

would allow more possibilities of abuse. The application of a full system from the start would be preferable, or at least a phasing-in that did not leave uncovered critical production phases for controlled materials. Given adequate advance preparation, the evolutionary problems faced by such a system would then be those arising from new safeguards procedures, new industrial processes, and the possible extension of the system to cover new chemical agents or precursors.

The Agency's INFCIRC/153 system is based on the application of materials accounting methods at specific points in the nuclear fuel cycle (Key Measurement Points): flows into and out of a Material Balance Area (MBA) should only occur through such points and should correlate appropriately with physical inventories, with some allowance for operating losses, measurement errors, etc. These factors, and the possibility of diversions, will generate Material Unaccounted For (MUF), a difference between book and actual inventories for the MBA. Materials accounting is supplemented by surveillance and containment methods. Surveillance can help secure the boundaries of the MBA, monitor channels of movement between MBAs, and watch for unusual operations in a facility. Containment can package materials for easier counting, similarly help secure the boundaries of the MBA and monitor channels between MBAs, and also monitor the integrity of safeguards instruments through, for example, the use of tamper-indicating seals.

Specific types of facilities present difficulties for the IAEA systems, and in generic terms at least, these would probably be replicated in the chemical area. Safeguards on reactors are generally readily handled by item-counting materials accounting methods, supplemented by containment and surveillance, and by techniques of non-destructive testing (e.g., of fuel assemblies). Bulk-handling facilities are a problem, as a significant absolute quantity of MUF might be reached even for a small percentage of MUF relative to the throughput. Measurements may be more difficult for continuous or liquid flows as compared to movements of discrete items. Even increased emphasis on containment and surveillance methods can run into problems if there are parts of a facility which are difficult to monitor because of the inherent dangers of some processes or materials.

The general dependence on materials accounting has been acceptable because it can reduce the level of intrusion by safeguards. Specific sensitive areas and processes can be "black-boxed" by this methodology. Another advantage is that the information needed for materials accounting will overlap to some degree with the needs of state regulatory authorities and of facility operators. But stressing one safeguards methodology could be a difficulty if, despite its centrality, it is inappropriate or inadequate for some cases. States may be reluctant to permit changes in a safeguards system to allow the more extensive use of other methods.