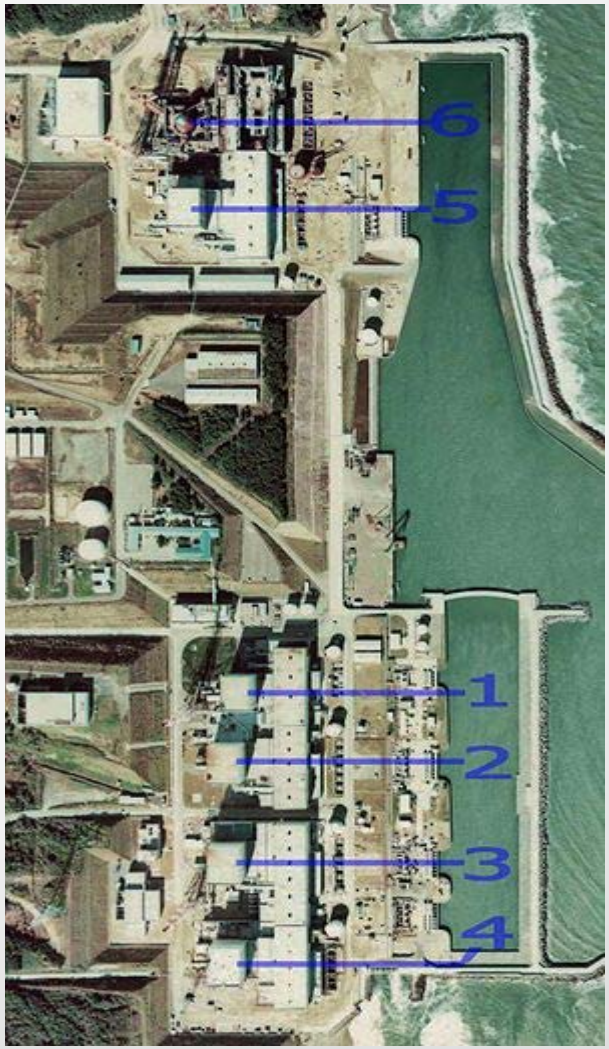


Figure 2. Fukushima Nuclear Plant

# Contamination Zone

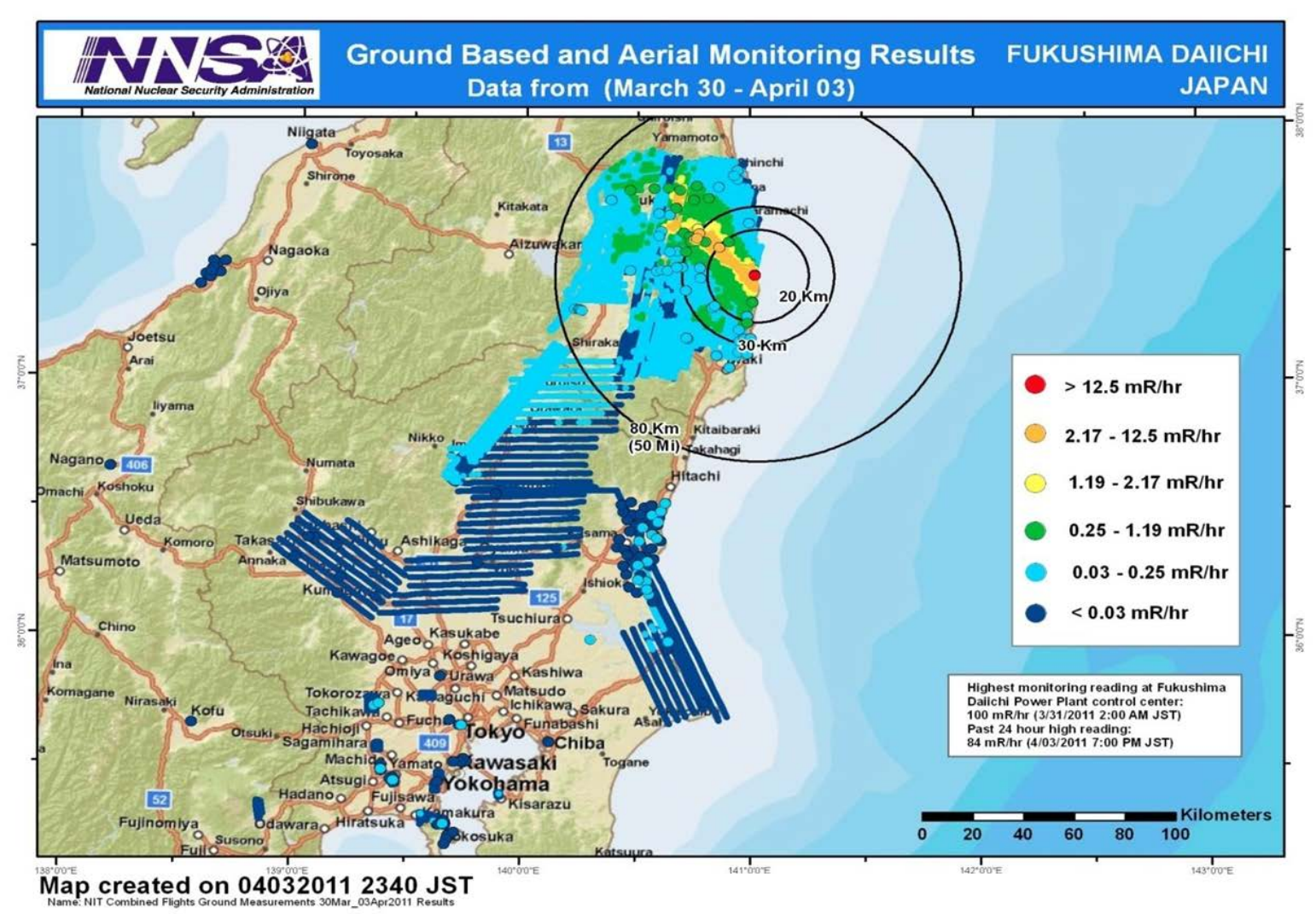


Figure 3. Contamination zone.

http://energy.gov/content/situation-japan

# Severity of Disaster

- Declared Nuclear Emergency
- 7 out 7 on the INES (International Nuclear Event Scale)

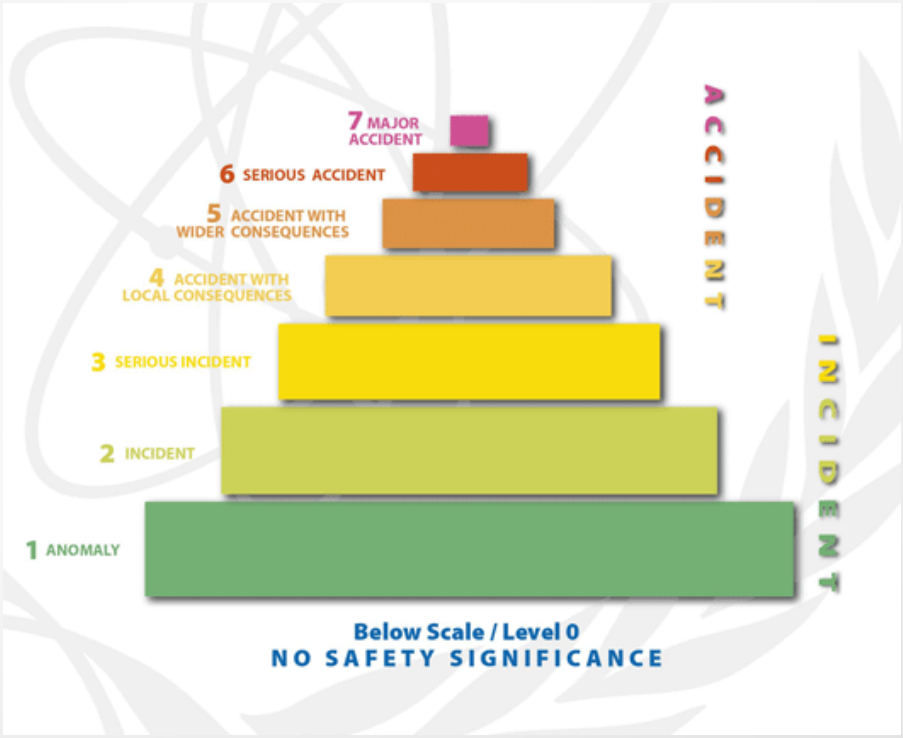


Figure 4

# Reactions

- Automatic Shut Down
- Evacuated 100,000 people
- Started cooling 2 weeks later
- Drop to a stable temperate 6 months later
- Cold shutdown 9 months later

# Design Flaws

- RPV: reactor pressure vessel.
- DW: dry well enclosing reactor pressure vessel.
- WW: wet well - torus-shaped all around the base enclosing steam suppression pool.
- SFP: spent fuel pool area.
- SCSW: secondary concrete shield wall.

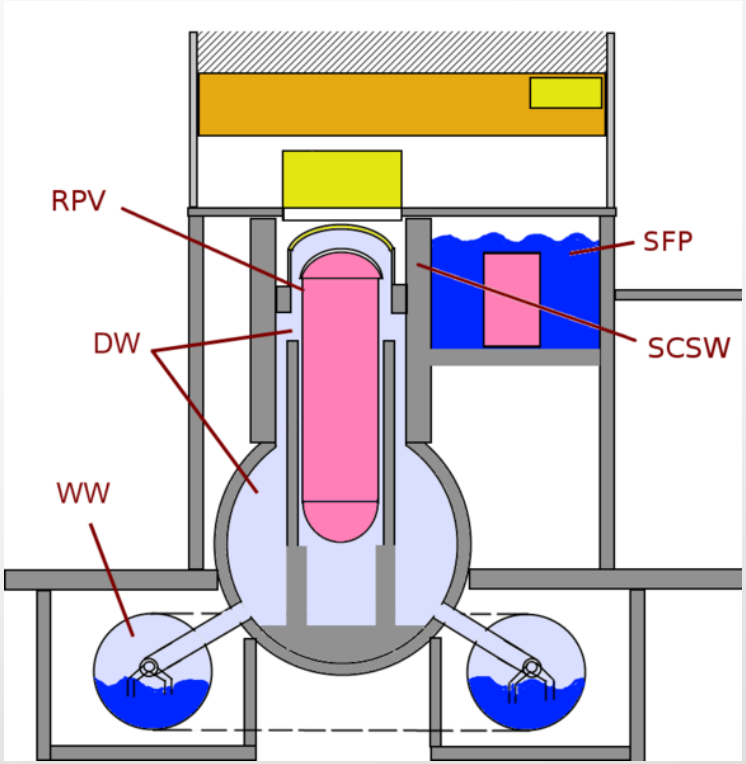


Figure 5:Reactor Cross section

# Suggestions on Prevention of Future Disasters

- Emergency generators for the plant should be placed in areas of little seismic activity and low risk of flooding.
- High quality design, material selection, and construction of the plant.
- Equipment which prevents operation disturbances and human error.
- Monitoring and testing to detect equipment failure.
- Redundant safety measures and containment systems.
- Ability to confine damage to individual systems, sections, and reactors.

# Suggestions For Containment

- Lead sarcophagus around the reactors like Chernobyl.
- Ice wall around the affected area.

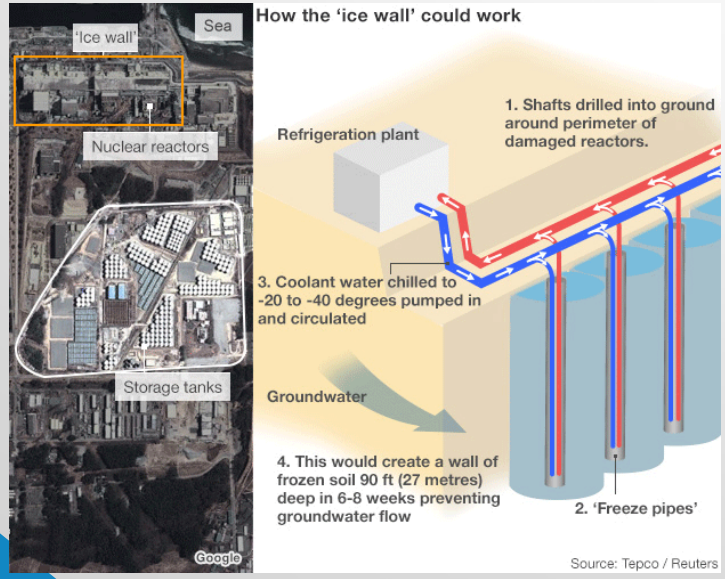


Figure 6: Ice Wall

Figure 7:Lead Sarcophagus

# Conclusion

- Reason
- Event
- Reaction
- Design
- Suggestion

# References

Figure 1 and Figure 2
http://en.wikipedia.org/wiki/Fukushima_Daiichi_nuclear_disaster

Figure 3
http://energy.gov/content/situation-japan

Figure 4
http://www-ns.iaea.org/tech-areas/emergency/ines.asp

Figure 6
http://blog.kievukraine.info/uploaded_images/4778-750384.jpg

Figure 7
http://news.bbcimg.co.uk/media/images/69623000/gif/_69623952_fukushima_ice_wall_624.gif

# Resources

http://www.world-nuclear.org/info/Safety-and-Security/Safety-of-Plants/Fukushima-Accident-2011/#.UjY6fj-Dl8E

http://www-ns.iaea.org/tech-areas/emergency/ines.asp

http://www.reuters.com/article/2011/04/12/japan-severity-idUSTKE00635720110412

http://www.iaea.org/newscenter/news/tsunamiupdate01.html

# Question?