PRND Equipment for CM mission

Project Overview

- Mission/SOW:
  - Categorize PRND equipment for use in CM mission
  - Assist local first responder leadership to better use equipment

- Expected outcomes:
  - Tool to be used by local first responder leadership to size up current inventory
  - Copy/paste verbiage for policies and procedures

- Period of performance: 2 years beginning 9/2015

Major Milestones

- Task 2: *In progress*
  - Review current applicable standards
  - Create categories for equipment (ranges and limitations)
  - Completion anticipated: End of January
- Task 3:
  - Document Consequence Management Relevant Mission Space
  - Conduct webinars to solicit interagency feedback
- Task 4:
  - Develop CONOPS for CM Missions using categorized PRND equipment
- Task 5:
  - Scientifically validate CONOPS
  - Lab and field test
- Task 6:
  - Develop actionable knowledge products and training for first responders

December Meeting

- Overview of current categorization scheme
- Brainstorm session
  - Importance factors for CM
  - Attempts at categorization

Brooke Buddemeier, LLNL

Chuck Finfrock, BNL

Al Goodwyn, SRNL

RaJah Mena, CM Consultant

Frank Moore, RAP Region 5

Steve Musolino, RAP Region 1 and BNL support

Alexis Reed, CTOS

Dave Trombino, RAP Region 7

Don Van Etten, CTOS and CM Consultant

Typical types of equipment used by responders in initial response

In order of likelihood:

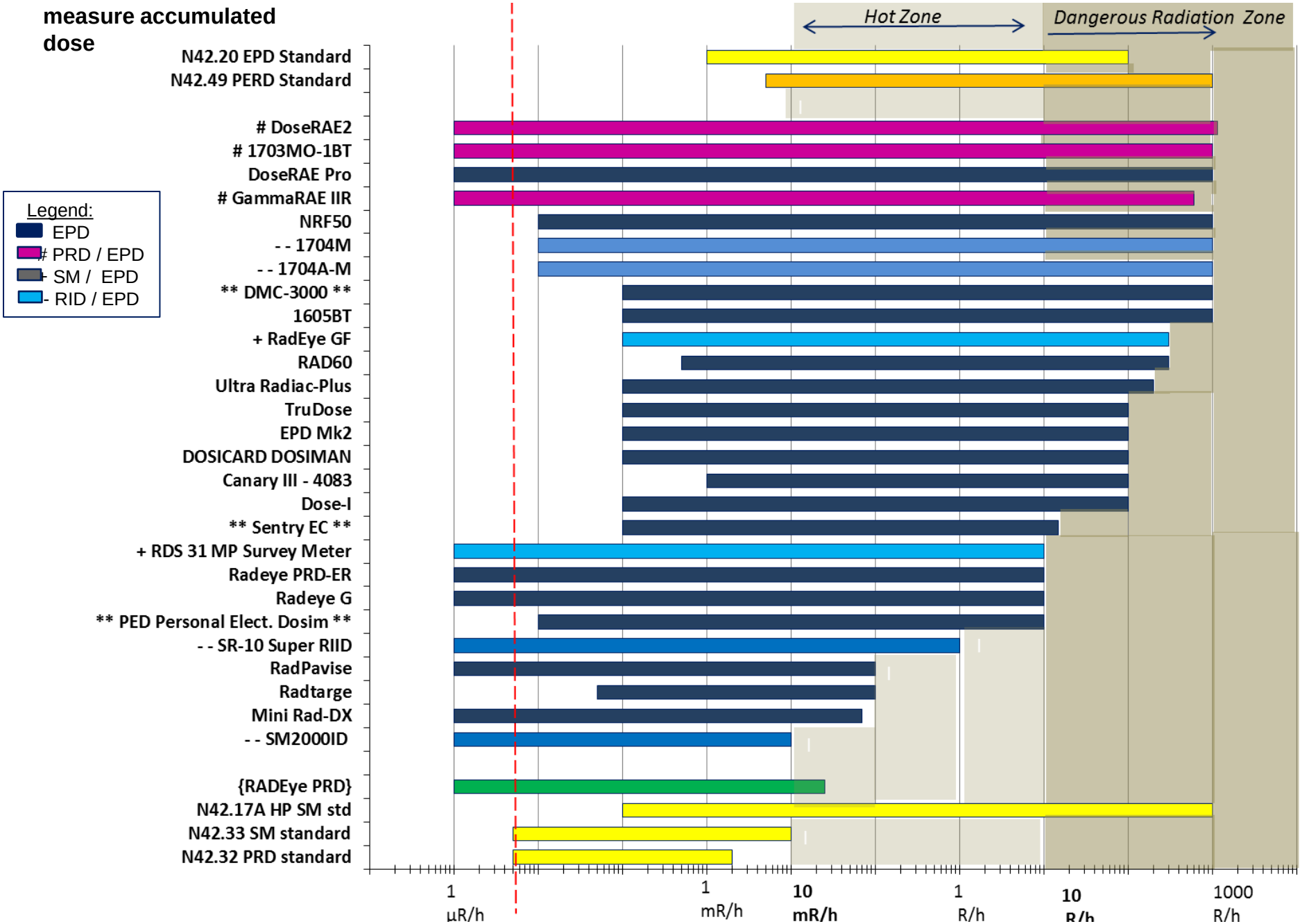
- Survey meters (hot dog GM, ion chamber, uR meter)
- Contamination meters (e.g., pancake GM)
- Self Reading dosimeter (Non-Alarming PERD)
- Personal Radiation Detector (PRD)
- Personal Emergency Radiation Detector (PERD)
- Electronic Dosimeter
- Passive Dosimeter
- Radio-Isotope Identification Device (RIID)
- Other?

Manufacturer/ Vendor	Model	Image	[Draft] NIMS Type	Weight (oz)	Dimensions (LxWxH in)	IP Rating, Water Tightness	Temp range (F	Battery ty	Expected Battery Life	Expected Unit Lifetime (yrs)	Gamma Detector 1 (High sensitivity)	Gamma 2 Detector (High Range
BNC	NukeAlert 951		Type 2	6.4	3.75 x 2.5 x 1.25	IP54, "Watertight"	-10 to 122	2 AA	2+ years @ 48hrs/week	10 Years Min	Cesium Iodide Scintillator	No
BNC	PalmRAD SPRD 920		Type 2	24.7	5.71 x 3.94 x 1.97	IP54, Water splash	-4 to 122		≥ 14 h	10 Years Min	Scintillator NaI	GM Tube
Canberra							-59.8 to					

Manufacturer/ Vendor	Model	Image	Gamma Readout (defined answers only)	Gamma Energy Range	Total Gamma Dose Rate Range	Maximum Dose Rate	Maximum Dose	Number of Adustable set points for Dose Rate Alarm	Number of Adjustable set points for Dose Alarm	Data Logging (defined answers only) automatic or manual
Canberra	BNC	NukeAlert 951		1 - 9	Down to 20 keV	0.035 mR/h to 1.1 mR/h	13 mRem/hr	N/A	1	N/A	No
D-Tect	Canberra	UltraRadiac Plus		Rem (Sv), Rad (Gy)	60 keV to 1.3 MeV	1 uR/h to 500 R/h	500R/hr	999 R	2	2	
D-Tect	D-Tect	mini-RadDX		Rem (Sv) and 1-9	50 keV to 3 MeV	1 uR/h to 70 mR/h	70 mRem/hr	No	4	None	
Mirion	D-Tect	mini-RadD		1 - 9	30 keV to 3 MeV	0.035 mR/h to 1.1 mR/h	1.1 mRem/hr	N/A	1	N/A	No
	Thermo	RadEye G		Rem (Sv)	45 keV to 1.3 MeV	5 ur/h to 10 R/h	10 R/h	N/A	2	2	Automatic

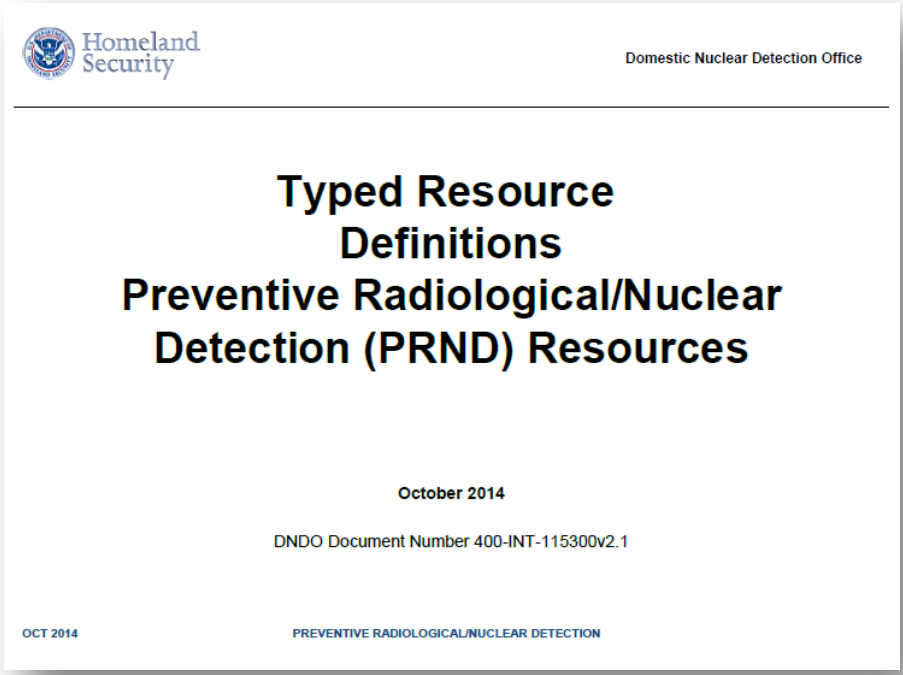
Exposure Rate Range

Instruments that measure accumulated dose



DNDO Alignment

- Current DNDO NIMS Typing only Defines:
  - PRD
    - Type 2 (gamma)
    - Type 1 (gamma/neutron)
  - RIID
    - Type 2 (Low/Med resolution)
    - Type 1 (High Resolution)
  - Backpack
    - Type 4 (gamma)
    - Type 3 (gamma + RIID)
    - Type 2 (gamma/neutron)
    - Type 1 (gamma/neutron + RIID)


Homeland Security

Domestic Nuclear Detection Office

Typed Resource Definitions Preventive Radiological/Nuclear Detection (PRND) Resources

October 2014

DNDO Document Number 400-INT-115300v2.1

OCT 2014 PREVENTIVE RADIOLOGICAL/NUCLEAR DETECTION

  - Vehicle Mounted
    - Type 4 (gamma)
    - Type 3 (gamma + RIID)
    - Type 2 (gamma/neutron)
    - Type 1 (gamma/neutron + RIID)

Factors Important in CM

- Helps to Have:
  - Track integrated exposure / Dose
  - Alarm at exposure rate set points > 1 mR/h
  - Alarm at integrated exposure set points
  - Strong /Loud Vibration/Audible Alarm
  - Rugged construction
  - Change parameters / set points in the field
  - Read out in Dose Rate
  - Battery Change
  - Field Readable
  - Geo-reference / Data logging
  - Ease to Decon (IP 67)
  - Short Over-range recovery time

- Should Not:
  - Auto Adjust Background (at mrem/hr levels)
  - Over-Range to Zero
  - Long time to alarm

Big Picture Detection/ Measurement Missions

- Event Recognition / Clearance
- Contamination Footprint Characterization
  - Model normalization
  - Transportation corridors
  - PAG/PAR
  - Establish Control zone / Staging / Reception center locations
- Worker Safety
  - Critical infrastructure / Agricultural
  - Public Health and Lifesaving Activities
- Mass Care
  - Population monitoring & decontamination
- Public Health and Medical
  - Uptake / Exposure indication

Next Steps…

921

TABLE 3.2—Mission-oriented detector selection.[a]

Mission	Alarming Dosimeter	PRD	PERD	Survey Meter Type-1	Survey Meter Type-2	RID	Backpack	Mobile	Aerial	Portal Monitor	Sensor Networks	Medical Instrumen-tation[b]	Smart Phone App
Shelter/Evacuation Recommendations													
Confirmation of Nuclear Yield	●	○	●	○	●	○	○	○	●	○	○	—	—
Location of Ground Zero	—	—	●	—	●	—	—	—	●	—	○	—	—
Yield Estimation	—	—	●	○	●	—	—	—	●	—	●	—	—
Survey of Dangerous Radiation Zone	●	—	●	○	●	—	—	—	●	—	○	—	—
Dose Monitoring at Shelters	●	○	●	○	●	○	○	○	—	○	—	—	—
Location of Safest Evacuation Routes	●	●	●	●	●	○	○	○	●	—	○	—	—