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Progress of Offsite Decontamination in Fukushima

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SCIENCE

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Acknowledgement

US Embassy Science Fellowship Mission to Support Japan's Ministry of the Environment

- US State Department's Embassy Science Fellowship Program was used to provide expert support to Japan's Ministry of the Environment (MOE) in its decontamination efforts in areas outside of the Daiichi nuclear plant site.
  - Sang Don Lee, US Environmental Protection Agency
  - Robert Sindelar, Savannah River National Laboratory
  - Mark Triplett, Pacific Northwest National Laboratory
- Overall intent was to draw upon US DOE and US EPA remediation experience to:
  - Share methods and lessons learned
  - Offer suggestions for enhancing Japan's off-site decontamination efforts, and
  - Identify areas for future collaboration
- Assignment duration: February – March 2013

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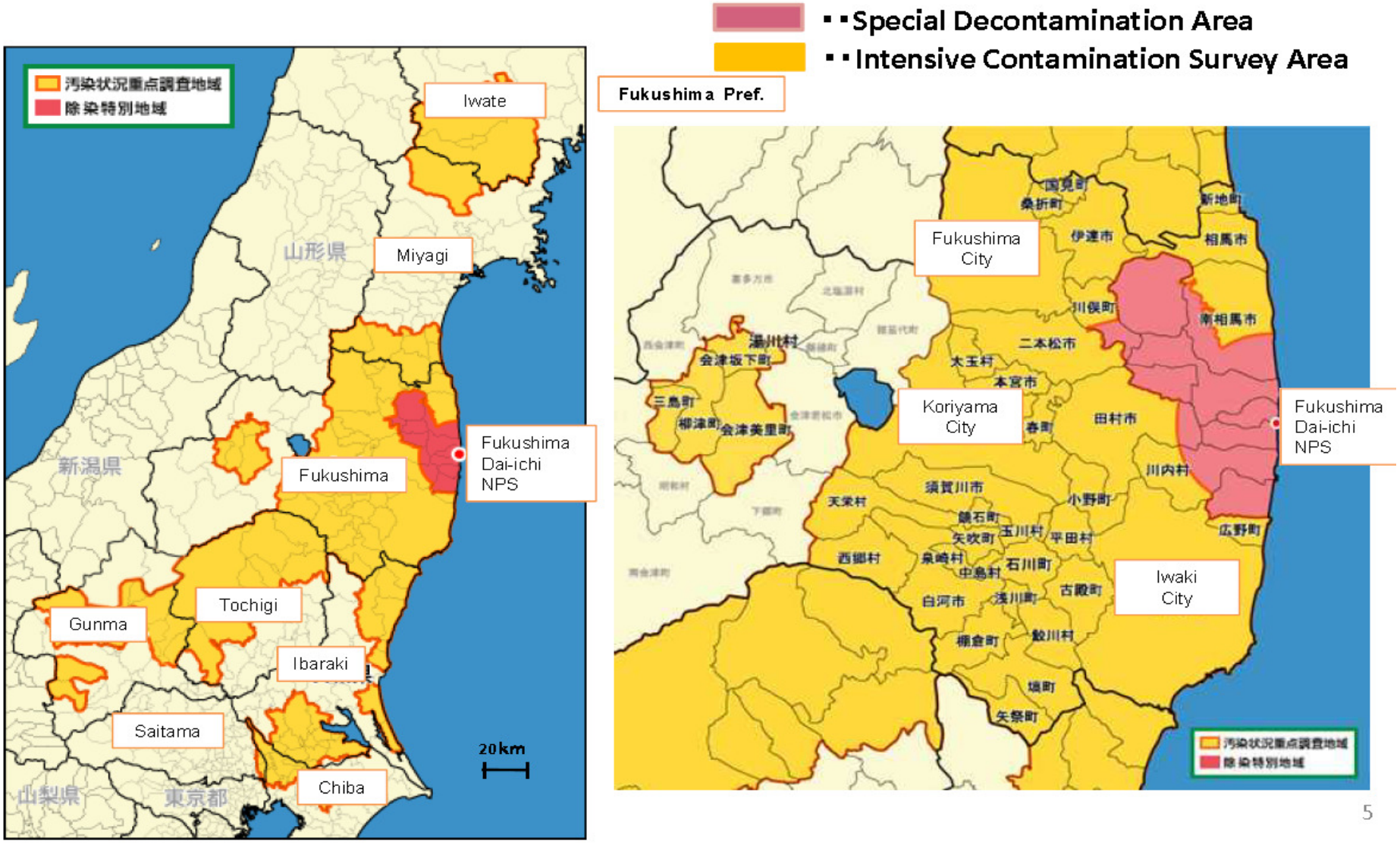
Outline

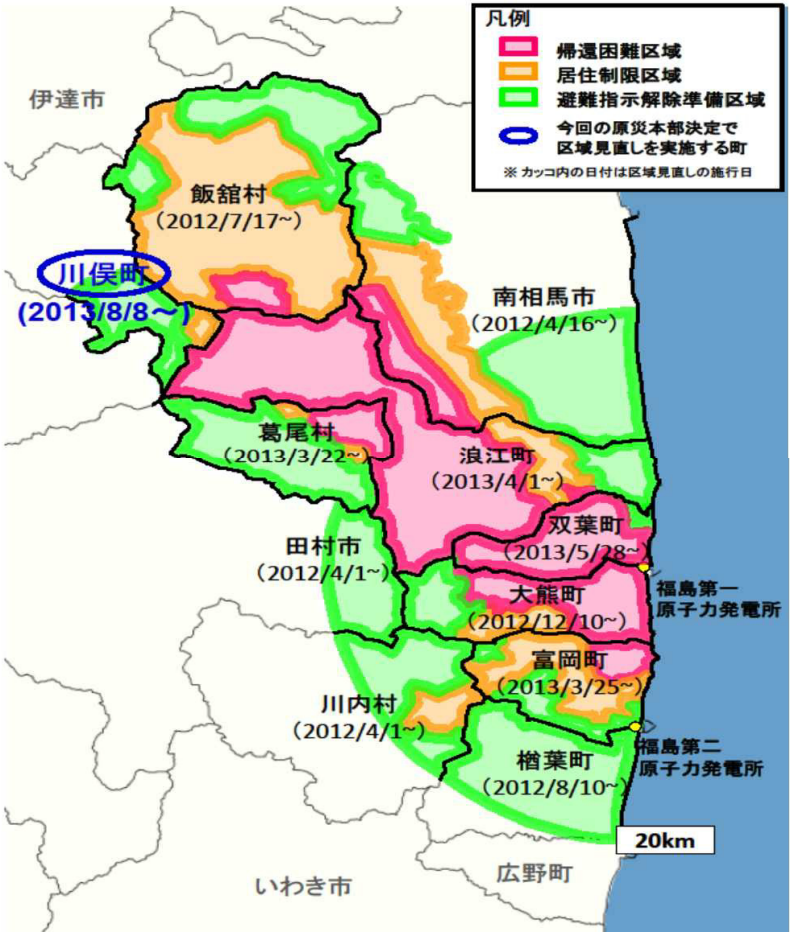
- **Overview of Decontamination Area**
- **Special Decontamination Area**
- **Intensive Contamination Survey Area**
- **Decontamination Results**
- **Considerations**

Decontamination Area



Ministry of the Environment, February 2014, Progress on Off-site Cleanup Efforts in Japan http://josen.env.go.jp/en/

Special Decontamination Area



- <20mSv/year area: reduce additional exposure dose to <1mSv/year
- 20～50mSv/year area: reduce additional exposure dose (residential and farmland area) to < 20mSv/year
- 11 municipalities (9 in progress of decontamination or in preparation)
- Decontamination of the town of Tamura is complete

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Intensive Contamination Survey Area

- 100 municipalities are in progress of decontamination
- 2-5 years planned for decontamination
- Facilities for children and public are decontaminated first

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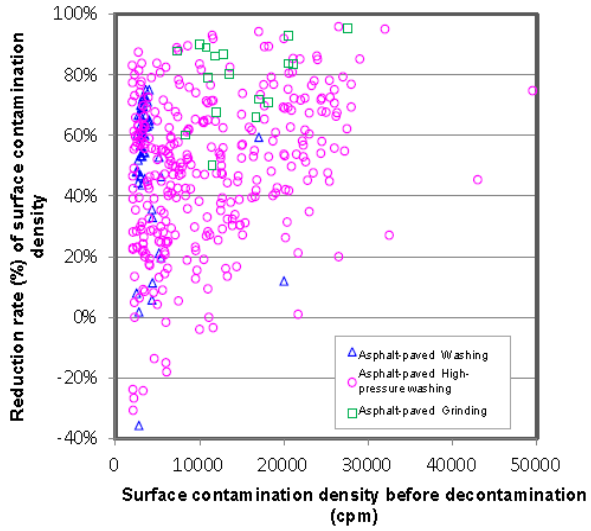
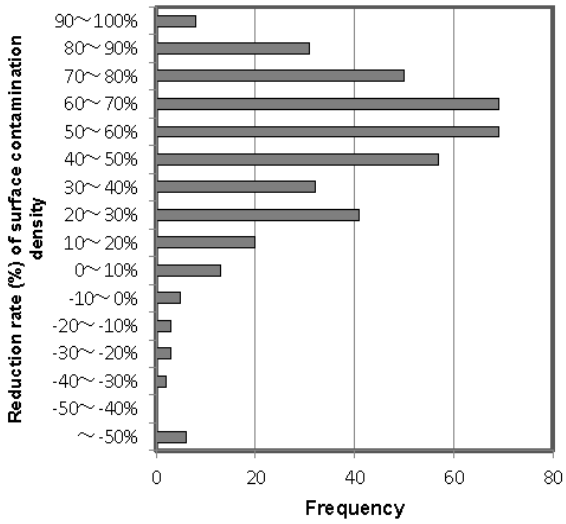
Decontamination





National Homeland Security Research Center,

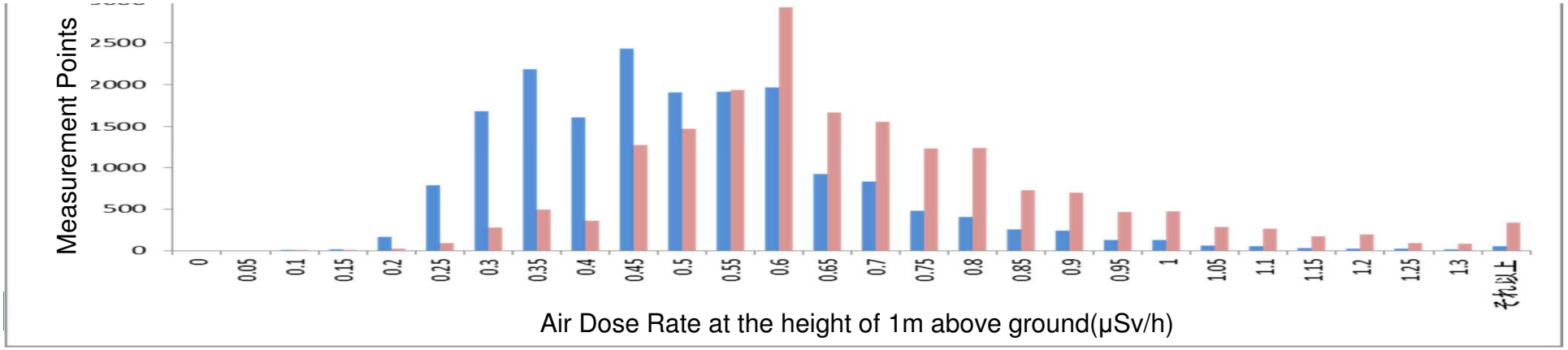
Ministry of the Environment, January 2013, Decontamination effect of decontamination work, http://josen.env.go.jp/en/

Decontamination Results

Effect of decontamination works by national and local governments (Major results)

Air dose rate*1,2 (Measured at 1m height)	Before decontamination: **0.36-0.93** μSv/h ↓ After decontamination: **0.25-0.57** μSv/h		
Reduction rate (average) of air dose rate*2,3	<1μSv/h before decontamination	1-3.8μSv/h before decontamination	> 3.8μSv/h before decontamination
	32%	**43%**	**51%**
Example of reduction rate of surface concentration of contamination *4	Asphalt-paved roads: 50-70% by washing, 30-70% by high-pressure washing Playground(Soil): 80-90% by stripping off surface-dirt		

*1: Range from 25 to 75 percentile values of the air dose rate.
*2: Data measured at 50cm height in children's living environment are not included.
*3: Average reduction rate of the air dose rate for different dose levels before decontamination.
(Reduction rate (%)= (1-air dose rate after decontamination / air dose rate before decontamination) x100.)
*4: Already in press release of "Announcement on 'Effectiveness of decontamination work which is implemented by the national government and relevant municipalities in decontamination project' (Jan. 18, 2013)"



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Decontamination Considerations

- **Re-entrainment of contaminants**
- **Further actions in decontaminated areas**
- **Decontamination improvement**

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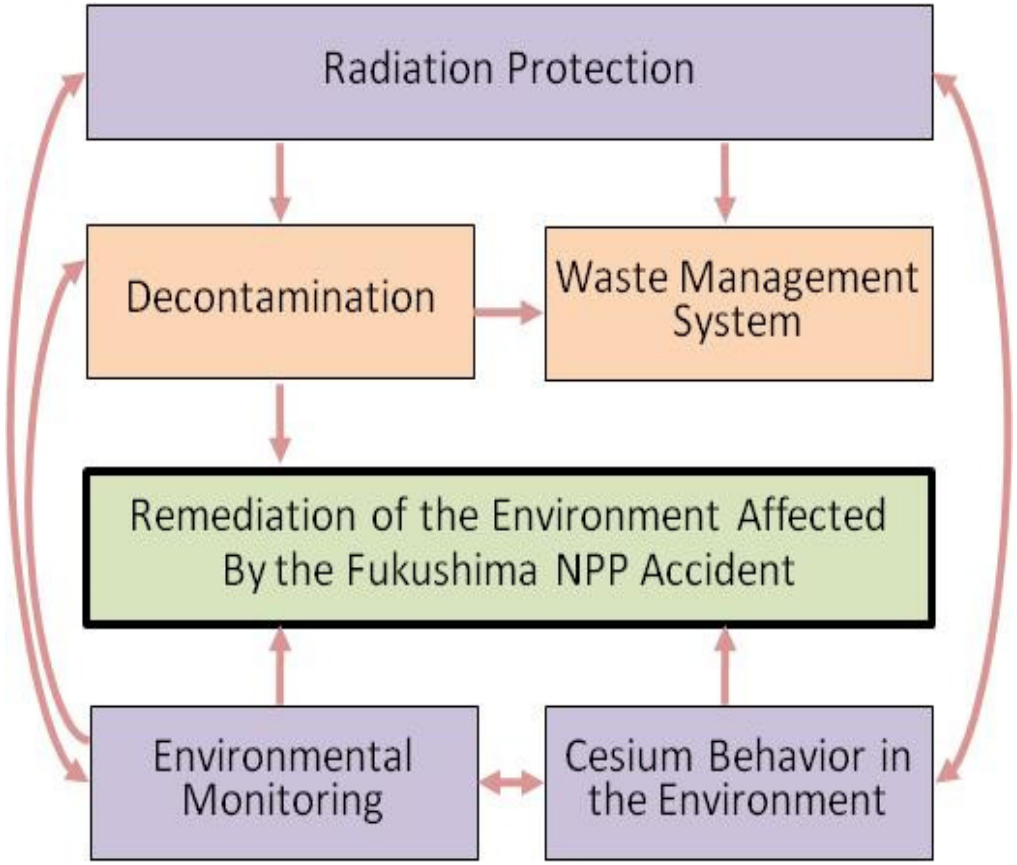
Systems Perspective



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Recommendations

1. Regularly review environmental monitoring results, dosimetry results and impacts from decontamination efforts

2. Conduct a systematic analysis of the existing performance data to identify potential factors or practices that could improve effectiveness of future decontamination efforts and that identifies situations where specific practices are not likely to be effective

3. Conduct periodic reviews and evaluations of monitoring data to ensure appropriate feedback with other strategic functions including efforts to optimize decontamination strategies, efforts to improve understanding of cesium behavior in the environment, and efforts to optimize the long-term monitoring program

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Recommendations

4. **Develop and apply models to inform urgent radiation protection strategies for people living in areas with residual contamination (re-entrainment) and for re-population of evacuated areas**

5. **Develop and maintain an overall remediation strategy complete with life cycle cost estimates, resource allocation strategies (e.g., manpower, etc.), and analysis of critical strategic alternatives.**