OFFICIAL USE ONLY	WLDP-26400-038-000-0001	09-Mar-17	J.G. Miller	Revision 2														
Contaminant	System	Component	dimensions	quantity	total	units	Comments	Related Drawings	Document Reference	Assumed % remaining	Justification	Estimated total remaining	Normalize unit	Uncertainty and Justification				
KOH - Potassium Hydroxide	Concrete Cooling Water SystemChemical Addition Tank	CCW-TK2	1'3"H x 2in OD	1	0.02727077	ft3	Also notes 1.5lb capacity of tank		HB 9.2.5 (b)					0.1x-10x. Could vary by an order of magnitude (1/10 or 10 times)				
	Thermal Shield Water System Chemical Addition Tank	TSW-TK2	2" OD (No length)	1	0.02727077	ft3	Assume same as previous		HB 9.1.5 (b)									
																kg/lb	0.453592	
	Sub-Total				3	lbs	used lbs, as valume of solid may vary			1%	Assume only residuals from the solution tanks are remaining. Likely conservative.	0.01360777	kg			m3/ft3	0.028317	
																m3/in3	1.64E-05	
Boron _ B10 Enriched 90%	Boron Addition Feed Tanks	BH-TK1/2	1ft OD x 2'2"L	2	90	L			HB 5.6.4					0.1x-10x. Could vary by an order of magnitude (1/10 or 10 times)				
	Boron solution is 1000ug/g. Sec 5.6.2				0.09	L												
	Sub-Total				0.09	kg	water solution so 1L=1kg			1%	Assume only residuals from the solution tanks are remaining. Likely conservative.	0.0009	kg					
Lead	Ion Chambers	Ion chamber plug	7300lbs each	3	21900	lbs		202E848	HB pg 6-14					1x-1.25x once consolidated with forthcoming lead and PCB estimate,the results should be within 25% of actuals, and any uncertainty would likely be due to small overlooked quanities, or overestimation/oversimplication during field sampling work.		p Lead	11.34	g/cm3
	Active Dry Storage Shield Plugs - Carbon steel, lead filled	6" plugs	3"Rad x 10" long	14	2.29074464	ft3	plate is 10" deep so assumed plugs the same		HB 12.6.2								11340	kg/m3
		8" plugs	4"Rad x 10" long	13	3.78154671	ft3	plate is 10" deep so assumed plugs the same		HB 12.6.2									
	Washing Cell Drain Filter Flask	WO-FL1	3ft long 4" ID, 5" thick	1	5089.3801	in3			HB pg 12-17									
	activity monitoring room	lead castles	~ 2.5"rad x 11" cylinder	19	2.37482952	ft3		E-24W62-1 and E-24W62-AR-1	HB 18.2									
	Sub-Total				1.36E+04	kg	to accommodate unnoticed shielding, buried items etc.			300%	still working on this, as much of the lead in the building was installed after design and commissioning beyond the scope of the handbook and design manuals. Look to consolidate this estimate with PCB Lead Characterization report (forthcoming). conservatively, for now, I've assumed that all the loose, or post-commissioning lead is equivalent to double the lead identified in this estimate.	4.08E+04	kg						
Xylene	Fuel Storage Block - storage tube	storage tube	7.5" diameter x 25' long	1	7.66990394	Ft3		C-12W62-49	HB 12.2.3					0.1x-10x. Could vary by an order of magnitude (1/10 or 10 times)		p Xylene	0.864	g/cm3
	Flask Maintenance Pit	pit floor	6' x 7'	1	0.0546875	ft3	assume 1/64" deep on floor during spill	E-100-A-24	anecdotal								864	kg/m3
	Sub-Total				188.987654	kg				1%	likely conservative as Xylene evapourates at conditions in WR-1 (temp, vetilation etc)	1.88987654	kg					
Palladium	SO-TK2/3 Palladium Bed Adsorption Columns on HB-40 supply system	SO-TK2/3	2.28ft3	x2 beds	4.56	ft3			HB pg 4-32					0.1x-10x. Could vary by an order of magnitude (1/10 or 10 times)		p Palladiun	12.023	g/cm3
																	12023	kg/m3
	Sub-Total				1552.46516	kg				1%	palladium would have been in solution, and in residutal quanities. 1% likely conservative	1.55E+01	kg					
Chromium (chrome)	Concrete cooling systems Chromel (10% Cr, 90% Ni) Alumel Thermocouple	no ID	No specs	x16	1.02943708	in3	http://www.nanmac.com/type-k.html	assumed #8 gauge (0.128D) and 50ft of themocouple wire each	HB pg 9-8					0.1x-10x, estimate here assumes very thick plating, and may be orders of magnitude higher than realistic, or may also greatly underestimate the number of plated components in the reactor so may be orders of magnitude higher.		p Chromiu	7.19	g/cm3
	Fuel storage tubes - Upper section - chromium plate inside	no id	6" OD x 41"L	x26	627.925832	in3	assume 1/32" thick		HB 12-6								7190	kg/m3
	various plating uses			unknown														
	Sub-Total				7.41E+01	kg				200%	Assumed to be double that known. Known parts are large and less numerous, and potentially equivalent to many smaller parts throughout	1.48E+02	kg					
Cadmium	Shutter sleeve in Ion chamber	3 chambers and 3 sleeves per chamber	apprx 5" long - 1/32" thick = 12 1/32"wide	x9	16.9189453	in3		493D691	HB 6-4					0.1x-10x, estimate here assumes very thick plating, and may be orders of magnitude higher than realistic, or may also greatly underestimate the number of plated components in the reactor so may be orders of magnitude higher.		p Cd	8.65	g/cm3
	Fuel storage cans - sleeve absorber		NO fuel cans left		0	in3			HB 12-9								8650	kg/m3
	Fuel storage tubes - Upper section - cadmium plate outside	no id	6" OD x 41"L	x26	627.925832	in3	Assume same as chromium inner plating		HB 12-6									
	Sub-Total				9.14E+01	kg				100%	no removal efforts undertaken, or planned. Assumed all remain in place. No indication of other uses in documentation or through anecdotal sources	9.14E+01	kg					
HB40			Section 3.1.1	all in m3	Other Sections									0.5x-2x. The volume of HB-40 is conservatively estimated to fill 30% of the volume of the systems. 30% based on anecdotal experience and may be less. It cannot however fill more than 100% so the uncertainty is limited, likely to within 0.5-2x the estimated volume of 30% of the total system.		HB40	1.23	g/cm3
	PHT circuit main components (A and B Circuit)	Piping	5.805	2	11.61	m3			HB 3.1.1								1230	kg/m3
	everything is x2 for A + B Circuit	Main HX	1.472	2	2.944	m3			HB 3.1.1									
		Surge Tank	1.756	2	3.512	m3	1.841 given as total capacity in 3.4.3		HB 3.1.1									
		Drain tank	9.061	2	18.122	m3	9.373 given as total capacity in 3.4.3		HB 3.1.1									
	PHT circuit main components (C Circuit)	~~Piping~~	~~6.371~~	1		m3			HB 3.1.1									
		~~Main HX~~	~~1.472~~	1		m3			HB 3.1.1									
		~~Surge Tank~~	~~1.736~~	1		m3	1.756 given as total capacity in 3.4.3		HB 3.1.1									
		~~Drain tank~~	~~no tank for C~~															
	Emergency Injection Tanks	PO-TK1	20.53	1	20.53	m3	26.93 given as total capacity in 3.4.3		HB 3.1.1									
		PO-TK3	20.53	1	20.53	m3	26.93 given as total capacity in 3.4.3		HB 3.1.1									
		Lines	4.248	1	4.248	m3			HB 3.1.1									
	Degass System (per circuit)	All components	11.77	2	23.54	m3			HB 4.1.3									

	no capacity for condensers given		18.35	1	18.35	m3												
		Backup filter	0.045	2	0.09	m3			HB 4.1.8									
	Purification System - 1 system Common to all circuits	Total Volume	5.124	1	5.124	m3			HB 4.2.3									
	Relief Exhaust	Total Volume	5.45	1	5.45	m3			HB 4.3.3									
	Organic Supply	Total Volume	71.26	1	71.26	m3			HB 4.4.3									
	Fuel storage block	25' long	7.5" diameter	x25 tubes	766.990394	Ft3		C-12W62-49	HB 12.2.3									
	Fuel Washdown Facility (never used)	Dump Tank	2500	1	2500	L			HB 12.7.4									
	no indication of volume of other components	Storage Tanks	1362	2	2724	L each												
	Organic Sump A	Sump Pit	1680	1	1680	L			HB 14.2.2									
		lines	no estimate															
	Ventilation system	May have HB-40 coating, likely small compared to other systems																
	Experimental Loops	1L1 Loop	1135	1	1135	L			20.1									
		~~1L2 Loop~~	~~800~~	~~1~~		~~L~~	Light water, no organic		20.1									
		1L4 Loop	1360	1	1360	L			20.1									
		1L5 Loop	1360	1	1360	L			20.1									
	removed	~~1L6 Loop~~	~~1400~~	~~1~~		~~L~~			~~20.1~~									
	Sub-Total				2.92E+05	kg	this assumes that every surface of these systems was coated in organic, and not that the entire system was 100%filled		Mass	30%	assumes some tanks are still 1/3-1/2 full, and some fuel channels not properly drained.	8.77E+04	kg					
							this volume was included for perspective, in that the ISD part of the building itself is about 15000 m3		Volume			7.13E+01	m3					
Tritium	Moderator system	All	17500	1	17500	kg	17Ci/kg at shutdown (decay corrected)	WLDP-26100-041-000	HB 5.1.2					0.1x-10x. The estimate of 1% remaining is relatively arbitrary as little information could be located about the absorbed levels of HTO into the system walls. 1% volume loss seemed a conservative value based on the relative thickness of the system walls compared to the thickness of D2O within it. Could be substantially lower if sorption was much more limited or higher if the absorbed levels of HTO have been underestimated.		Tritiated Water	1	g/cm3
	Heavy water sump	Sump Pit (room 107)	2725	1	2725	L											1000	kg/m3
	Sub-Total				297546.325	Ci				1%	Likely conservative. Assumes max concentration of H3 at shutdown over lifetime of sorption. Desorption of metals has been occurring for 30 years.	2.98E+03	Ci					
												1.10E+14	Bq					
Mercury	Primary A+B Pumps 4 SPST mercury Switches volume unknown	Seal Drain Collection Chamber	4	6	24	cm3	Assume 1mL of Hg per switch. Assume 4 switches for each coolant pump (A+B, 4 loops, 6 pumps total)		DM 3.7.1.2					1x-10x. Mercury is specifically mentioned in the special cases, and may represent all uses of it withi WR-1, however mercury was more commonly used at the time of WR-1 construction, and it may have been used without specifically identifying it in less vital components.		Mercury	13.534	g/cm3
	Active Drains	Floor Drains	1	31	31	mL	assume 1mL was spilled in every large room once and made it to the drain. Based on mercury being present in WR-1 effluent in small quantities. Trace material is expected somewhere in the active drain system.										13534	kg/m3
	Sub-Total				7.44E-01	kg				100%	No mercury was visually confirmed. Only assumed from mention of switches on A+B pumps. Assumed all major PHT pumps had similar and no removal work completed. Also assume to be in drains in WR-1, and not in effluent tanks or lines outside WR-1.	7.44E-01	kg					
																0.035	0.42	