PURPOSE

To clearly establish procedural guidelines to be followed by all personnel for the deployment of gamma radiation detectors.

POLICY

The department has received portable gamma radiation detectors as part of a regional initiative funded through a State Homeland Security Grant Program (SHSGP) grant.

The detectors are a tool to provide important and immediate information in the event of a radioactive incident such as a transportation accident or terrorist act where radioactive material may be present.

Definitions

Alarm Settings - Settings programmed within the unit that once reached provide both audible and visual indicators. There are alarms for DOSE and for RATE. Each alarm setting has two thresholds, Low and High.

- Low visual is indicated by a flashing **GREEN** light.
- High visual is indicated by a flashing **RED** light.

Contamination - Coming in physical contact with radioactive material through ingestion, injection, inhaling, or having radioactive material on the outer layer of clothing or skin. If contamination occurs, decontamination must then occur. (See Exposure)

Dose Rate - (Low 100 mR, Low 500 µR/hr; High 5 R, High 2 R/hr)

Distance Rule - By doubling the distance from a radioactive source, the RATE of exposure is reduced by four times. (Example: At 1 yard distance from a source, the RATE is 400 mR/per hr. At 2 yards, the RATE is reduced to 100R/per hr)

Dirty Bomb or Radiological Dispersal Device (RDD) - A device used to spread radioactive material over an area using explosives, leaking containers, or other means.

Dose - Gamma radiation energy absorbed expressed in units of Roentgens (R) per incident as totaled by the detector. (Example: If the RATE displays 25 mR/hr, the DOSE after 2 hours would be 50 mR total.)

Emergency Response Guidebook (ERG) - This is the orange book published by the U.S Department of Transportation used by first responders to transportation/hazmat accidents. Guide 160 through Guide 166 provides information on radioactive materials.

Exposure - Being in an environment where radioactive material is present but not on the person. (See Contamination)

High Radiation Area - Any area, accessible to individuals, in which there exists radiation at such levels that an individual could receive in any one hour a dose to the whole body in excess of 100 millirem. (mR as displayed in the DOSE partition of the detector)

Personal Protective Equipment (PPE) - Safety equipment used by an individual to protect him/her self from expected or unexpected hazards associated with this department memorandum. Examples include gloves, goggles, shoe covers, gasmask, etc. *PPE equipment is not effective against gamma radiation and provides some airway protection from Alpha and Beta radiation.*

Seek Mode - Mode provided by the unit to seek out, through use of auditable chirps, the direction and possible source of gamma radiation. To enter Seek Mode hold RATE button until the number “1” is displayed. As the detector moves towards the source, the chirps are more frequent. To exit Seek Mode hold the RATE button until the number “0” is displayed.

Rad - Unit of radiation measurement. One Rad = one Rem = one Roentgen.

Radiation - Alpha, beta, gamma, and neutron particles or energy. Gamma radiation is the only radiation detected by the MiniRadiac. Most materials releasing radiation, release in gamma form. Neutron is weapons grade radioactive material**.**

Rate - Expressed in units of Roentgens (R) per hour in the RATE display are of the unit.

Rem - Unit of radiation measurement. One Rem = one Rad = one Roentgen.

Roentgen - Unit of radiation measurement. One Roentgen = one Rad = one Rem

µR - microRoentgens/microrem which is the smallest radiation level detected by this device. 1 million µR = 1 Roentgen/Rem/Rad

mR - millirem/milliRoentgen a radiation unit detected by this device. One thousand mR = 1 Roentgen/Rem/Rad.

- The RATE of 100 mR/hr is the nationally recognized limit for safe exposure for the general public.

Routine Detection Deployment

- The detectors are designed and programmed for routine detection deployment. When going to a hazardous materials call, all unit Captains will turn on their detector by pressing the ON/OFF button and then, once the detector is on, clear the DOSE reading. (Dose button held down + the CLR/TEST button until the display flashes and shows “00.0”)
- Once the call is completed, clear the dose, and turn the unit off by pressing and holding the ON/OFF button. Failure to clear the DOSE will give a false DOSE reading to the next officer/member using the unit.

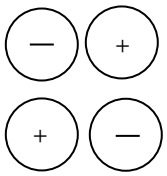
Emergency Incident Use

- Do not clear DOSE once an incident has begun.
- Once the unit provides a RATE ALARM, observe the unit’s readout on the display and notify Command. If possible, an attempt should be made to verify the reading by use of a second detector.
- If the unit rate is displaying µR/hr then the environment is safe enough to continue to investigate keeping the Distance Rule in mind to ensure that the RATE will not exceed 100 mR/hr.
- If the unit rate is displaying over 100 mR/hr, **STOP**! If possible, determine the source of radiation visually. Using the Distance Rule, remove yourself from the area until the RATE falls below 100 mR/hr.
- Command will be notified when a reading is determined valid. They will in turn ensure that emergency notifications are made to Alarm. Command will secure the scene and conduct the initial investigation. Alarm will make any other notifications.
- With the Distance Rule in mind, any RATE ALARM may indicate a larger radioactive level that is farther away from the officer’s present location.
- Any RATE over 100 mR/hr is a safety hazard and a possible violation of the law. AZDEQ and EPA are to be notified. Once the scene is safe ADEQ/EPA will make the proper notifications if a violation occurred. The violation will be investigated by the proper authorities.
- DOSE ALARMS are programmed to alarm *AFTER* a RATE ALARM. There should never be a time where a DOSE ALARM sounds first.

CARE AND MAINTENANCE

With proper use, the only maintenance required by a firefighter will be the changing of the four AA batteries. The display will indicate low batteries when the "BAT" symbol is in the display.

- To change the batteries, remove the detector from the cloth case and turn the detector so that the front of the detector is facing you.
  - **Be sure the unit is turned off before changing the batteries.**
- The battery compartment is located on the lower left corner of the unit. Turn the silver latch counter-clockwise which will release the latch.
- Remove the batteries and inspect the seal on the inside of the door and the O-ring seal around the latch post.
  - If either the seal is cracked or broken the unit is no longer water tight
  - Red tag the monitor and send to EMS.
  - Inspect the battery contacts for corrosion.
  - If any corrosion is seen, red tag the unit and send to EMS.
- Replace the batteries being cognizant of the proper battery polarity positions.



- Press the latch down and turn clockwise until the ring can be stored in the latch cover.
- Replace the unit into the cloth case.
- Press and hold the on/off button for 2 seconds. Verify that the unit turns on in the Rate Mode. Press and hold the on/off button again to turn the unit off.

Other than changing batteries, all personnel are prohibited from attempting maintenance of these detectors.

The detectors should be calibrated after 3 years of use. Detectors in need of calibrations should be red tagged and set to the EMS section.

Approved: _____ 2/21/08

Robert McKibben, Fire Chief Date