

# LCWS12

# Conventional **Electrical** System Americas Region Power Requirements

October 23, 2012

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#### **LOAD TABLE**

# TDR Baseline Peak Operating Loads MW

Area System	RF Power	RF Racks	NC Magnets & Power Supplies	Cryo	Conventional		
					Normal Load	Emergency Load	Total
e-sources	1.28	0.09	0.73	0.80	1.02	0.16	4.08
e+sources	1.39	0.09	4.94	0.59	2.19	0.35	9.56
DR	8.67		2.97	1.45	1.84	0.14	15.08
RTML	4.76	0.32	1.26	part of ML cryo	0.12	0.14	6.59
Main Linac	58.1	4.9	0.914	32	8.10	5.18	109.16
BDS			10.43	0.41	0.24	0.28	11.36
Dumps					1		1.00
IR			1.16	2.65	0.09	0.17	4.07
TOTALS	74.2	5.4	22.4	37.9	14.6	6.4	161

#### Loads Developed and Provided by the Area System Groups

#### Peak Operating Power Loads -

Loads During Steady State Operations at Baseline Design

#### **LOAD TABLE**

# TDR Baseline Peak Operating Loads MW

# Developed by CF&S from Loads Provided by the Area System

**Groups** 

						<b>\</b>
RF Power	RF Racks	NC Magnets & Power Supplies	Cryo	Conventional		
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		10.43	0.41	0.24	0.28	11.36
				1		1.00
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74.2	5.4	22.4	37.9	14.6	6.4	161
	1.28 1.39 8.67 4.76 58.1	1.28 0.09 1.39 0.09 8.67 4.76 0.32 58.1 4.9	RF Power     RF Racks     Power Supplies       1.28     0.09     0.73       1.39     0.09     4.94       8.67     2.97       4.76     0.32     1.26       58.1     4.9     0.914       10.43     1.16	RF Power         RF Racks         NC Magnets & Power Supplies         Cryo           1.28         0.09         0.73         0.80           1.39         0.09         4.94         0.59           8.67         2.97         1.45           4.76         0.32         1.26         part of ML cryo           58.1         4.9         0.914         32           10.43         0.41           1.16         2.65	RF Power         RF Racks         NC Magnets & Power Supplies         Cryo         Normal Load           1.28         0.09         0.73         0.80         1.02           1.39         0.09         4.94         0.59         2.19           8.67         2.97         1.45         1.84           4.76         0.32         1.26         part of ML cryo         0.12           58.1         4.9         0.914         32         8.10           10.43         0.41         0.24           1         1.16         2.65         0.09	RF Power   RF Racks   NC Magnets & Power Supplies   Cryo   Normal Load   Emergency Load   1.28   0.09   0.73   0.80   1.02   0.16   1.39   0.09   4.94   0.59   2.19   0.35   1.84   0.14   1.84   0.14   1.84   0.14   1.84   1.84   1.84   1.84   1.84   1.84   1.85   1

#### **General Criteria**

Peak Operating Power Loads -

Loads During Steady State Operations at Baseline Design Power Required to Support the Facilities and Tech. Loads

**Conventional Power –** 

Loads that Do Not Require Alt. Source Backup Power

Emergency –

Normal -

Critical Loads that Require Alt. Source Backup Power

#### **Conventional Load Development (Peak During Operations)**

#### Surface

- Lights - Receptacles - Crane - Elevator - Chillers - Cooling Towers - Chilled Water Pumps - Cooling Water Pumps -LCW Pumps - CRAC units - HVAC Units - Cryo Liquid StorageSystem - Ventilation Units

#### Tunnel

- Welding Receptacles
   Receptacles
  - Process Water Pumps
  - LCW Pumps

- Lights

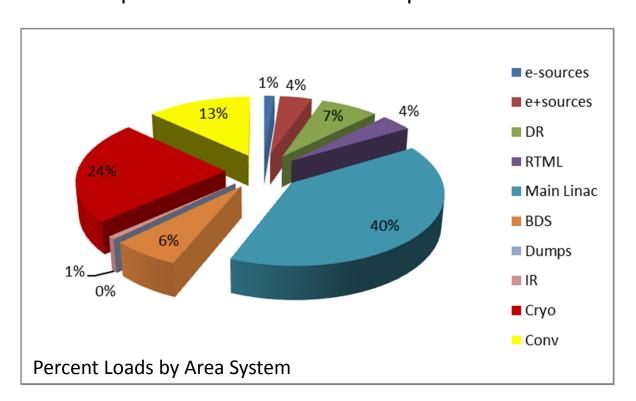
- LCW Booster Pumps
- Fan Coil Units
- -Sump Pumps
- Groundwater Lift Pump
- Emergency Power Required Loads Included in Peak
- Loads Included in Peak
- Loads NOT Included in Peak

#### **Load Distribution**

Conventional - 21MW (13% of the total)

Conventional related to heat rejection equipment - 14 MW (8% of total)

Fractional improvements to the heat rejection system can provide small improvements to the overall power load



Aica System	10100	
e-sources	2.1	1%
e+sources	6.4	4%
DR	11.6	7%
RTML	6.3	4%
Main Linac	63.9	40%
BDS	10.4	6%
Dumps	0.0	0%
IR	1.2	1%
Cryo	37.9	24%
Conv	21.0	13%

M/M

Area System

### **Emergency/Standby Power Systems**

- Fire detection and alarm systems.
- Exit sign illumination.
- Emergency lighting.
- Elevator car lighting.
- Fire Command Station lighting.
- Two-way fire department communication systems.
  - Ref: Hughes Associates Life Safety/Fire Protection Code Analysis
  - Project Requirement

- Elevators, elevator equipment, and elevator machine room/controller cooling.
- Air handling systems for the tunnels and elevator lobbies.
- Lighting for HVAC mechanical equipment rooms.
- Cranes, Sump/Lift Pumps.

# Operating Modes –

#### **Discussion**

#### **Full Capacity (Peak Operating)**

• Drives the Requirements for the Electrical Equipment Installed.

#### **O&M** Cost

**Nominal ? (Definition Needed)** 

Generally Determine the Power Bill

RF Only, No Beam

**Shut Down** 

**Standby (Momentary Interruption)** 

# **Possible Improvements**

#### **Unexplored Concepts**

#### Post RDR VF Exercise

- Provide <u>one</u> high efficiency cogeneration power/cooling plant on site and distribute power and 32F+ Chilled Water throughout the facility
- Provide <u>Distributed</u> Cogeneration Power/Cryo
- Consider use of Renewable Energy Source with Cogeneration