DOE/NNSA Response to Radiological Releases from the Fukushima Dai-ichi Nuclear Power Plant

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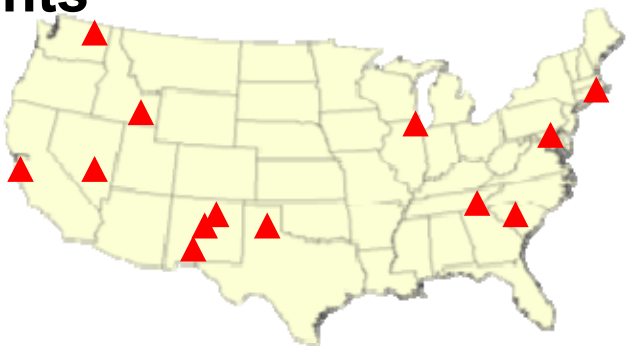
Office of Emergency Response

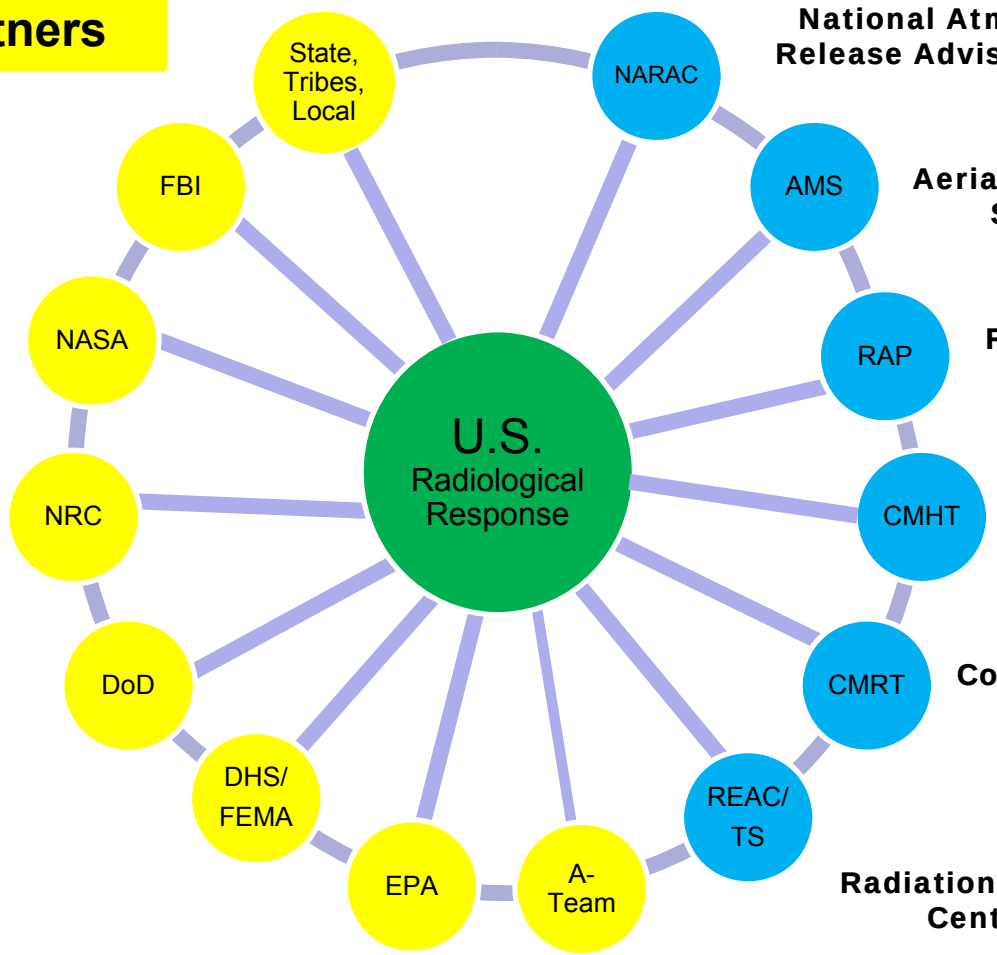
- **Expert technical advice from the DOE/NNSA National Laboratories in response to:**
  - **Nuclear weapon accidents and incidents**
  - **Possible acts of nuclear terrorism**
  - **Lost or stolen radioactive materials**
  - **Radiological accidents**



- **Expertise in nuclear weapons design, nuclear/radiological materials characterization, and radiological detection and characterization**
- **Deployable capabilities, configured for a rapid response to any nuclear/radiological accident or incident**

U.S. Response Asset Integration

Other Partners



National Atmospheric Release Advisory Center

Aerial Measuring System

Radiological Assistance Program

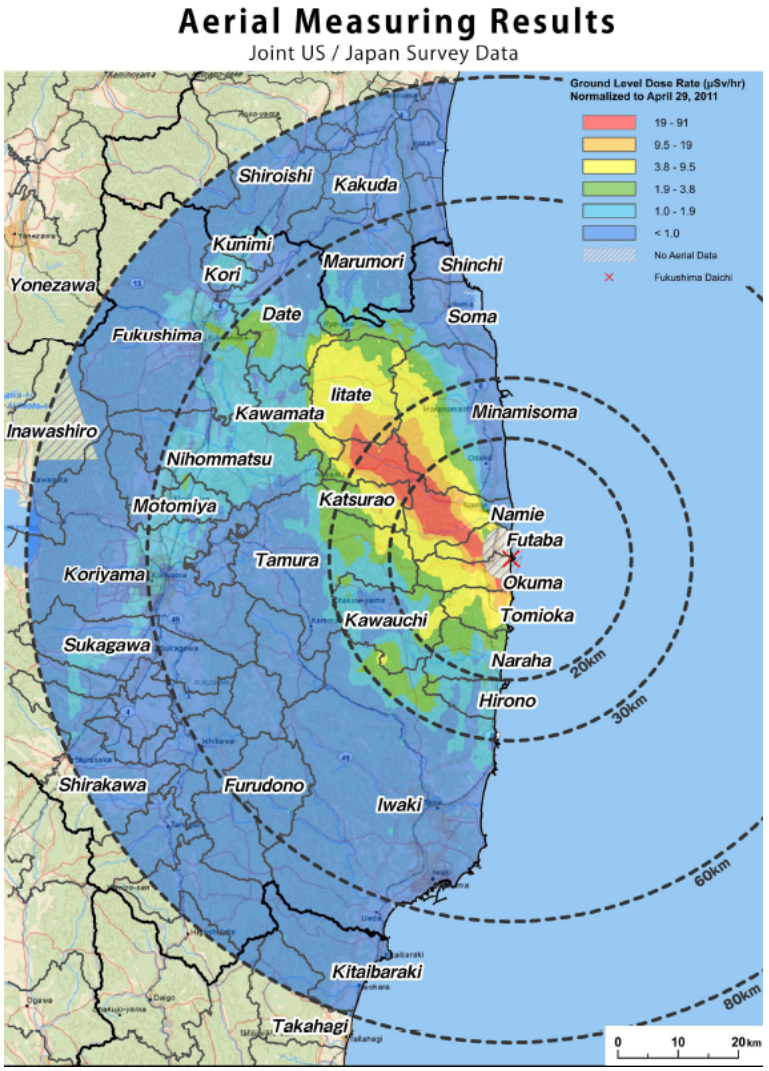
Consequence Management Home Team

Consequence Management Response Team

Radiation Emergency Assistance Center / Training Site

DOE/NNSA Assets

Fukushima Dai-ichi Damage & Deposition



DOE Timeline

- March 11: Assets activated
- March 12: Technical Liaison deployed to Tokyo
- March 14, 2011: Field monitoring team deployed via military airlift to Yokota Air Base

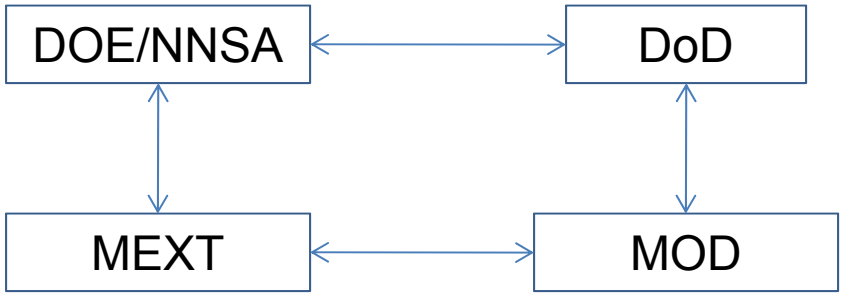
DOE Timeline (cont'd)

- March 16: Assets arrive at Yokota AB and begin flights
- March 17: First aerial measurement activities near reactor; first ground measurements
- March 22: Initial data published on DOE website
- May 28: Last DOE personnel depart Yokota AB

DOE's home at Yokota AB

Overview

- Many partners - US and Japanese



- DOE Role
  - Monitor environment through aerial and ground-based measurements
  - Perform dose assessments
  - Advise senior leaders (U.S. Embassy, U.S. Military)
- Division of labor among DOE teams
  - Field team: small, interdisciplinary, experienced, adaptable
  - Home team: multi-lab
  - Headquarters: handle political pressures

Aerial Monitoring

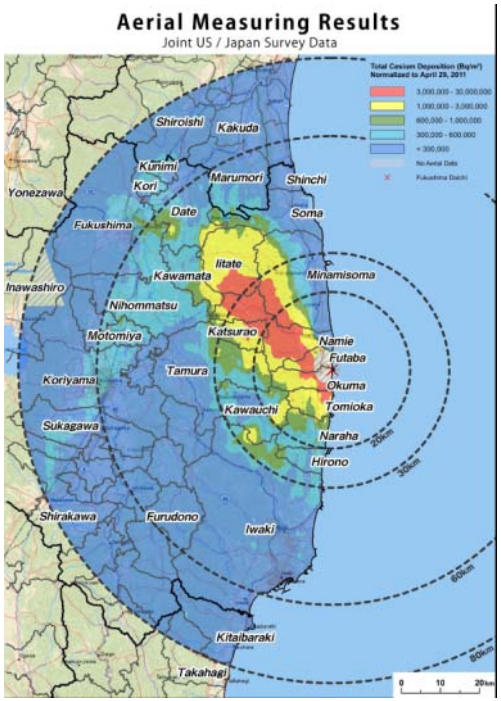
What was done

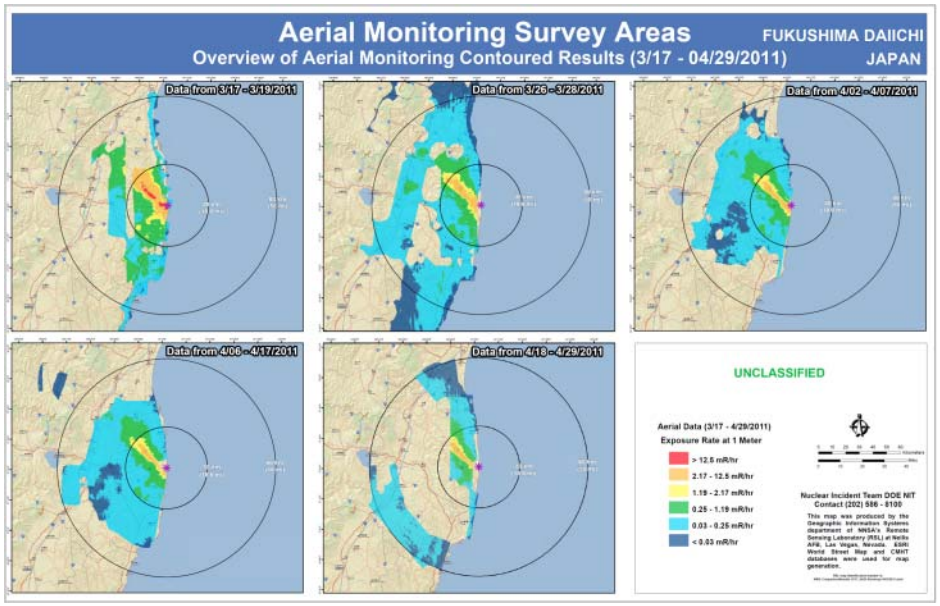
- Fixed wing and helicopter
  - US Military
- Up to 3 aircraft per day
- DOE & GOJ joint survey
- Map ground deposition out to 80 km from reactor

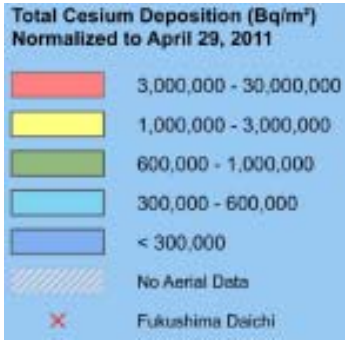
Why it was done

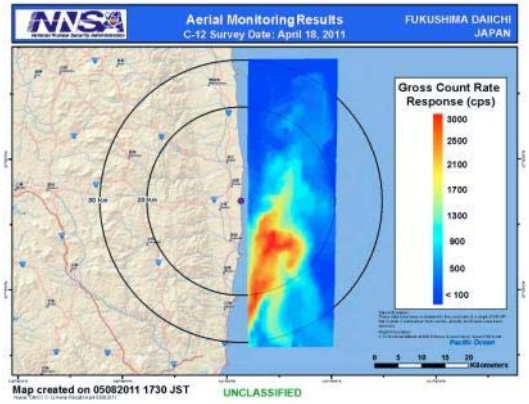
- Support Humanitarian and Disaster Relief Operations, evacuation, relocation, agricultural decisions

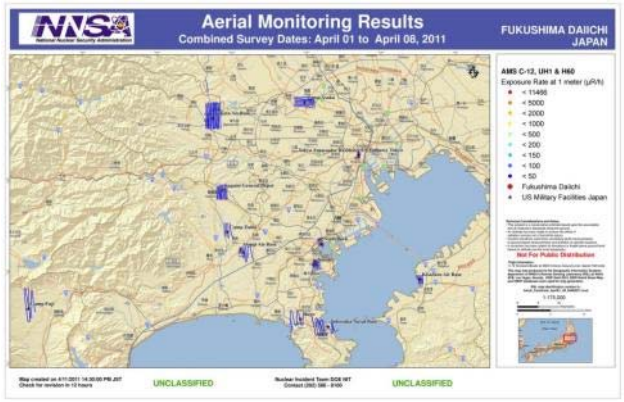
Aerial Monitoring Products



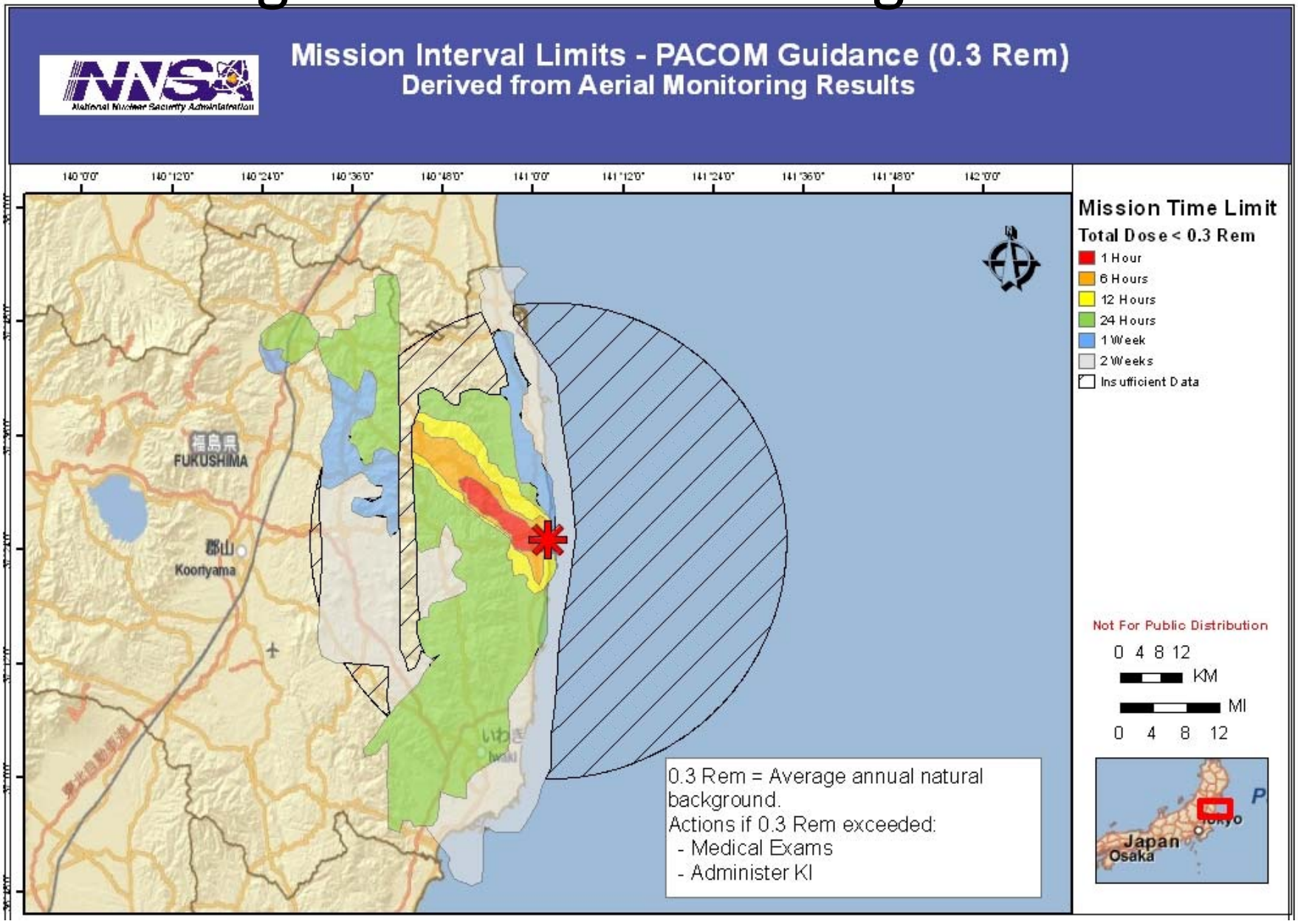








The Right Product for the Right Audience



Ground monitoring

What was done

- Mobile mapping
- In-situ & exposure rate
- Air & soil sampling
- Contamination swipes
- DoD & GOJ data aggregation

Why it was done

- Calibrate aerial measurements
- Define isotopic mix
- Characterize the inhalation component of integrated dose
- Assess vertical and horizontal migration of deposited material

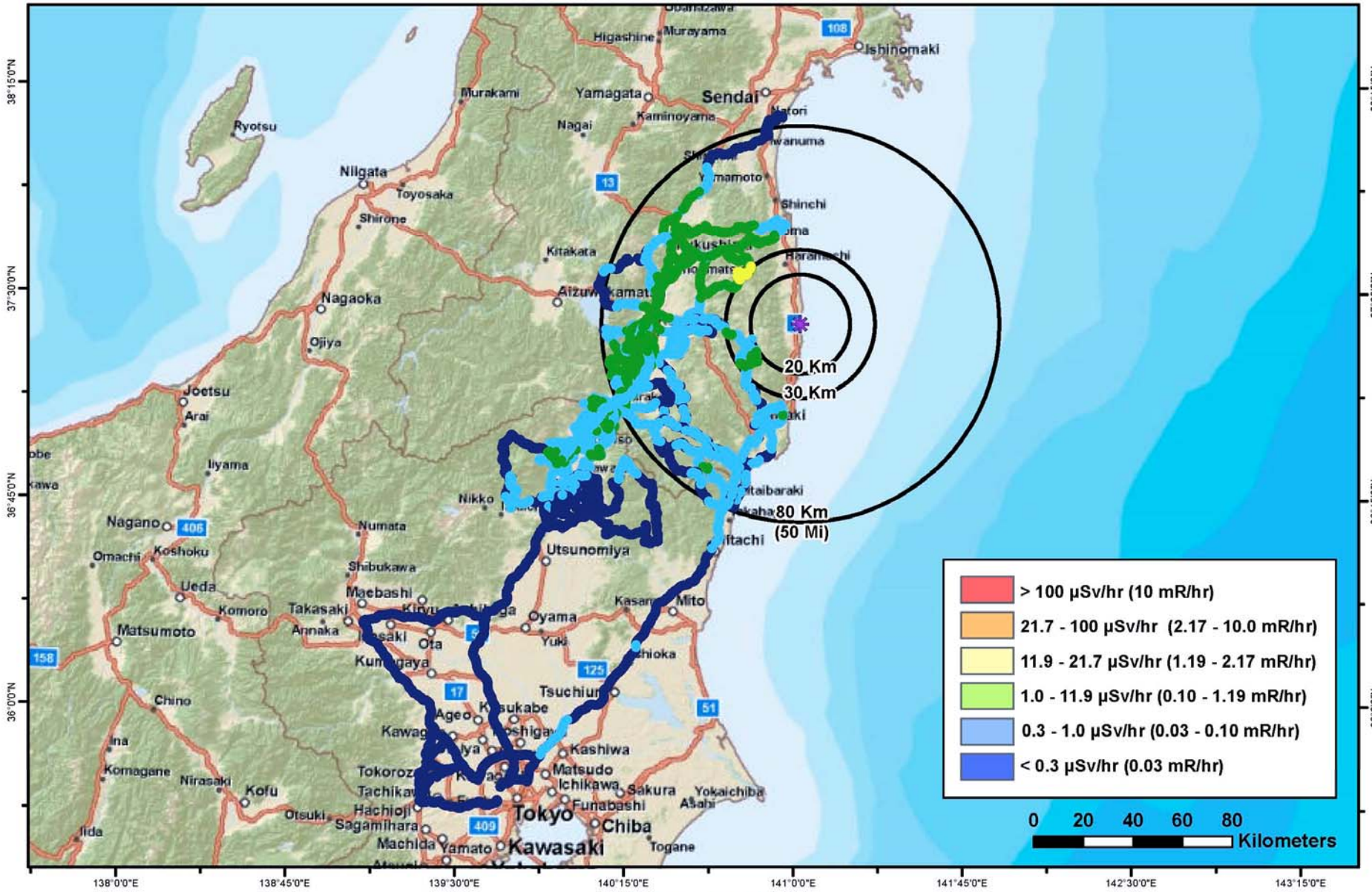
Ground monitoring

National Nuclear Security Administration

Mobile Monitoring Results

April 10 - May 05, 2011

FUKUSHIMA DAIICHI JAPAN



Map created on 05082011 1730 JST

Name: CMOC Mobilel Results 05082011

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Assessment

- Evaluation of field measurement results (aerial and ground)
  - Referenced to protective action measures
  - Informed mission planning
- Trend analysis and quality control
- Analysis of possible scenarios to inform future planning

Transition

- DOE provided equipment and training to augment GOJ capabilities
  - Aerial measurements
  - Laboratory analysis

- Current Status
  - Japanese bought additional aerial and laboratory analysis systems; DOE equipment returned to U.S.
  - DOE continues to support GOJ, US Military, and US embassy remotely from the DOE Home Team.

Field Team Challenges & Successes

Challenges

- Mission parameters
  - Unclear scope
  - Changing dose guidance
- Coordination of monitoring activities
  - Unfamiliar with partner expertise
  - Unclear chain of command
- Availability of experts
- Data volume & variety
- Communications/messaging
  - Both inter- and intra-agency
  - Comprehensive data products

Successes

- Rapid response
  - delivered right information at right time to support decisions
- Planning and preparedness
  - able to adapt established processes and analysis techniques
  - developed customized products
- Forged new relationships in time of crisis
- Unprecedented data collection

It's all about the planning, not the plan

Lessons Learned

- Before Response
  - Need to know available technical resources to avoid gaps and duplication in response capabilities
  - Need stable dose guidelines to avoid confusion on personnel safety
- During Response
  - Need clear mission objectives
  - Need stable chain of command and tasking process to accommodate unfamiliar assets and de-conflict and effectively employ similar capabilities
  - Not all existing organizational structures are applicable as is; need some specialization
  - Need timely, science-based, risk-informed decisions with incomplete information
    - Should not ignore the data in favor of political pressure; cannot wait for all the data
  - Need interagency strategy for intra-governmental and public affairs communication