



Recent Developments in Field Response for Mitigation of Radiological Incidents

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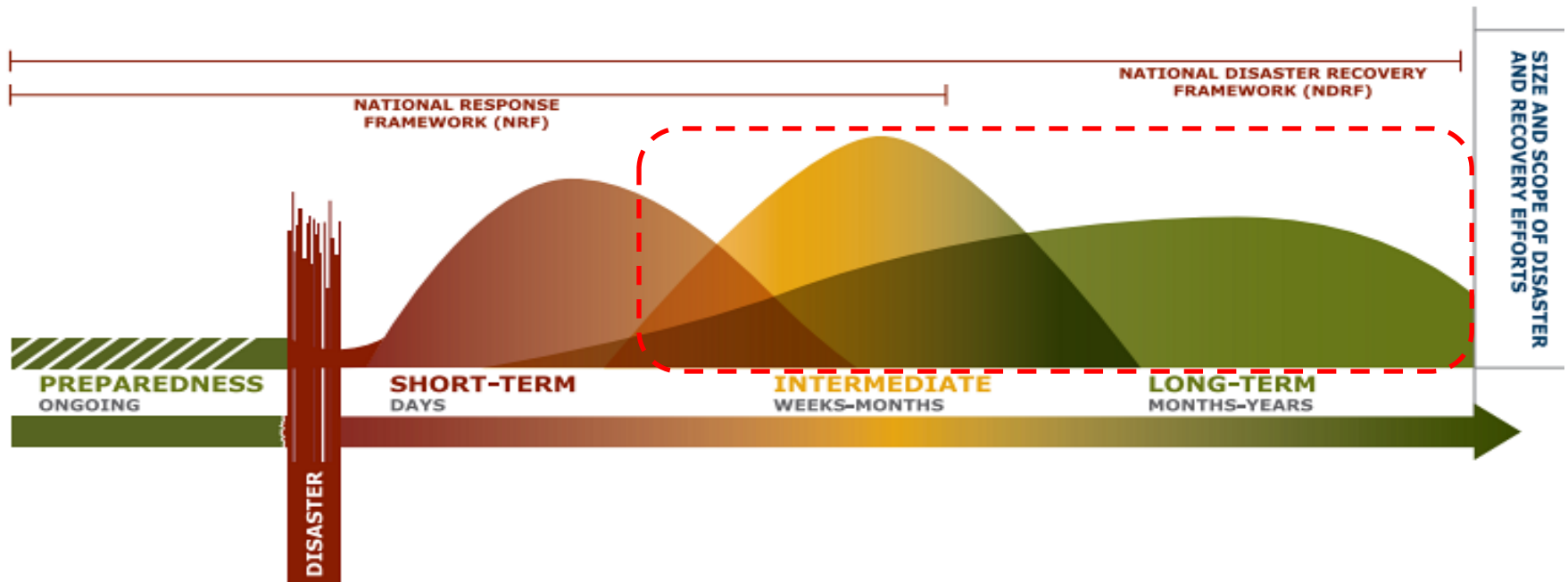
Office of Environmental Policy and Assistance

Office of Environmental Health, Safety and Security

Department of Energy



RECOVERY CONTINUUM – DESCRIPTION OF ACTIVITIES BY PHASE





Aftermath of an incident with an RDD

The Intermediate and Late Phase



- What is the next step for cleanup and recovery after immediate phase of an RDD incident?
- When can the public get back to their homes or place of business?
- When can you open critical infrastructures (i.e hospitals, healthcare facilities)
- Transportation and Access routes. What roads, bridges or side walks can be used? When can they be released?
- Personal property and waste management
- Food consumption at the different phases of an event.
- Can we develop a series of operational guidelines that can help us answer the questions above.
- Determine at what point we can say contamination levels from an RDD are lower than the PAG limits.



Role of Operational Guidelines



- **Protective Actions** Activities that should be conducted in response to an RDD to reduce or eliminate exposure of the public to radiation or other hazards.
- **Protective Action Guides (PAGs)** A projected dose to a reference individual, from an accidental or deliberate release of radioactive material, at which a specific protective action to reduce or avoid that dose is recommended.
- **Operational Guidelines** *Pre-derived levels of radiation that can be compared to field radiation measurements to quickly determine if PAGs are exceeded and actions for protection of the public need to be implemented.*



The OGT Manual History



- Fiscal Year 2003 appropriations language directed DOE *“to develop standards for the cleanup of contamination resulting from a potential RDD event.”*
- Operational Guidelines Task Group (OGT), established in 2003
- Department of Homeland Security Interagency Consequence Management Subgroup (CMS) developed *Planning Guidance* for response to RDD/IND incidents. Federal Register Notice (2008):
- OGT Manual was published in 2009 by DOE with technical support by Argonne National Labs
- Used in numerous exercises within State and Federal Levels and real world scenarios (Fukushima).
- Currently under revision by the OG Working Group established by DOE through the Interagency Steering Committee on Radiation Standards (ISCORS)

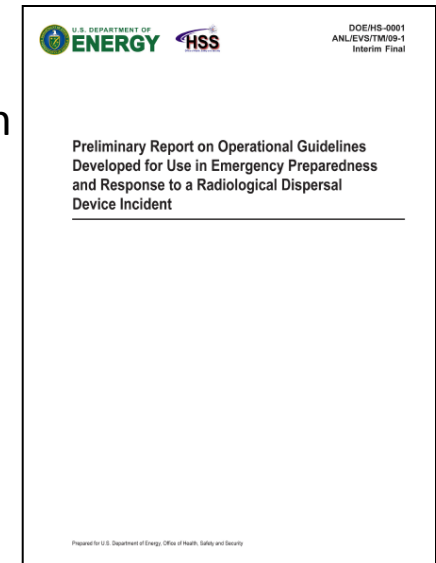


The OGT Manual (Cont.)



■ **Preliminary Report on Operational Guidelines(OGT Manual)**

- ✓ OGT manual provides guidelines on which actions to take in order to protect responders and the public ,based on field measurements, source and the DHS PAG values during the different phases of an emergency response to an RDD.
- ✓ OGT Manual is a complement to DHS/FEMA PAGs for RDDs/INDs published 2008
- ✓ Available for use and comment: February 2009



■ **RESRAD-RDD** software

- ✓ Companion assistance tool for implementing operational guidelines.
- ✓ Allows for calculation of incident-specific operational guidelines.





The OGT Manual (Cont.) Development



- Eleven radionuclides (Am-241, Cf-252, Cm-244, Co-60, Cs-137, Ir-192, Po-210, Pu-238, Pu-239, Ra-226, and Sr-90)
- Calculates dose-to-source (DSRs) (e.g., mrem/yr per pCi/m²) to identify critical scenario
- DSRs for critical scenario applied to applicable DHS PAGS to obtain guidelines
- Produce operational guidelines in form of look-up tables



The OGT Manual (Cont.)



- OGT Manual and RESRAD-RDD
 - Are a planning tool
 - Potential users should become familiar with the manual and software before an event
 - Use in exercises to learn how the tool can be used to support decisions.

- Products currently available through the OGT Web Site
 - ✓ OGT Manual at <https://www.energy.gov/ehss/services/environment/radiation-protection-public-and-environment/operational>

 - ✓ RESRAD software download Web site for RESRAD-RDD: <https://resrad.evs.anl.gov/>



Protective Action Guides (PAGs)




Phase	Protective Action	Protective Action Guide (PAG)	
		Interim EPA PAGs	DHS/FEMA 2008
Early	Limit Worker Exposure	5 rem (50 mSv)	5 rem (50 mSv)
	Shelter/evacuation of Public	1 to 5 rem(10 to 50 mSv)	1 to 5 rem(10 to 50 mSv)
	Administration of Prophylactic Drugs (KI)	5 rem (50 mSv) projected Child Dose from radioactive radioiodine	5 rem (50 mSv)
Intermediate	Limit Worker Exposure	5 rem (50 mSv)	5 rem (50 mSv)
	Relocation of Public	2 rem (20 mSv) -1st Yr 0.5 rem (5 mSv)-Subsequent Yrs	2 rem (20 mSv) -1st Yr 0.5 rem (5 mSv)-Subsequent Yrs
	Food Interdiction	0.5 rem (5 mSv) /yr or 5 rem(50 mSv)/yr to any organ	0.5 rem (5 mSv) /yr or 5 rem(50 mSv)/yr to any organ
	Drinking Water	Not Included yet	5 mSv/yr in the 1 st Year
	Reentry	Operational Guidelines (OGT)-Stay times and concentrations	Operational Guidelines and RESRAD-RDD
Late	Cleanup Actions	Brief description of planning process	Not considered as part of the emergency response-Optimization process



Operational Guideline Groups

Early Phase



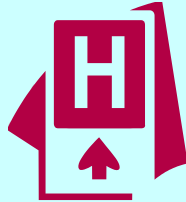
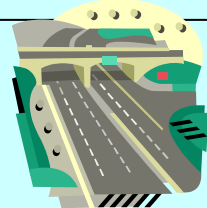
<i>Groups</i>	<i>Subgroups</i>
A. Access Controls During Emergency Response	<ul style="list-style-type: none">(1) Life and property-saving measures(2) Emergency worker demarcation(3) Stay time tables 



Operational Guideline Groups

Intermediate Phase





<i>Groups</i>	<i>Subgroups</i>
C. Critical Infrastructure Utilization in Relocation Areas	<ul style="list-style-type: none">(1) Residential areas(2) Commercial and industrial areas(3) Other areas such as parks & monuments(4) Hospitals and health care facilities(5) Critical transport facilities(6) Water and sewer facilities(7) Power and fuel facilities 
D. Temporary Access to Relocation Areas for Essential Services	<ul style="list-style-type: none">(1) Worker access to businesses for essential actions(2) Public access to residences for retrieval <p>Stay Times for Worker and Public Access</p>
E. Transportation and Access Routes	<ul style="list-style-type: none">(1) Bridges(2) Streets and thoroughfares(3) Sidewalks and walkways 



Operational Guideline Groups

Recovery Phase



<i>Groups</i>	<i>Subgroups</i>
F. Release of Property from Radiologically Controlled Areas	<div><div><div>(1) Personal property except wastes</div><div>(2) Waste</div><div>(3) Hazardous waste</div><div>(4) Lands and buildings</div></div><div></div></div>
G. Food Consumption	<div><div></div><div><div>(1) Derived Intervention Levels (early phase)</div><div>(2) Soil Concentrations for crops in place</div><div>(3) Soil Concentrations (intermediate phase) for growing new crops</div><div>(4) Soil Concentrations (recovery phase) for land use restrictions</div></div></div>



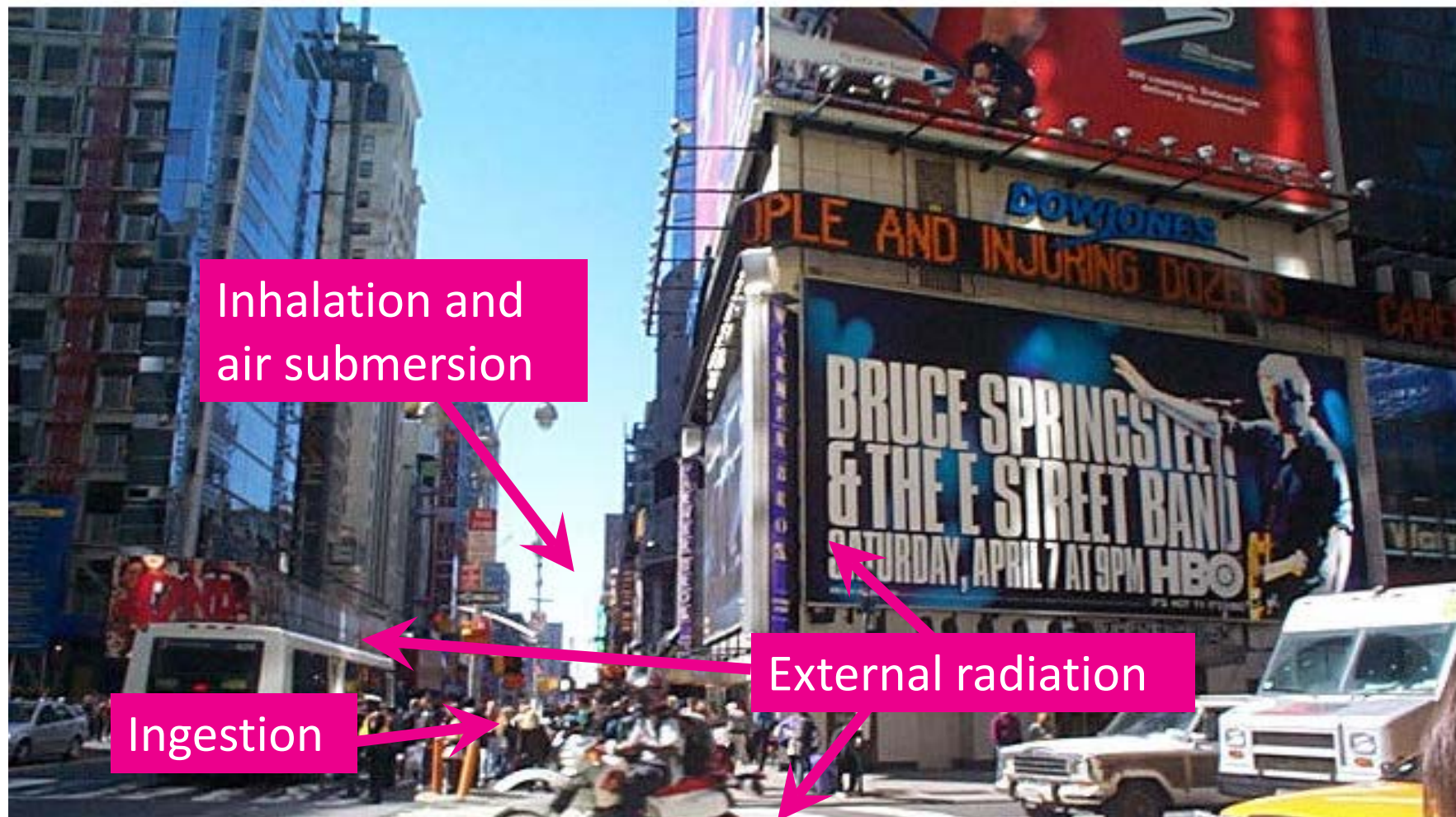
Additional Scenarios Not Included in RESRAD-RDD



- Vehicle Release
 - Personal vehicles
 - Public vehicles
- Street Flushing and Vehicle Cleaning
 - Three destinations for the flushed contaminants – POTW, detention pond, or river
- These scenarios along with calculated DSRs and screening values are included in the OGT Operational Guidelines Manual, but currently are not included in the RESRAD-RDD software



Contamination Pathways and Routes of Exposure

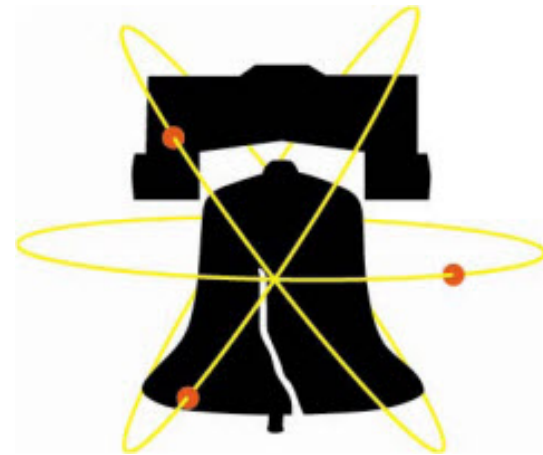




Use of OGT Exercises



- **EMPIRE 09 RDD Exercise:** Successful application of Operational Guidelines during (June 2009; Albany, NY)
- **Liberty RADEX,** National Tier 2 Full-Scale Radiological Dispersion Device Exercise (April 2010, Philadelphia, PA)

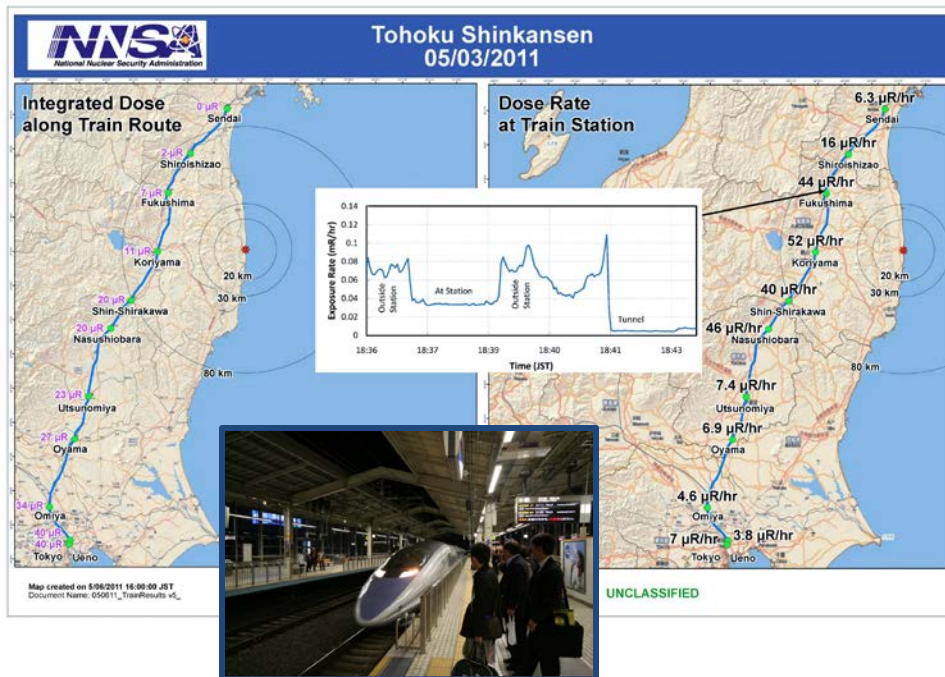




Use of OGT(cont...) Fukushima



- Cultivating rice after incident
- Traveling on Tohuko Shinkansen Train and Highways
- Seafood Consumption





Surface contamination near 68th St (Hunter College) and 77 St metros



Cs-137

10-100 uCi/m² (1E7-1E8 pCi/m²) in outside
perimeter (Light purple region)



68th St Metro



77th St Metro



New DOE Update to OGT Manual



Interagency Steering Committee on Radiation Standards (ISCORS) Federal Working group

- Develop operational guidelines based on the new 2013 Interim PAGs(or Final PAGs)
- Address comments and lessons learned from review and use (exercises and Fukushima).
- Update to address INDs, nuclear incidents and RDDs
- Increase number of radionuclides from 11 to 55+
- Ensure consistency with methodologies from Federal Radiological Monitoring and Assessment Center (FRMAC)
- Upgrade dose coefficients based on 2010 US Census
- Apply current state of science in radiation protection, appropriate for addressing RDDs and INDs
- Include additional scenarios currently not included in RESRAD-RDD: vehicle release, street flushing and vehicle cleaning , airports, shore ports, Etc
- Project a final OG Manual within next 2 years



Questions

