according to the facility type. To avoid excessive information the specific methods are not listed in the tables because of their very extensive nature and level of detail. A complete listing of all existing safeguard verification techniques is available from the IAEA Safeguard Manual, Chapter SMO 7.1, Annex 1, 1991. Potential verification techniques are listed for uranium mines and uranium mills for completeness, but uranium mines and mills are not currently safeguarded by routine inspection techniques. Only after yellowcake (U_3O_8) enters a uranium conversion facility are safeguards currently applied.

Special Inspections are as defined in INFCIRC/153, and would in principle include both destructive and non-destructive analysis techniques.

4.3.5 Effectiveness of Verification Methods

A descriptive qualitative assessment is provided of the effectiveness of verification methods, for a given facility diversion. The assessment is based on what is known of the current technologies. Intuitive judgement has been used for this assessment.

Verification method effectiveness is assessed for a specific facility diversion. There is no attempt to judge the combined effectiveness of verification methods on more than facility. The likely synergies from such an approach would provide insights into the verification effectiveness of detecting an overall fissile-isotope route diversion, as opposed to diversion in a single contributing facility. For successful overall diversion it is necessary to conceal, either the existence of, or the misuse, all the essential facilities over a period of time of a least a few years. The matrix type approach used in this report is quite suitable for a synergistic type analysis, which could be used, for example, to identify optimum verification strategies for a given fissile-isotope diversion route.

Cost-effectiveness aspects are not included. Aspects of verification where technically sensitive information from a commercial or national security aspect may cause problems for verification activities are not discussed. Aspects of verification activities that could provide information for potential violators to evade detection are also not discussed.

4.3.6 Risk of Diversion from Facility (L x I)

A qualitative relative assessment of the risk of diversion from each facility type is provided for each of Tables 1, 2 and 3. Information from the Likelihood and Importance items is utilized for this assessment, using the Expert Choice method. Figures 2 and 3 show the hierarchies used for the U-235 and Pu-239 isotope routes respectively. Figure 3 is also used for the U-233, route as it uses the same facility types as Pu-239. The facility diversion relative risk rankings are referenced from the analysis tables, and the presentation of the risk ranking format is the same as discussed in Section 4.3.1. Details on the pairwise assessments and the individual variable weightings are not included in the report, but are available from the author.

In Figure 2, the distinction between technically demonstrated and technically undemonstrated enrichment methods is not definitive, and is susceptible to change as technology develops. Techniques where the technical status is, from the unclassified literature, not definitive such as the laser isotope methods (MLIS and AVLIS), have been grouped under undemonstrated. The aerodynamic U-235 enrichment technique is intended to be the Helikon method, used by South Africa. This is placed under developed techniques, with the alternative aerodynamic technique, the jet nozzle, being included implicitly under *R & D Stage* defined techniques. The chemical exchange methods and mass diffusion technique (Table 1.1, footnote [1]) are also implicitly included under *R & D Stage* defined techniques.