

PUBLIC AFFAIRSFigure 7. Fact Sheet 1: Characteristics, Hazards, and Health Considerations of Plutonium

FACT SHEET 1

CHARACTERISTICS, HAZARDS, AND HEALTH CONSIDERATIONS OF PLUTONIUM

(For release to the general public)

The accident at _____ (to be filled in) _____ has resulted in the release of the radioactive substance plutonium. Persons who are downwind from the accident may become exposed to this substance by coming into contact with contamination (radioactive material that has coated or fallen on the surfaces of structures, the ground, or objects) from the mishap. Also, very small amounts of plutonium may have been spread by the winds to adjacent areas. Radiological survey teams are monitoring these suspected areas to determine the presence of plutonium and to measure the levels, if present. No immediate danger exists to anyone, and no medical intervention is necessary; however, some actions may help prevent further contamination or reduce its spread to clean areas.

Plutonium, which is abbreviated Pu, is a heavy metal that has a shiny appearance, similar to stainless steel when freshly machined. After exposure to the atmosphere for any period of time, it oxidizes to a dark brown or black appearance. When released from a weapons accident, plutonium may not be readily seen by the naked eye, but in areas close to the accident, its presence may be assumed in dust and dirt on the ground or on flat surfaces, and from ash resulting from the accident fire.

Plutonium is an alpha radiation emitter; that is, it radiologically decays by emitting an alpha particle, a very heavy radioactive particle. Alpha particles do not substantially penetrate materials. Their range in air is only a few inches at most. This means that alpha radiation is not a hazard to people if it stays external to the body. The epidermis, or outer dead layer of the skin, is sufficient protection for exposure to this isotope from sources external to the body. No external hazard exists to people walking through an area contaminated with plutonium. Alpha radiation may, however, represent an internal radiation hazard when plutonium is taken into the body by inhaling contaminated air, eating contaminated food, or getting contamination into a wound or cut. In actuality, contamination from ingestion is unlikely to be a problem, since plutonium is very poorly absorbed through the intestines. Less than 0.02 percent may be absorbed, or 2 of every 10,000 atoms eaten. Absorption through wounds may introduce small amounts of plutonium into the body. Inhaling plutonium particles is the most likely route of internal exposure.

Inhaled plutonium is kept in the lungs in much the same manner that people in a dust storm inhale dust. This "dust" settles in the lungs. Once in the lungs, a low percentage of plutonium may be translocated by the bloodstream to the liver and the bones. This deposition may be prevented by using "chelation" compounds, such as ethylenediamine tetraacetic acid or diethylenetriamine pentaacetic acid (DTPA), which hasten the excretion of plutonium from the body through the urine. The use of these chelating compounds is not without some medical hazard to the individual, since they are IV-administered, and should be performed by a physician who has been in contact with appropriate agencies to coordinate the use of these drugs.

Plutonium in a weapon has a radiological half-life (the length of time it takes for the plutonium to lose one half of its radioactivity) of more than 24,000 years. This long half-life means that its radioactivity does not decrease substantially by nuclear decay or disintegration. Likewise, eliminating plutonium from the body

is also a very slow process. Biological elimination of plutonium may be improved significantly by using the chelating agents mentioned above.

Therefore, until the limits of contamination are determined, the public is advised to follow a few simple guidelines to reduce the spread of contamination, and there will be little, if any, hazard. Stay inside and reduce opening doors and windows. Turn off fans, air-conditioners, and forced air heating units that bring in fresh air from the outside. Use them only to recirculate air already in the building. Children should not play outdoors. Fruits and vegetables grown in the area should not be eaten. Individuals who think they have inhaled some plutonium should not be unduly concerned. The inhalation of plutonium is not an immediate medical emergency. Very sensitive monitoring equipment is being brought into this area to survey the inhabitants of suspected contamination area(s) for inhaled radiation, and once established, this will be made available to those who need it.