The decision analysis method is discussed in Appendix D. It was designed specifically to assess subjective variables on a common scale using expert judgements, in this case to rank the relative importance of states with regard to diversion likelihood. Figure 1 provides the decision analysis hierarchy structure with the associated variables used in this particular application for anomaly likelihood. Verification effectiveness is included as a variable contributing to the likelihood, as noted in Section 4.3. A more detailed analysis than the present one would further define this particular variable, as well as the others, down into further sub-criteria.

The ranking of only three state types could be done without the use of a systematic method, by simply using intuitive judgement only and this has been used for the diversion paths of lower importance. Intuition, however, makes judgements of the relevant variables in a non-systematic way. As numerous factors contribute to the assessment of diversion likelihood, the use of Expert Choice™ in this application provides a logical and auditable basis for the rankings, which intuitive judgements do not provide. In addition, the framework of Figure 1 could be expanded, if required, to rank the relative trustworthiness of individual states, or to rank a larger number of state category definitions. For instance, if individual states were being defined, then, for example, the likelihood of particular U-235 enrichment technologies being associated with a specific state could be assessed. The choice of the state categories used in this report is based upon intent and capability to violate, rather than on NPT status. The NPT status of a state is implicitly accounted for as a sub-criteria category in Figure 1 designated as *"Political/Security Status"*.

The overall qualitative anomaly assessment (e.g., high, medium, low) is summarized verbally on the spreadsheet tables or referenced to Expert Choice™ histogram figure results. A description of the interpretation of the histogram results is provided in Appendix D, Section D4.

4.3.2 Importance of Facility Anomaly to Final Material Acquisition (I)

This variable assesses the qualitative importance of a given facility to the final acquisition of weapons-grade fissile material. This parameter then represents the consequence contributor to risk (Section 4.3). As facility importance is based almost entirely on a rather simple technical basis the judgements in this case were based on intuition, rather than on the Expert Choice method. For example, an anomaly in uranium enrichment or plutonium reprocessing facilities would be far more significant (to the ultimate production of weapons-grade material) than anomalies in uranium mines or uranium mills.

4.3.3 Diversion Signatures

For each potential facility or material acquisition source, the various potential signatures (identifiers) that could be used to identify a diversion scenario are listed. These could involve physical, chemical or nuclear characteristics. This variable does not contribute directly to facility diversion risk but, in order to logical identify appropriate diversion verification methods (Section 4.3.4) and subsequently judge verification effectiveness, it is essential to provide a systematic list of diversion signatures. The list of signatures for a given facility is prioritized, as far as possible, from the general and simplest signature to the more specific and most detailed signature.

For undeclared facilities, for example, facility location identification features are the most general, followed by facility function identifiers, operational/shutdown status identifiers and production capacity indicators. To simplify the table presentation the signatures have not been specifically grouped by type. Intelligence-gathering methods, such as communication