

Tool for Developing Integrated Strategies for Decontamination and Waste Management



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SEPA Waste Management

Why is this important?



- Generation Starts at Initiation of Incident
- Need for Pre-Planning
- Decontamination Strategy has Profound Impact on Waste Quantity, Characteristics, and Logistics





SEPA WEST: Description

- GIS-based tool that can assist in planning/preparedness activities at all levels of government
- Waste Estimation Support Tool (WEST) facilitates:
 - First-order estimate of waste quantity and activity
 - Help identify potential triage/staging/storage/disposal options
 - Assess impact of decontamination strategies on waste generation
 - Asses impact of waste management strategies on decontamination decisions
 - Identifying starting points for policy discussions

WEST Overall Methodology

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WARRP Scenario

WARRP Movie

Wide Area Recovery and Resiliency Program (Denver Metro Area)



GIS Module

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•	St WEST GIS	_		-
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×	Project Name			7
	Plume Operation			
	Plume (Zone 3) or Single Plume			
	Plume (Zone 2) (optional)			
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- GIS module functions as an ArcGIS add-in
- Point and click little GIS expertise required
- Image analysis method built in
- Ability to launch Waste Estimator directly from ArcGIS
- Generates necessary files to import into WEST Calculation Module

Set EPA

GIS Module: Surface Classification



Calculation Module: Building Decon

WEST 🛞 Waste Estimation Sup	Rac port Tool	liological De	econtamina	tion Scenario	DS			
♠ ⊕ / ×								
Dataset Name Dec	ontamination Exan	nple			\sim			
General Info Building	g Decon/Demo Dec	on Parameters						
Zone Number Media Type 1 Buildings 2 Ground Surfaces 3	Surface Type Exterior Walls, Excluding Interior Floors Interior Walls, Including Roofs	Occupancy (Roofs Agriculture Banks Ceilings Church/Non Colleges/Un	Class -Profit iversities	^ ~				
Decontamination Technology	Source Total Decon Percent	Percentage of Surface Decontaminated Using Decon Technology 100	Mass of Solid Waste Generated (kg/m^2)	Volume of Solid Waste Generated (m^3/m^2)	Mass of Liquid Waste Generated (kg^3/m^2)	Volume of Liquid Waste Generated (m^3/m^2)	Area Decontaminated (1 person day) (m^2)	Contamination Removal (Fr)
Foam/Rinse	EPA	0	0.00000	0.00000	26.66667	0.02667	5.62222	0.46222
Grinding	EPA	0	0.00000	0.00000	0.00000	0.00000	0.00000	0.54000
Grit Blasting	EPA	0	56.00000	0.02798	0.00000	0.00000	0.00000	0.96000
Low Volume Foam/Rinse	EPA	0	0.00000	0.00000	3.60000	0.00360	8.00000	0.67500
Polymer/Gel	EPA	0	0.00000	0.00000	5.62500	0.00563	14.00000	0.55750
Strippable Coating	EPA	0	0.26000	0.00303	0.00000	0.00000	12.00000	0.56000
Surface Brushing	JAEA	100	0.00000	0.00000	0.00000	0.00000	130.00000	0.26000

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Calculation Module Outdoor Area Decon

WEST Waste Es	stimation Support Too	ol	Radiologic	eal Waste Res	ults				
Â									
Sce	nario: Example Wa	aste Scenario							
Gran	nd Totals Building Decon B	uilding Demo Ground S	Surfaces						
Zone Number (3	3) Surface Type (1)	Decon Technology (0)		Census Tract (0)				
1	Soil	Abrasion			▲ 34017016400	Apply Filter			
2	Streets - Asphalt Streets/Sidewalks - Concrete	e Excavation/Physica Excavation/Physica	Removal - Machine Assisted Removal - Manual Removal		34017016500	Export D	ata rel		
		Excavation/Physica	Removal with Solidification A	gent - Machine Assisted	✓	Clear Filter			
Clear All	Select All	Select All			Select All				
			Activity Unit			Solid/Liquid Waste Mass U	Init	Solid Waste Volume Unit	Liquid Waste Volume Unit
			Bq 🗸			kg	✓	m3 🗸	m3 🗸
Zone Number	Surface Type	Surface Area (m2)	Surface Activity	Surface Activity Removed	Surface Activity Remaining	Solid Waste Mass	Liquid Waste Mass	Solid Waste Volume	Liquid Waste Volume
	Totals	1.1E+05	8.3E+07	4.3E+06	7.8E+07	2.1E+04	3.9E+05	2.6E+01	3.9E+02
1	Streets - Asphalt	1.3E+04	1.5E+07	7.8E+05	1.4E+07	2.5E+03	4.6E+04	3.1E+00	4.6E+01
2	Streets - Asphalt	8.0E+04	6.0E+07	3.1E+06	5.7E+07	1.5E+04	2.8E+05	1.8E+01	2.8E+02
3	Streets - Asphalt	2.1E+04	7.7E+06	4.0E+05	7.3E+06	3.9E+03	7.1E+04	4.7E+00	7.1E+01

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Calculation Module: Reporting



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New Enhancements: Vehicles

Radiological Waste Results

WEST 🛞 Waste Estimation Support Tool

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Scenario: Example Rad Waste Scenario

G	rand Totals	Building Decon	Building Demo	Ground Surfaces	Vehicles	Biomass				
Zone Numbe 1 2 3 Select All	er (0) Ce 4; 4; 4; 4; 4; 5	ensus Tract (0) 2101000100 2101014200 2101014300 2101014400	Apply Filter Clear Filter	Export Data To Excel						
Tota	Total Nur als	mber of Vehides 2E+05	Cars Li 8E+04	ght Trucks Heavy 6E+04 6E	r Trucks Car Mass	Light Truck Mas ; (kg) (kg) -08 1.22E+08	ss Heavy Truck Mass (kg) 2.22E+08	Car Volume (m3)	Light Truck Volume (m3) 1.13E+06	Heavy Truck Volume (m3) 1.03E+06
		2E+05	8E+04	6E+04 6E	+03 1.37E+	-08 1.22E+08	2.22E+08	1.11E+06	1.13E+06	1.03E+06



New Enhancements: Vegetation

Radiological Waste Results

WEST 🛞 Waste Estimation Support Tool

Scenario: Example Rad Waste Scenario

	Grand Tota	ls Building Decon	Building Demo	Ground Surfaces	Vehicles	Biomass		
Zone Nu	mber (0)	Census Tract (0)						
1 2		42101000100 42101014200	Apply Filter	port Data				
3		42101014300 42101014400	✓ Clear Filter	To Excel				
Select /		Select All						
	Τα	tal Biomass (kg)	Total Biomass (m3)	Trunk Mass (kg)	Branches and Foliage Mass (kg)	Trunk Volume (m3)	Branches and Foliage Volume	
٦	Fotals	5.95E+09	6.63E+06	1.92E+09	4.03E+09	2.12E+06	4.51E+06	
		5.95E+09	6.63E+06	1.92E+09	4.03E+09	2.12E+06	4.51E+06	

Example Case Study

- A case study was conducted using EPA's waste managment tools
- Goal was to model the impacts of decon strategy on the waste stream and supporting processes
- Assumed a hypothetical incident at the Shearon Harris Nuclear Power Plant located in New Hill, NC
- Cesium 137 (Cs-137) was selected as the principal source of contamination



Example Decontamination Approaches

 Two separate decontamination approaches considered:

EPA

- Decon Strategy 1: primarily dry decontamination technologies
- Decon Strategy 2: combination of wet and dry decontamination technologies

		Buildi	ngs		Ground Surfaces			
Decon Technology	Exterior Walls, Excluding Roofs	Interior Floors	Interior Walls, Including Ceilings	Roofs	Soil	Streets - Asphalt	Streets/ Sidewalks – Concrete	
Low Volume Foam/Rinse	W							
Water Blasting						W	W	
Polymer/Gel								
Brushing/Pressure Washing				W				
Grinding				D				
Manual Removal								
Machine Assisted Removal								
Abrasion								
Surface Brushing	D						D	
Soil Inversion					D			
Road Sweeper						D		



- Greater emphasis for strategy 1



- Greater emphasis for strategy 2

- Equal emphasis for both strategies

SEPA Example Results

- Decontamination Strategy 2 generated significantly more aqueous waste than Decontamination Strategy 1
- This estimate did not consider cost, time, or decon efficacy

Decon Strategy 1 (dry)

Decon Strategy 2 (wet)

Zone Number	Solid Waste Volume (yd ³)	Aqueous Waste Volume (gal)	Zone Number	Solid Waste Volume (yd ³)	Aqueous Waste Volume (gal)
1	2.15E+05	2.42E+06	1	2.15E+05	3.74E+07
2	9.79E+05	1.58E+07	2	9.79E+05	1.35E+08
3	1.13E+06	2.41E+06	3	1.13E+06	3.60E+08
Total	2.33E+06	2.07E+07	Total	2.33E+06	5.33E+08

SEPA Conclusion

- Waste management is a key component of the response and recovery process
- The inability to effectively manage waste can greatly increase costs and delay reoccupancy of remediated sites
- Homeland Security Research Program (HSRP) uses its capabilities/expertise to develop data and decision making tools that meet the waste management needs of its EPA stakeholders
- Develop tools for systematically evaluating waste management issues with the purpose of optimizing decisions with consideration to large-scale recovery efforts

SEPA Conclusion Cont.

- Minor deviations in decontamination strategy can have significant impacts on the overall waste stream
- Pre-planning efforts are important and should consider waste staging/storage limitations
 - Integrate waste staging and storage selection into routine planning (before an incident occurs)
 - Minor differences in the decontamination strategy can significantly impact the logistics of waste



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