uranium mines and uranium mills should still be considered a valuable part of a verification regime. These techniques would provide excellent and very effective signatures, indicating potential diversion at an early stage in any diversion attempt.

5.3.2 Pu-239 Route

Table 2.2 provides a similar analysis for the undeclared Pu-239 route similar to that described in Section 5.2.1 for the undeclared U-235 route. The most important facility anomaly diversion paths, row 2, are acquisition from smuggled enriched plutonium sources, plutonium reprocessing (extraction) facilities and reactors producing plutonium.

The bottom row of Table 2.2 provides figure references to the overall diversion-risk relative ranking as a function of state type. Figure 3 decision analysis hierarchy was used to derive these rankings, which are shown in Figures 3.2.2a, 3.2.2b and 3.2.2c. For the NWS and NNWSD the risk rankings are the same. The diversion paths judged with the most overall diversion-risk potential for undeclared facilities are from existing weapon grade stockpiles, dual-use reactors and reprocessing/fuel fabrication facilities. The risk from production reactors is small, because the detection of their operation is simple to conclusively verify by technical means.

For the NNWSU (Figure 3.2.2c), the dominant risk is acquisition of clandestinely obtained weapons-grade plutonium. Plutonium reprocessing facilities are assessed as the next highest risk diversion risk paths. Power reactors were exclude by the definition of NNWSU, but were left in the risk rankings for illustration, and would in any case be expected to be extremely low as shown, because of very unlikely existence of undeclared power, as well as, research reactors.

The only means of effectively verifying clandestinely obtained weapons-grade Pu-239 is by the use of intelligence information from various sources. This would be difficult because of the same reasons provided above for U-235. Pu-239 is somewhat more difficult to transport and handle but not significantly so. To determine the true nature of an undeclared plutonium reprocessing plant would also be difficult using optical or infra red surveillance technical means, as a small plant would not be physically distinctive. The radioactive signatures of Kr-85 and I-129 emissions from the facility, detectable by environmental sampling or monitoring, offer more conclusive evidence however. Verifying that undeclared production is actually being carried out and production rates could not conclusively be determined by technical means, and would require special inspections, which should be conclusive. The reprocessing operation might well not take place, however, until long after the first fuel irradiation was started in a reactor facility, depending upon the required time-scale for final weapons production. Verifaction of a undeclared research reactor should be straightforward unless it was underground but the actual production capacity would remain uncertain unless confirmed with special inspections.

5.3.3 U-233 Route

Table 2.3 provides the previously described analysis for the U-233 diversion route and associated facilities. As discussed in Section 5, this route, in principle, is considered much more unlikely than both Pu-239 or U-235 for all state types. Material acquisition routes are the same as those for plutonium, in Table 2.2, being reactor irradiation and fuel reprocessing/ U-233 extraction. The risk rankings of diversion paths would be expected to be about the same as that of equivalent Pu-239 facilities (Figures 3.2.2a, 3.2.2b and 3.2.2c), and have therefore not been repeated.