**Discussion of Risk Significant Accident Scenarios**

The description of Scenario 1 includes explicit calculations for deriving the value discussed. These calculations are included to provide an example of how the values in the rest of the scenarios were derived. Unless otherwise noted, accident frequencies are based on the 2,000 weapons operational level.

**Scenario 1: Explosive Driven Plutonium Dispersal from an Internal Event.** Nuclear weapons may be made with either conventional or insensitive HE, depending upon weapon design. Scenario 1 represents the accidental detonation of conventional HE in the presence of plutonium due to an internally initiated event. HE is present with radioactive materials in facilities where nuclear explosives work occurs. Initiators for this scenario include accidental actuation of an electro-explosive device during disassembly and handling accidents. Insensitive HE is a negligible risk contributor because it is not susceptible to ignition under the conditions existing during assembly or disassembly operations. Insensitive HE is, thus, not a credible explosive source for this scenario.

Scenario 1 is comprised of three individual cases in which an accidental HE detonation is postulated to be initiated by an internal event. These cases differ in where the accidental detonation occurs; i.e., in a nuclear weapons assembly and disassembly cell, a bay, or a special purpose building. An HE detonation during assembly or disassembly would lead to the dispersal of radioactive material. Weapons are designed so that, in the event of an accidental detonation, there will be no significant nuclear reactions. Positive measures are engineered into nuclear explosives to preclude a nuclear yield from an accidental HE detonation.

For operation on 2,000 weapons annually, the frequency of Scenario 1 is $1.1 \times 10^{-5}$ per year. It is, thus, *extremely unlikely* (frequency of occurrence is less than $10^{-4}$ per year but greater or equal to $10^{-6}$ per year). The derivation of this frequency involves summing of probabilities of different initiating events in different facilities (see appendix D, section D.4.1). Explosive driven plutonium dispersal from an internal event can result from operations conducted in bays, cells, or special purpose facilities. The probability per operation that an operational error could cause an explosive driven plutonium release was estimated for each facility using data from available safety analyses (see references mentioned in section 4.14.2.1 as well

**TABLE 4.14.2.1–3.—*Societal Risk Evolution***

| SCENARIO | CONFIGURATION 1 | CONFIGURATION 2 |
|---|---|---|
| Scenario 1 (Explosive Dispersal) | $6.3 \times 10^{-6}$ excess fatal cancers per year | $3.5 \times 10^{-6}$excess fatal cancers per year |
| Scenario 3 (Explosive Dispersal) | $7.2 \times 10^{-6}$ excess fatal cancers per year | $4.9 \times 10^{-7}$excess fatal cancers per year |
| Scenario 8 (Fire Dispersal) | $2.9 \times 10^{-7}$ excess fatal cancers per year | $6.6 \times 10^{-7}$ excess fatal cancers per year |
| Overall Risk | $1.5 \times 10^{-5}$ excess fatal cancers per year | $5.7 \times 10^{-6}$ excess fatal cancers per year |

Configuration 1: Cell leak area = 42 square inches, Zone 4 storage configuration of 36 magazines with pits, 24 magazines with weapons.
Configuration 2: Cell leak area = 5 square inches, Zone 4 storage configuration of 60 magazines with pits.