

Signatures	Mining/Milling	Conversion	Enrichment (centrifuge)	Fuel Fabrication (U)	Reactors (Gen)	Separations	Waste Disposal
Nuc Matl In (estimate)		# 55 gall drums	# tanks (15tonnes)	#tanks	# assemblies	# casks or assemblies	# casks or barrels
Nuc Matl In (qty, precise)		Mass	Mass, PSI	Mass, PSI	mass	mass	barrels, tanker trucks, casks, trupack2 concrete barrels
Nuc Matl In (quality)		assays	IAEA assays	assays	IAEA assays	assays, radiometry	radiometry
Nuc Matl Out (estimate)	Trucks	# tanks	# tanks	# fuel assemblies (decoy rods in assembly?)	pools, dry cask storage	UF6 tanks (UF6), Pu or Pu+FP	
Nuc Matl Out (qty, precise)		mass, psi	mass, psi (~3000)	mass	mass	mass? (total mass can be tracked stream fraction depends on burnup etc)	
Nuc Matl Out (quality)	radiometry	assays	assays	assays	assays	assays	
Supplemental Material In	Sulfuric acid (20kg/tonne), magnesium chlorite, lime, magnanese, ammonia, or caustic soda	nitric acid, HF, tributyl phosphate		zircaloy(tin, niobium,iron,chromium,n ickel), NSF cladding (zircaloy+iron), H2, ammonia or ammonium carbonate, argon, erbium, organic binding agent (polyvinal alcohol), He, HNO3-HF	(heavy water, gas cooling, etc) ?	nitric acid, kerosene or dodecane, Na2CO3, NaOH, HNO3	entombment matls (concrete, filler matl), vitrification material (borosilicate glass)
Supplemental Material Out		Chem waste, silicon flouride (commercial) from DU		florine, hafnium (natural Zr byproduct)	(sodium? other chemicals)	Chem waste, Alternative isotope streams (Ti, I, Tc, Pt, Np,Am), fuel casing metals	
Power		Trans line/substation	Trans line/substation	Trans line/substation	produce vs consumed	Trans line/substation	(vitrification)
Nuc Waste Quantity	Tailings pond (satellite)		Trucks	"lost fuel": grinding, scraps (diff. to measure)	low-level (trucks)	Containers (borosilicate glass, high level waste)	
Nuc Waste Quality	radiometry		Tails Enrichment	assay	radiometry	radiometry	
Effluent	tailpipe emissions, radon	Ammonia gas leaks	uranyl, HF		fuel leak (Kr, Xe)	Kr85, Xenon, tritium, I, CO2	
Environmental Signatures	dynamite blast signatures	soil contam.	trace enriched U?	soil contamination	soil contam, fuel leak in coolant water (I,Cs)	soil contam	soil contam (barren)
Declarations to IAEA	Out Qty/Quality	In/out Qty/Quality	In/out Qty/Quality	In/Out Qty/Quality	In/Out Qty/Quality	In/Out Qty/Quality	In Qty/Quality
Shipping In		Satellite (# trucks), freq	Satellite (# trucks), freq	Satellite (# trucks), freq	Satellite (# trucks, rail), freq	Satellite (# trucks), freq	Satellite (# trucks), freq
Shipping Out	Satellite (# trucks), freq	Satellite (# trucks), freq	Satellite (# trucks), freq	Satellite (# trucks), freq	Satellite (# trucks, rail), freq	Satellite (# trucks), freq	
Specialized Equipment	bulldozers, dynamite	centrifuge	Forklift rigs	Forklift rigs	radioactive handling	acid storage/handling, radioactive handling	radioactive handling
Heat Processes/Signatures		furnace (800C)		furnace (1750C)	cooling towers/ponds (temp, vol, fan speed)	furnace (1200C - pyroprocessing)	vitrification (1100C)
Connections outside facility	where do trucks go	where do trucks go	where do trucks go	where do trucks go	trans lines to correct location	where do trucks go	where do trucks come from
Special Handling Protocols/Rates	acoustic signatures of dynamite	florine handling, heavy tanks	florine handling, heavy tanks, building below atmospheric pressure	flouride handling, heaving shipping (0.5tons/assembly), high temp vaccum oven	refueling frequency, transition to offsite waste storage	refresh acid supply, toxic waste, venting (operated at negative pressure), radioactive handling	
Configuration Change (staging materials etc)	addition of mill to mine site	combined w/ enrichment?	piping			special construction matls (ceramic vats, piping)	