

WATER AND AIR HEAT LOAD (all LCW) and 9-8-9 ML

MAIN LINAC - ELECTRON & POSITRON																							
Components	Quantity Per 36m	Location	Total Heat Load (KW)	Average Heat Load (KW)	To Dirty Water							To Low Conductivity Water							to Chilled Water	Keith Jobe load to air Nov 22 06		Max Space Temp (C)	Source
					Heat Load to Water (KW)	Supply Temp (variation) (C)	Delta Temperature (C delta)	Water Flow (l/min)	Maximum Allowable Pressure (Bar)	Typical (water) pressure drop Bar	Acceptable Temp Variation delta C	Heat Load to Water (KW)	Supply Temp (variation) (C)	Delta Temperature (C delta)	Water Flow (l/min)	Maximum Allowable Pressure (Bar)	Typical (water) pressure drop Bar	Acceptable Temp Variation delta C		Heat Load to Water (KW)	Power fraction to Tunnel Air (0-1)		
Non-RF Components																							
LCW Skid Pump 1 per 4 rf -Motor/Feeder Loss	0.25	Service Tunnel	0.60	0.60	0.00	N/A	N/A		N/A	N/A	None	0	N/A	N/A		N/A	N/A	None	0	1.00	0.60		based on (1) 30 HP per 4 RF from Clay Table Email dated 9-15-06
I ² R Loss and Motor Loss (misc)	1	Service Tunnel	14.01	12.01																1.00	12.01		Clay's Email Nov 22 2006
Fancoils (5 ton Chilled Water) 1.5 Hp	2	Service Tunnel	2.91	2.91	0.00	N/A	N/A		N/A	N/A	None	0	N/A	N/A		N/A	N/A	None	0				(2) 1.5 HP per RF (Table 4 Ashrae Chap 28) placeholder
Rack Water Skid	0.25	Service Tunnel	0.20	0.20	0.00	N/A	N/A		N/A	N/A	None	0	N/A	N/A		N/A	N/A	None	0	1.00	0.20		based on (1) 5 HP per 4 rf (table4 Ashrae Chap 28) placeholder
Lighting Heat Dissipation ~1.3W/sf		Service Tunnel	1.65	1.65	0.00	N/A	N/A		N/A	N/A	None	0	N/A	N/A		N/A	N/A	None	0	1.00	1.65		* Clay - 14 W per sq m
Lighting Heat Dissipation ~1.3W/sf	-	Accelerator Tunnel	0.00	0.00	0.00	N/A	N/A		N/A	N/A	None	0	N/A	N/A		N/A	N/A	None	0				
People Heat Dissipation 500btuh each	0	Accelerator Tunnel	0.00	0.00	0.00	N/A	N/A		N/A	N/A	None	0	N/A	N/A		N/A	N/A	None	0				
People Heat Dissipation 500btuh each	2	Service Tunnel	0.29	0.29	0.00	N/A	N/A		N/A	N/A	None	0	N/A	N/A		N/A	N/A	None	0				
AC Pwr Transformer 34.5-.48 kV	0.25	Service Tunnel	2.00	2.00	0.00	N/A	N/A		N/A	N/A	None	1.50	N/A	N/A		N/A	N/A	None	0	0.25	0.50		* Clay email 3-14-06 typical 112.Kva oil xfmr *
Emerg. AC Pwr Transformer 34.5-.48 kV		Service Tunnel	1.00	1.00	0.00	N/A	N/A		N/A	N/A	None	0	N/A	N/A		N/A	N/A	None	0	1.00	1.00		* Clay email 3-14-06 typical 112.Kva oil xfmr Keith J
RF Components																							
RF Charging Supply 34.5 Kv AC-8KV DC	1/36 m	Service Tunnel	4.0	4.0									40	40	1.17	18	8	10	0	0.3	1.2		* C.Jensen email 2-27-06 183 kVa 0.84pf oil ps xfmr **Shigeki Apr 18 2006 ** Clay 5-25-06 LLRF meeting ** Sep 18 move all to LCW per Marc Ross ** Move load to Dirty Water per RCassell Oct 20 2006, **Nov 22 2006 Keith Jobe Wag on load to Air**Nov 27 2006 C. Adolphsen Email
Switching power supply 4kv 50kW	1/36 m		7.5	7.5									35	13.6	7.6	13	8	10	0	0.4	3.0		** Move load to Dirty Water per Rcasell Oct 20 2006 LCW for now **Nov 22 2006 Keith Jobe wag on load to air **Chris Jensen Post meeting notes 11 16 06 **Nov 27 2006 C. adolphsen Email
Modulator	1/36 m	Service Tunnel	7.5	7.5												28.823			0	0.4	3.0		* Shigeki Fukuda Email 3-1-06 **Shigeki Apr 18 2006**Nov 22 2006 Keith Jobe wag on load to air** 11-27-06 C. Adolphsen Email **12-1-06 Email from Chris Jensen
Pulse Transformer	1/36 m	Service Tunnel	1.0	1.0															0	0.3	0.3		**Shigeki Apr 18 2006** Nov 22 2006 Keith Jobe wag on load to air**11-27-06 C.Adolphsen Email
Klystron Socket Tank / Gun	1/36 m	Service Tunnel	1.0	1.0															0	0.2	0.2		**Shigeki Apr 18 2006** Marc& Keith -remove load to air/chilled - transfer all load to water**Nov 22 2006 Keith Jobe wag on load to air**11-27-06 C. adolphsen Email
Klystron Focusing Coil (Solenoid)	1/36 m	Service Tunnel	4.0	4.0															0	0.1	0.4		* Shigeki Fukuda Email 4-05-06 **Nov 22 2006 Keith Jobe wag on load to air** 11-27-06 C. Adolphsen Email
Klystron Collector	1/36 m	Service Tunnel	58.9	47.2														2	0	0.0	1.4		* Shigeki Fukuda Email 3-1-06 **Nov 22 2006 Keith Jobe wag on load to air** 11-27-06 C. Adolphsen Email
Klystron Body	1/36 m	Service Tunnel																5	+ - 2.5 C	0			* Shigeki Fukuda Email 3-1-06** Keith Jobe added stability Oct 20 2006 * * HLRF 11/16 /06 meeting** 11-27-06 C. Adolphsen Email
Klystron Windows	1/36 m	Service Tunnel																1		0			* Shigeki Fukuda Email 3-1-06**11-27-06 C. Adolphsen Email
Relay Racks (Instrument Racks)	1/36 m	Service Tunnel	10.0	10.0	0.0	N/A	N/A		N/A	N/A	None	0.0	N/A	N/A		N/A	N/A	None	11.5	-0.2	-1.5		* Shigeki Fukuda Email 3-30-06 **Shigeki Apr 18 2006 (chilled water) ***Rlarsen email** RayLarsen Email 9-15-06 except reduced by 40% per Marc * Ray HLRF Meeting 11/16/06**11-27-06 C. Adolphsen Email
Circulators, Attenuators & Dummy Load	1/36 m	Accelerator Tunnel	42.3	34.0															0	0.1	1.7		**Shigeki Email Apr 28 2006**HLRF 11/16/06 meeting update from 24.3 to 29.8 KW** 11-27-06 C. Adolphsen Email
Waveguide	1/36 m	Accelerator Tunnel	3.9	3.9															0	0.1	0.4		* Shigeki Fukuda Email 3-30-06** Keith Jobe added stability Oct 20 2006** HLRF 11/16/06 meeting from 4 KW to 5 KW**11-27-06 C. Adolphsen Email
Subtotal RF unit Only			140.10	120.10																			(a) HLRF meeting Nov 16 2006
Total RF			162.8	140.8	0.00														99.99	11.50	26.07		

85 F (a)

Total Heat load to Chilled water (per RF)	37.6 KW	cooled by process water with rust inhibitor
Total Heat load to LCW (per RF)	100.0 KW	cooled by chilled water
		cooled by low conductivity water