7.2 Dominant Risks

The relative risk between three isotope routes is not explicitly analyzed. In the NWS, because of the huge material stockpiles of Pu-239 and U-235, there is likely no significant difference in risk between these routes.

For the NNWSU it is also likely that there is no significantly different risk between the two main routes if material is made indigenously and both routes may well be pursued together. U-235 is more difficult for undeveloped states to produce indigenously than Pu-239, although the latter requires a reactor facility. The existence of an undeclared reactor facility is relatively straightforward to detect, unless it is located underground, while undeclared U-235 enrichment facilities are, in general, harder to detect. In addition a U-235 'gun' weapon design is much simpler than a Pu-239 implosion weapon design. If the diversion is from smuggled sources, which is assessed as high risk for NNWSU, then U-235 would be more likely than Pu-239 because of its greater availability and easier handling.

The U-233 route should be a considerably smaller risk, for all state types, as it offers no significant advantages and has a number of disadvantages as discussed in Section 4.2.3.

The two sections below summarizes the dominant facility risks for the state types.

7.2.1 NWS and NNWSD

For NWS and NNWSD, diversion from existing material stockpiles, enriched uranium conversion facilities and laser isotope enrichment techniques, dominate the U-235 route for both declared and undeclared facilities. Enrichment techniques at the R & D stage all also judged as prominent from the Expert Choice outputs, but have not been included in the analysis Tables due to lack of specific data. For stockpiles the likelihood of diversion will increase with the number of storage locations. Once stockpiles are declared, verification with seals and camera surveillance, should be conclusive. Prior to the initiation of a cut-off agreement the risk of stockpiled material being kept in these states as undeclared would likely be very significant. Conversion facilities are relatively small size and involve a fairly simple process so that verification, of both declared and undeclared facilities, may not be conclusive. Verification techniques need to be developed for R & D stage enrichment facilities, in anticipation of commercial demonstration of these techniques.

The Pu-239 route risk is also dominated by existing material stockpile potential diversion and verification aspects are the same as noted for U-235. Existing international stockpile quantities are currently a few hundred tonnes of Pu-239 and many hundreds of tonnes of U-235. With potential undeclared stockpiles in mind, the development of new U-235 enrichment techniques is, in the shorter term not as important. However, with advances in technology the longer term risk is that these newer technologies become accessible to the less advanced states, who then continue their own development.

7.2.2 NNWSU

For the NNWSU, research test reactors and Pu reprocessing dominate the Pu-239 route declared-facility risks. Diversion from declared reactors should be simple to verify from routine inspections provided spent fuel accountancy records and seals are used. Verification of a declared plutonium reprocessing facility, particularly a small one, may not be conclusive unless very frequent inspections were used.