Table 1.2 Diversion Path Analysis: Generic Route Pu-239, Declared Civilian, Dual Purpose and Dedicated Nuclear Weapon Facilities

POTENTIAL FACILITY / SOURCES OF MATERIALS / RISK RELEVANT PARAMETERS		URANIUM MINE	URANIUM MILLING	URANIUM CONVERSION	CIVILIAN POWER REACTOR	DUAL-PURPOSE REACTOR	MILITARY PRODUCTION REACTOR	RESEARCH & TEST REACTORS	PLUTONIUM REPROCESSING [1] Chemical	PLUTONIUM REPROCESSING [1] Laser Isotope Separation	PLUTONIUM CONVERSION/ FUEL FABRICATION FACILITY	EXISTING STOCKPILES
LIKELIHOOD OF FACILITY ANOMALY (L)	NWS	low	low	low	low, (pressure vessel); high (channel type)	high	low (assumed shutdown)	low (< 10 MW,LEU fuelled); medium (> 10 MW, D20 moderated, with in-core loop facilities)	high	technology under development (US had proposed plant)	high	high
	NNWSD	low	low	low	as above	high	N/A	as above	high	low	high	high
	NNWSU	low	low	low	as above	N/A	N/A	high	high	low	high	low
IMPORTANCE OF FACILITY ANOMALY TO FINAL MATERIAL ACQUISTION (I)		low	low	low	as above	high	high	high, depending on reactor rating and neutron flux	high	very low	medium	high
DIVERSION SIGNATURES		Same as for see Table 2.1			•Modification of fuelling scheme for Pu-239, fuelling frequency changes (pressure vessel)	•Frequency of shutdowns if off power refuelled	•Thermal emissions indicating operation	•Fuelling scheme changes •Active experimental loop program.	• Active liquid waste tank storage •Active gaseous emissions	•EM emissions from lasers (not yet demonstrated)	•Small size chemical plant, not distinctive •Active emissions small	•Intelligence information
VERIFICATION METHODS	Technical Means	Same as for see Table 2.1			•Film/video camera surveillance of fueling operations (channel reactor) and spent-fuel storage •bundle counters (channel reactors)	•Film/video camera surveillance of spent-fuel storage	•Satellites detecting thermal infra-red radiation for S/D reactors. •non-intrusive facility seals	•Camera surveillance of fresh and spent-fuel storage	•camera surveillance of bulk fuel shipment receipts	•camera surveillance of bulk fuel shipment receipts	•none defined, camera surviellance of fuel receipts not effective	•camera surveillance of stockpiles
	Routine Inspections	Same as for see Table 2.1			•seals (pressure vessel reactors) •fresh and spent fuel seal inspections •no practical direct assay method of Pu content in spent-fuel bay •fresh and spent-fuel accountancy	•Same as for civilian reactors	•Facility seal inspections (reactors assumed shutdown) •Spent fuel seal inspections	•Spent & fresh-fuel seal inspections •fresh and spent-fuel accountancy	•Inventory change verification: spent fuel receipts, waste streams, Pu product output, Pu shipments •Operations verification: transfers to cells,shearing,dissolution, instrumentation •Design verification •Interim & physical inventory verification	•specific techniques unknown •design, inventory & operations verification expected as for chemical reprocessing	•Inventory change verification: Pu nitrate receipts, Pu metal product, waste streams	•stockpile accountancy •seal inspection •assay verification
	Special Inspections	Same as for see Table 2.1			SI limited value	SI limited value	SI limited value	SI limited value	Plant complexity, inventory holdups, time scales makes high SI confidence difficult	•Disclosure of technology and process needed	SI limited value	•effective with assay verification
EFFECTIVENESS OF VERIFICATION METHODS		Same as for see Table 2.1			RI conclusive	RI conclusive	TM and RI conclusive	RI conclusive	Complexity of process makes RI essential and difficult to be conclusive	•Unknown	•RI conclusive	•RI should be conclusive, if storage locations fixed
RISK OF FACILITY DIVERSION (L x I)		See Figure 3 for the risk ranking hierarchy, and Figures 3.1.2a, b and c for relative risk rankings for NWS, NNWSD and NNWSU, respectively. Ranking order also given below for reference.										
	NWS	7	8	9	6	3	5	4	2	no facilities	2	1
	NNWSD	6	7	8	5	4	9	3	2	no facilities	2	1
	NNWSU	4	5	6	3	8	9	1	2	no facilities	2	7

[1] Safeguards at a reprocessing plant depend significantly upon the scale and design features of the plant; e.g, a small plant with manual controls will require very different safeguards than a large new commercial-scale plant.