aLIGO Outgassing Workbook

- M. Zucker 11/3/2009
v1 M. Zucker 11/5/2009 add VE & wire
v2 D. Coyne 2/5/2010 added damping struts, improved Viton (Flourel) estimates for SUS added PTFE for Quad SUS
v3 D. Coyne 6/17/2010 added SLC baffles & beam dumps (porcelainized mild steel). Added Alu & SS estimates for HSTS & OMC SUSs. Added porcelainized steel measured outgassing rates.
v4 D. Coyne 7/7/2010 added diffusion rate through o-ring sealed viewports
v5 D.Coyne 9/25/2010 added Suspension MasterBond EP30-2 adhesive bonds

Outgas flux assumed

	(T*l/s/cm^2)	(T*l/s/cm^2)	(T*l/s/cm^2)	(T*l/s/cm^2)	(T*l/s/cm^2)	(T*l/s/cm^2)	(T*l/s/cm^2)	(T*l/s)	(T*l/s/cm^2)
Species	**SS/Cu**	**Aluminum**	**Viton**	**PEEK**	**Kapton**	**PTFE**	**Porcelain-Steel**	**O-ring Viewport**	**MasterBond EP30-2**
Hydrogen	1.0E-11	1.0E-11	1.0E-10	1.0E-10	1.0E-10	1.00E-10	6.9E-13		1.2E-12
Water (100h)	5.0E-11	5.0E-11	3.0E-09	3.0E-09	3.0E-09	3.0E-09	5.0E-14		
Water (1000h)	5.0E-12	5.0E-12	1.0E-09	1.0E-09	1.0E-09	1.0E-09	5.0E-15		2.2E-12
Air (or N2)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-14	9.9E-07	2.1E-11
CO	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E-15		
CO2	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.6E-15		3.1E-11
hydrocarbons							1.2E-16		5.0E-13
Source:							E1000221-v1	PSI V049-1-097, Rev.0, section 3.3.5	E1000386

Nominal pump speeds

	Dominant pump	**(l/s)**	
Water	80K cryo (long or short)	142,000	
Hydrogen	2500 l/s ion pump	4,200	
N2, CO etc.	2500 l/s ion pump	2,000	
other species	2500 l/s ion pump	1,700	(from PSI V049-1-078, pg. 19)

Ion Pump Speeds:

Species	Liters/sec	AMU
H2	4200	2
N2	2000	28
CO	1900	28
CO2	2150	44
CH4	2200	16
others	1700	

Equilibrium pressure

	(torr)	(torr)	(torr)
Station/Volume	**Hydrogen**	**Water (1000 h)**	**Total (1000h)**
LLO vertex	1.6E-08	4.0E-09	2.1E-08
LLO end	1.0E-08	9.6E-10	1.2E-08
LHO vertex	1.7E-08	4.0E-09	2.2E-08
LHO diagonal	1.4E-08	3.9E-09	1.9E-08
LHO end	1.7E-08	1.9E-09	2.1E-08