

For the U-235 route declared facilities, electromagnetic, gas centrifuge and the aerodynamic enrichment methods, are the dominant risks. Verification using routine inspections can provide high assurances but methods used should be continually developed to ensure that both older and as well as developing technologies are adequately covered under the terms of a cut-off agreement.

For undeclared facilities, smuggled sources of either U-235 or Pu-239 dominate the risk followed by the same U-235 enrichment facilities as noted for declared facilities, and plutonium reprocessing/fuel fabrication facilities for Pu-239. Verification of an undeclared reactor facility should be conclusive although design and actual production capacities may be very uncertain. Despite radionuclide emissions a small undeclared reprocessing facility could also be difficult to identify and the production capacity could likely not be confirmed without special inspections.

### **7.3 Analytical Approach**

The approach taken to collate the information acquired for this project, and the framework developed for the analysis and presentation of the material appears to be an innovative approach to this kind of problem. It is recognized that the information presented in this study has been developed from first principles, literature surveys, and limited discussions with technical staff, particularly regarding the risk ranking judgements. In essence, the study has been conducted with a relatively narrow support base. The framework, however, can serve as a viable platform for confirmation and refinement of the initial findings.

The main advantage of using this approach is that the dominant areas of concern are revealed in the analytical process and all of the bases for strategic decisions are auditable. Further development of the approach could incorporate cost-effectiveness aspects of the verification process if required.

## **8. Areas for Further Research**

As a result of this study several areas for further work were identified, in refining and augmenting the current work and are listed below.

- The conclusions presented in the diversion risk rankings have been drawn from information in the existing, unclassified literature and from non-intelligence based sources. The decision analysis model structure and associated judgements used could be refined using input from a wider experience base.
- A state-specific diversion risk analysis could be developed and used by governments interested in ensuring that their non-proliferation policies and principles are being met.
- This report has taken an initial step in identifying the threats and risks associated with verifying a fissile materials cut-off regime. The potential benefits to pursuing this approach could be applied to other areas of arms control, disarmament and non-proliferation, such as chemical and biological weapons of mass destruction.
- An optimum verification strategy, accounting for both cost as well as technical effectiveness could be developed, for a given isotope path by looking at synergies from techniques applied to more than one facility. In particular, more detailed verification data than used in the current report would need to be produced.