

PUBLIC AFFAIRSFigure 9. Fact Sheet 3: Plutonium Fact Sheet

FACT SHEET 3

PLUTONIUM FACT SHEET

(For Operational Commanders)

As Operational Commander, you will be assaulted by many needs at once in determining the actions to be taken in coping with a nuclear weapon accident. You should have had the opportunity to review the preceding fact sheets for the general public and medical personnel. Several facts are important to keep in mind, as general guidance.

By the time you have arrived at the scene, the weapons have usually suffered low order detonations if they are going to do so. This low order detonation produces a cloud of finely dispersed plutonium that falls out over the area downwind, depending on particle size, wind direction and speed, and amount of explosives in the detonation. A very worst case situation is shown on the ARAC plots that are made available to you. The initial ARAC plots show desposition and dose predictions based on the detonation of all weapons involved, using all the available explosives. Desposition resulting from explosive dispersal is significantly larger than that resulting from a fire. The actual scenario should be less, perhaps 10 to 100 times less, based on the actual survey data from the site. Note that plots are predictive in nature, and must be corroborated by actual field measurements.

The cloud deposits its radioactive material over several hours after an explosion or fire, with the largest particles settling out earlier and closer to the accident site and the finest particles being carried further by the wind and taking longer to settle out. In the case of such releases, Protective Action Recommendations to civil authorities for sheltering downwind members of the public in place must be made (and executed) within the several-hour period of plume passage to be effective for reduction of dose from the initial plume. After initial cloud passage, the inhalation of material from the accident is by resuspending the plutonium by operations in the area of cloud passage, such as walking. The DOE may compute a dose equivalent for persons in the area of the initial cloud passage. People exposed in the plume may experience significant intakes of radioactive material through inhalation (with corresponding significant radiation doses). Note that this is only from the cloud passage; doses from resuspension will be significantly less.

The important point is that the ARAC plot usually overestimates the total dispersion of plutonium, and the dose estimate is based only on cloud passage, not later resuspension of the plutonium; therefore, basing your sheltering plans on these numbers may easily result in a significant conservatism.

Sheltering should be recommended for the downwind population, but you must be careful to avoid the impression of extreme hazard from the plutonium. Your sheltering advisory should indicate that there is a contamination hazard and a slight inhalation hazard. Care should be taken not to increase tension over the accident and/or incident. You and your PIO should stress that people should stay indoors as much as possible, keep houses closed to prevent contamination, and follow other ideas, as outlined in the public release.

Usually, the resuspension of plutonium in the original areas of contamination is not significant, except for the area very close to the accident site. To prevent the spread of material in this area, consider spraying with some sort of fixative to prevent resuspension and/or spread of the plutonium. Something as simple as hand sprayers with vegetable oil may be used to bind the plutonium into the soil and/or surface around the

site. A secondary advantage is that this method lowers the airborne hazard for the workers inside the control boundaries and may help the eventual cleanup process move faster. It does, however, mask the plutonium from some alpha detection RADIACs, such as the AN/PDR 56, AN/PDR-77, and the ADM-300 with AP-100 alpha detector. Usually, these types of instruments are used only for monitoring people or material leaving the site, not site contamination surveys.

In dealing with a nuclear weapon accident, some of the concepts that are usually used to handle injuries and/or fatalities on board ship do not hold true, or may be counterproductive. Such an example is keeping the population under tight sheltering requirements or restricting traffic from the contamination area downwind. Any recommendation for the civilian populace will be just that, a recommendation. The military has no authority in the contamination areas unless they are military areas, or are within the NDA. Use the local authorities, and have the FEMA representative assist in this function.

Some concept of the exact magnitude of the risk people experience from the accident may be compared with the risks outlined in the Nuclear Regulatory Guide 8.29 (reference (cb)). The Service, DOE, and/or NNSA health physicists should be consulted to give the best approximation of the public risk; this may be compared with the risks reference (cb).