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

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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?
<table>
<thead>
<tr>
<th>Manufacturer/Vendor</th>
<th>Model</th>
<th>[Draft] NIMS Type</th>
<th>Weight (oz)</th>
<th>Dimensions (LxWxH in)</th>
<th>IP Rating, Water Tightness</th>
<th>Temp Range (°F)</th>
<th>Battery Type</th>
<th>Expected Unit Lifetime (yrs)</th>
<th>Gamma Detector 1 (High Sensitivity)</th>
<th>Gamma Detector 2 (High Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNC</td>
<td>NukeAlert 951</td>
<td>Type 2</td>
<td>6.4</td>
<td>3.75 x 2.5 x 1.25</td>
<td>IP54, &quot;Watertight&quot;</td>
<td>-10 to 122</td>
<td>2 AA</td>
<td>2+ years @ 48hrs/week</td>
<td>10 Years Min</td>
<td>Cesium Iodide Scintillator No</td>
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<tr>
<td>BNC</td>
<td>PalmRAD SPRD 920</td>
<td>Type 2</td>
<td>24.7</td>
<td>5.71 x 3.94 x 1.97</td>
<td>IP54, Water splash</td>
<td>-4 to 122</td>
<td>2 AA</td>
<td>≥ 14 h</td>
<td>10 Years Min</td>
<td>Scintillator Nal GM Tube</td>
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</tbody>
</table>

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

Instruments that measure accumulated dose

N42.20 EPD Standard
N42.49 PERD Standard

# DoseRAE2
# 1703MO-1BT
DoseRAE Pro
# GammaRAE IIIR
  NRF50
  - - 1704M
  - - 1704A-M
  ** DMC-3000 **
  1605BT
  + RadEye GF
  RAD60
  Ultra Radiac-Plus
  TruDose
  EPD Mk2
  DOSICARD DOSIMAN
  Canary III - 4083
  Dose-I
  ** Sentry EC **
  + RDS 31 MP Survey Meter
  Radeye PRD-ER
  Radeye G
  ** PED Personal Elect. Dosim **
  - - SR-10 Super RIID
  RadPavise
  Radarge
  Mini Rad-DX
  - - SM2000ID
  {RADEye PRD}
  N42.17A HP SM std
  N42.33 SM standard
  N42.32 PRD standard
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)
  - 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…**

**Table 3.2—Mission-oriented detector selection.**

<table>
<thead>
<tr>
<th>Mission</th>
<th>Alarming Dosimeter</th>
<th>PRD</th>
<th>PERD</th>
<th>Survey Meter Type 1</th>
<th>Survey Meter Type 2</th>
<th>RID</th>
<th>Backpack</th>
<th>Mobile</th>
<th>Aerial</th>
<th>Portal Monitor</th>
<th>Sensor Networks</th>
<th>Medical Instrumentation</th>
<th>Smart Phone App</th>
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<tbody>
<tr>
<td><strong>Shelter/Evacuation Recommendations</strong></td>
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<td>Confirmation of Nuclear Yield</td>
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<td>Location of Ground Zero</td>
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<td>Yield Estimation</td>
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<td>Survey of Dangerous Radiation Zone</td>
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<td>Dose Monitoring at Shelters</td>
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<td>Location of Safest Evacuation Routes</td>
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