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NRC's Activities Following the Fukushima Dai-ichi Nuclear Accident

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Baltimore-Washington Chapter of the
Health Physics Society
May 13, 2011

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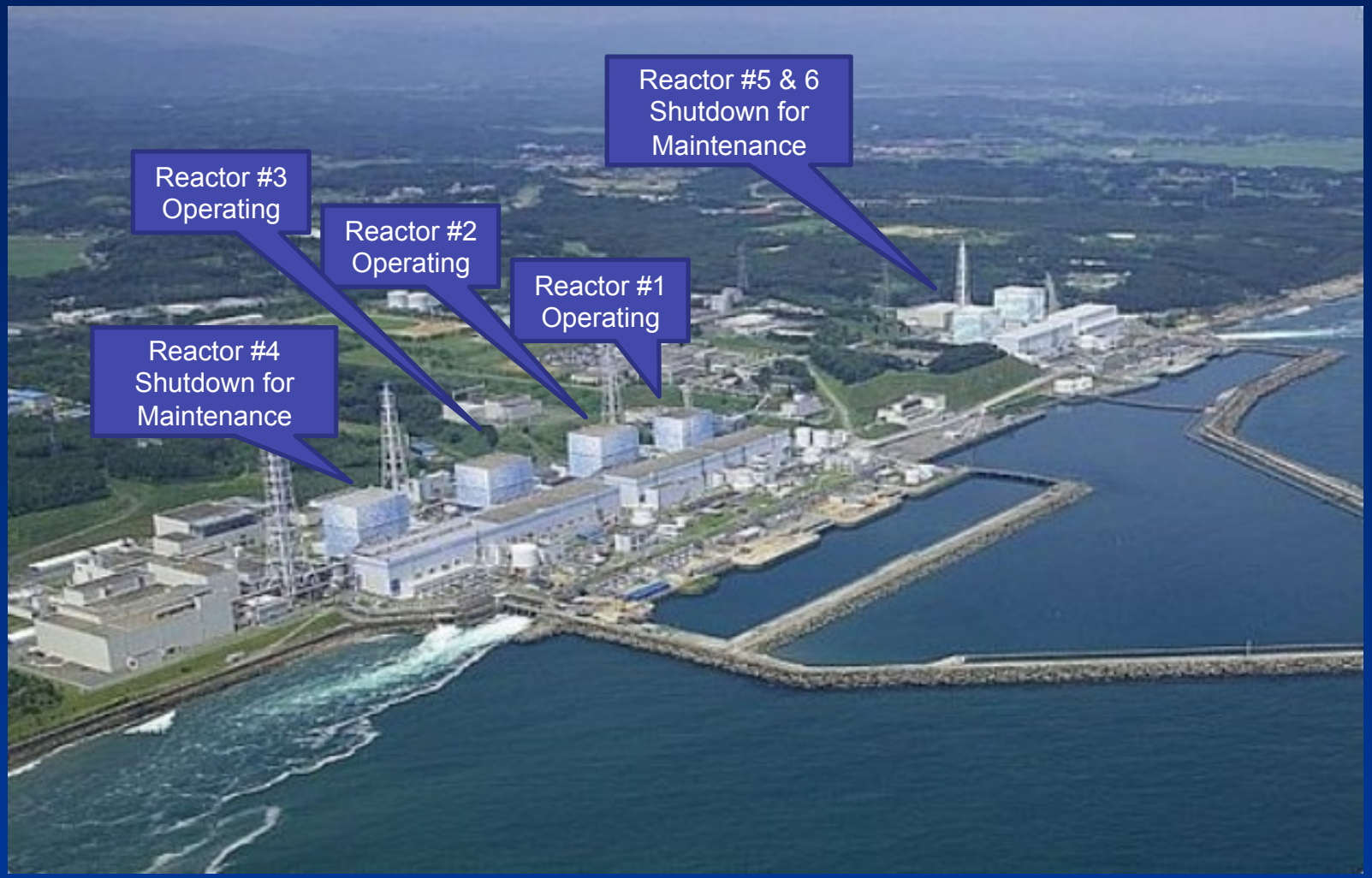
Status of site prior to earthquake



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NPP site post Tsunami March 11, 2011

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Plant Response

Earthquake

- Earthquake Caused Automatic Shutdown of 3 Operating Units
- Offsite Power Lost
- Initial indications are that Emergency Diesels were operating

14m Tsunami (less than 1 hour later)

- All Emergency Back-up Power Lost
- 8-10 hours later Station Batteries Depleted

IAEA International Nuclear and Radiological Event Scale (INES) - Provisional Rating Level 3

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What is INES?

The International Nuclear and Radiological Event Scale

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INES Main Features

- Prompt communication to the public
- Consistency in terms of safety significance
- Operating successfully in more than 70 countries
- Can be applied to any event associated with radioactive material
- Events are classified on a scale from 1 to 7

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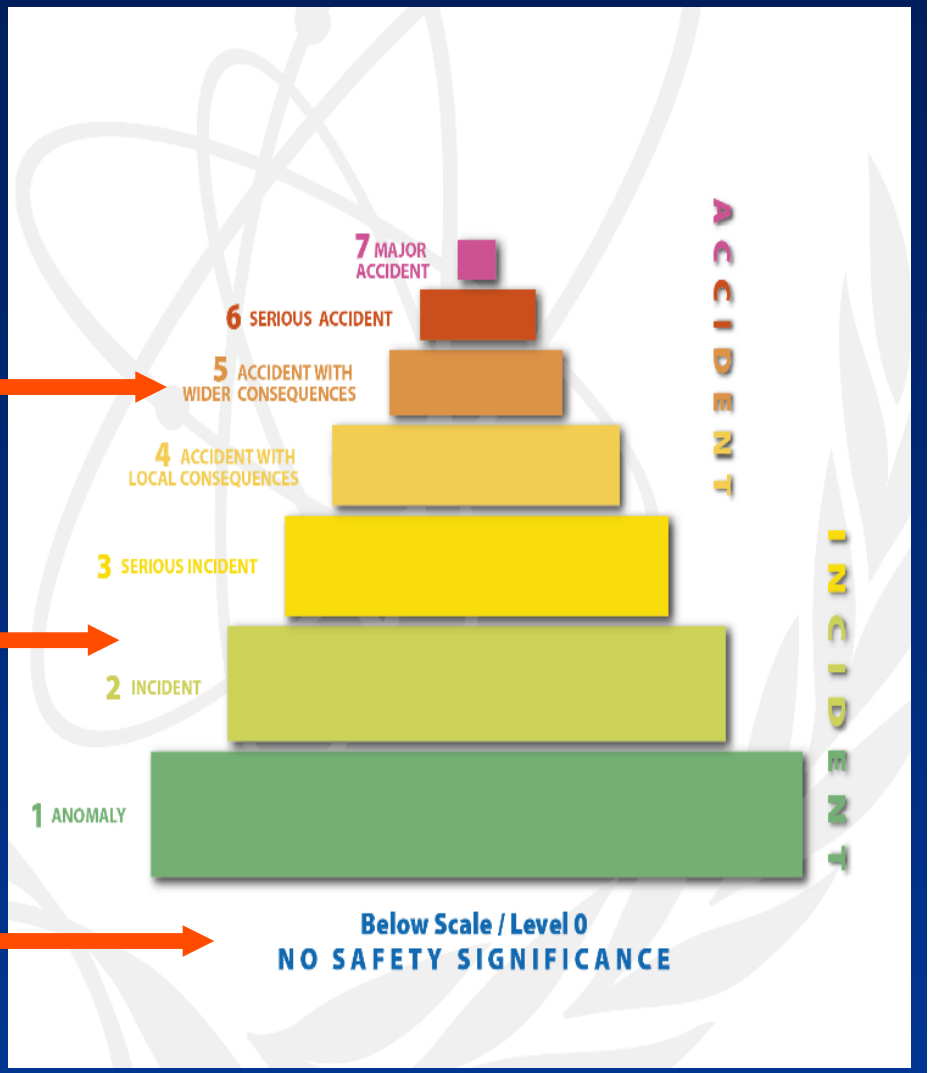
INES Classification

Levels 4 to 7 - "Accidents"

Levels 1 to 3 - "Incidents"

Level 0 – "Deviations"



www.iaea.org/Publications/Factsheets/English/ines.pdf

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March 12, 2011 early in the day

INES Provisional Rating – elevated to Level 4

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March 12, 2011- later in the day

INES Provisional Rating – elevated to Level 5

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March 14, 2011

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March 15, 2011

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NRC Response

- Ops Center 24/7
- Several teams of experts to Tokyo
  - First team deployed on March 12
  - Additional teams have been deployed
- Support to U.S. Ambassador and Japanese
- Coordination of environmental monitoring with federal agencies: DOE & EPA
- Protective Action Recommendations

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Emergency Planning Zones and Protective Action Recommendations….*Why 50 miles?*

- Limited and uncertain data was available
- Significant challenges to 3 units and at least 2 spent fuel pools on site
- Potential for large offsite release existed
- Elevated dose rates on site presented challenges to crews attempting to stabilize reactor
- Limited offsite data suggested serious damage to fuel
- Winds shifting from out to sea to land

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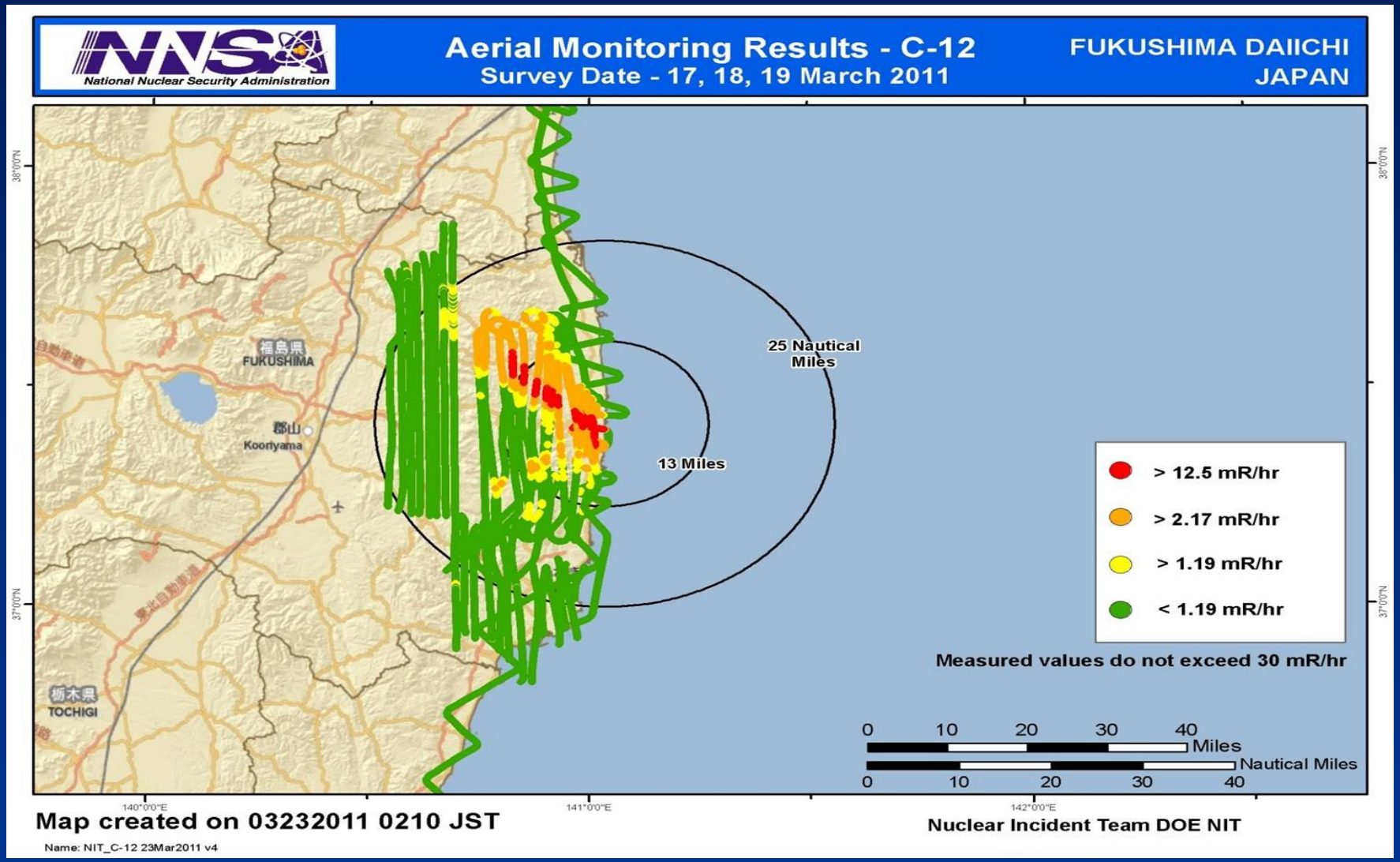

Source: http://blog.energy.gov/content/situation-japan

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April 12, 2011

- NISA reevaluation of discharge amounts
  - I-131 estimated 1.3×10^{17} Bq (~3.5 MCi)
  - Cs-137 estimated 6.1×10^{15} Bq (~0.16 MCi)
- Reevaluated to be an INES Level 7
- Based on this, amount released to atmosphere is ~10% of the 1986 Chernobyl accident

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INES Examples of Previous Events

Event	Rating
Chernobyl (1986)	7
Kyshtym (1957)	6
Windscale (1957)	5
Goiâna (1987)	5
Three mile island (1979)	5
Tokaimura (1999)	4
Vandellos (1989)	3
Industrial radiographer worker overexposure	2

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Current Assessment
(through May 6)

- Radiation levels continue to decrease
- No measurable deposit of radioactive material since Mar 19
- More than 218,000 total field measurements taken by DOE, DoD, and Japanese monitoring assets
- All measured dose rates at US bases and facilities are below 32µrem/hr– a level with no known health risks
- Soil and water samples are the only definitive method to determine agricultural countermeasures
- Ground monitoring gives better fidelity to identify areas that require agricultural sampling
- Ratio of amounts of Cs-137 to Cs-134 is uniform in survey area

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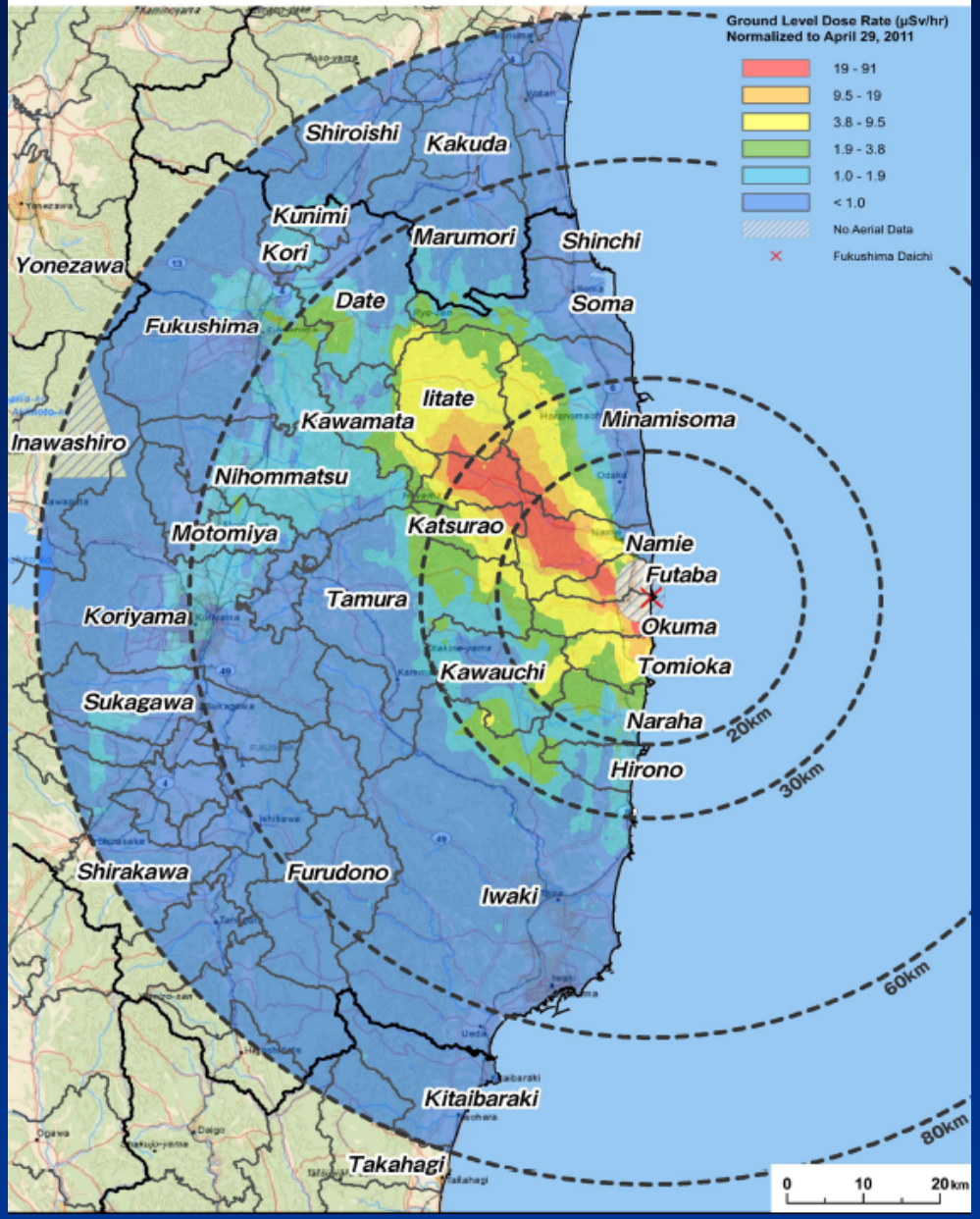
Aerial Measuring Results

Joint US / Japan Survey Data



Ground Level Dose Rate (μSv/hr)
Normalized to April 29, 2011

- 19 - 91
- 9.5 - 19
- 3.8 - 9.5
- 1.9 - 3.8
- 1.0 - 1.9
- < 1.0
- No Aerial Data
- Fukushima Daichi

Source: http://blog.energy.gov/content/situation-japan Updated May 6, 2011

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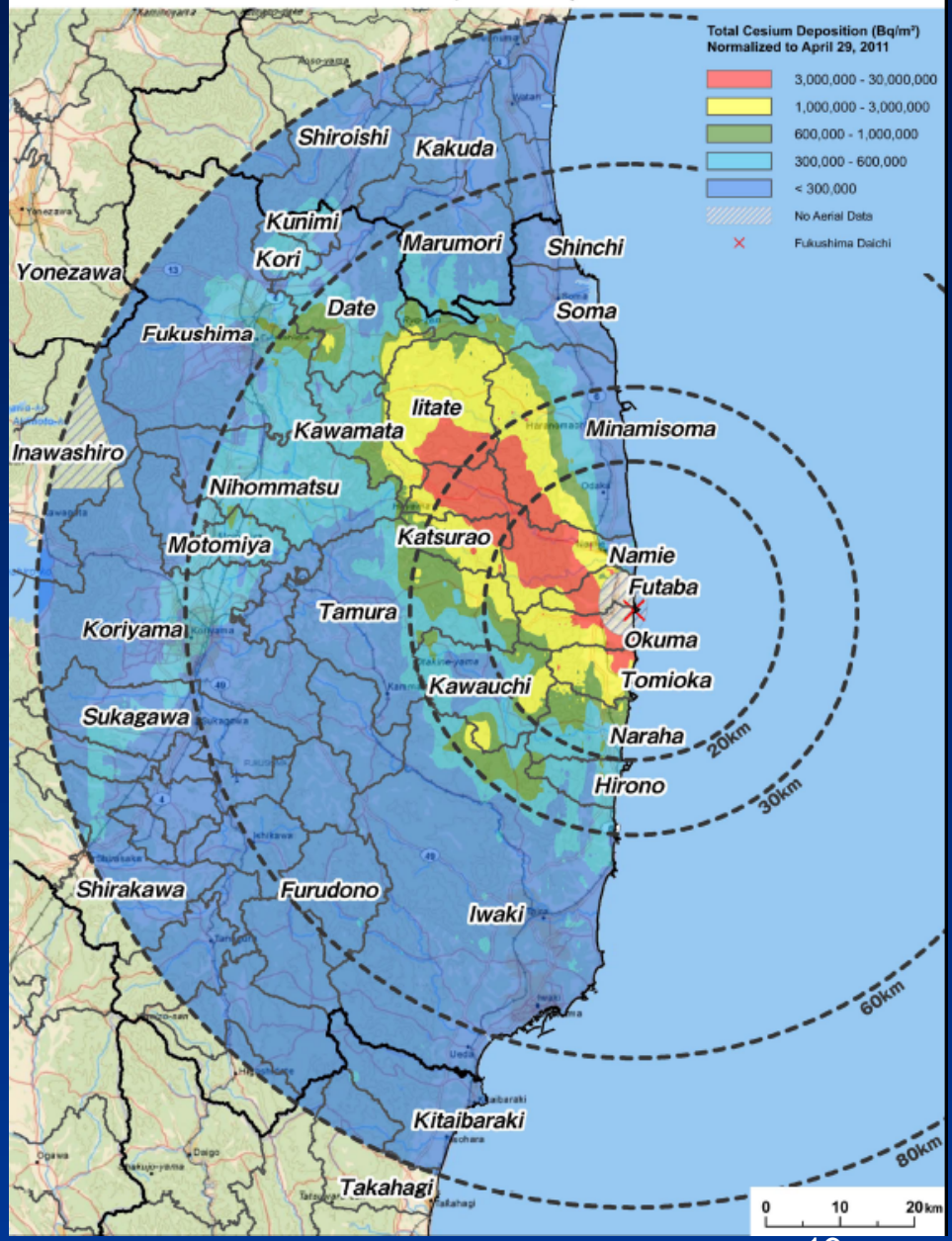
Aerial Measuring Results

Joint US / Japan Survey Data



Total Cesium Deposition (Bq/m²)
Normalized to April 29, 2011
3,000,000 - 30,000,000
1,000,000 - 3,000,000
600,000 - 1,000,000
300,000 - 600,000
< 300,000
No Aerial Data
Fukushima Daichi

Source: http://blog.energy.gov/content/situation-japan Updated May 6, 2011

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Domestic Considerations

- No U.S. health effects from radiation from Fukushima
- U.S. plants designed for external events
- Post -TMI regulatory requirements include
  - Station blackout rule
  - Hydrogen rule
  - BWR Mark I Containment Improvement Program
- Emergency preparedness and planning requirements
- March 23: Commission Tasking Memo
  - NRC Task Force Established: Near- and Long-Term Reviews
  - NRC initiated additional inspections at all U.S. Plants

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Information Notice & Bulletin

- Status of event in Japan and NRC response

  ✓Information Notice 2011-05, "Tohoku-Taiheiyou-Oki Earthquake Effects on Japanese Nuclear Power Plants" (3-31-11)

  ✓NRC Bulletin 2011-01: Mitigating Strategies (5-11-11)

www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/2011/index.html
www.nrc.gov/reading-rm/doc-collections/gen-comm/bulletins/2011/

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NRC Inspection Activities

- Temporary Instruction (TI) 2515/183, "Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event (3/23/11)
- TI 2515/184 on severe accident management guidelines (SAMGs) (4/29/11)
- Inspections are a combination of assessment of licensee actions and independent inspections
- Fact/data gathering

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NRC Near-Term Review

- Evaluate Fukushima Dai-ichi Events
- Domestic Operating Reactors and Spent Fuel Pools
  - External Events
  - Station Blackout
  - Severe Accident Mitigation
  - Emergency Preparedness
  - Combustible Gas Control
- Commission public meeting on May 12; next meeting June 16
- Final recommendations in public meeting July 19

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Current Assessment

- Task force has not identified any issues that undermine our confidence in the continued safety and emergency planning of U.S. plants
- Task force review likely to recommend actions to enhance safety and preparedness
- May 12, 2011 presentation: **http://www.nrc.gov/reading-rm/doc-collections/commission/slides/2011/20110512/staff-20110512.pdf**

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NRC Long-Term Review

- Formation on the sequence of events & status of equipment during the event
- Evaluate all technical and policy issues to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to the regulatory framework
- Evaluate potential interagency issues such as emergency preparedness
- Applicability of lessons learned to non-operating reactor and non-reactor facilities should also be explored
- Report to the Commission within 6 months from the start of the evaluation for Commission policy direction

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Summary

- Safety of current facilities remains top priority
- Challenging new issues raised by Fukushima event
- Near-term and longer-term recommendations
- U.S. National Response Framework essential
- Effective emergency preparedness & response is critical

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