



5X-960926-CLN-01

TO: M ONO
FROM: C NEUMEYER
SUBJECT: REVISED ESTIMATE OF OPERATING COSTS AT D-SITE
REFERENCE:

(1) 5X-960923-CLN-01, "Implementation of NSTX WBS5 At D-Site"

This memo presents a revised estimate for NSTX WBS5 operating costs at D-site.

The following assumptions were changed compared to the reference memo:

- Assumed MG idle \approx 70 Hz, with excitation off most of the time (since only one set is used and there is no synchronization issue, and since there will be no NBI load on the MG (it can run from the grid if it is used), it is feasible to de-excite between pulses). This reduces the typical loss to 1.75MW from the 4.0MW assumed previously.
- Corrected the application of G&A rates.
- Revised the D-site MG maintenance estimate to 3500 tech hours + \$30K M&S.
- Reduced the number of operating days per month to 15 from 20.
- Added manpower for AC power operations and maintenance (although it is the same for C- and D-sites). This covers the AC power operations for the entire facility (not just the rectifier systems AC supply).

The results are given in the following table.

Although not credited in the table, it is noted that, for non-inductive operation it is likely that the MG power is not required because of the absence of the OH load. The TF load ($\approx 17.77\text{kA} \cdot 2\text{kV} = 35.5\text{MVA}$) plus the outer PF, CHI, and NBI loads will likely be within the grid capability. This would reduce the energy bill and, if the OH operation was eventually dropped, the need for the MG.

Also, a proposal is on the table to modify the D-site MG air circulation in such a way that the windage losses would be substantially reduced.

	D-site	C-site	
MG System			
#months/yr	9.00	9.00	mo
#days/month	15.00	15.00	day
#hrs/day	8.00	8.00	hrs
repetition period	5.00	5.00	min
#pulses/day	96.00	96.00	pulses
Idling Power	1.75	1.00	MW
Pulse Energy	100.00	100.00	MJ
Average Power	2.08	1.33	MW
Energy/Day	16.67	10.67	MW-hr
Energy Cost	0.08	0.08	\$/kW-hr
Peak 15 min Avg Power	2.08	1.33	MW
Demand Cost	10.00	10.00	\$/kW
Energy Cost/month	20000.00	12800.00	\$
Demand Cost/month	20833.33	13333.33	\$
Annual Electricity Costs	367500.00	235200.00	\$
Annual Maintenance Cost	181155.00	126800.00	\$
Subtotal	548655.00	362000.00	\$
#Engineers	1.00	0.50	Engr
#Technicians	1.00	2.00	Tech
Engineer Cost/Day	868.00	868.00	\$
Technician Cost/Day	414.00	414.00	\$
Annual Operator Cost	283322.00	278902.00	\$
Total	831.98	640.90	\$K
AC Power System			
#Engineers	1.25	1.25	Engr
#Technicians	2.00	2.00	Tech
Engineer Cost/Day	868.00	868.00	\$
Technician Cost/Day	414.00	414.00	\$
Annual Operator Cost	422773.00	422773.00	\$
M&S	50000.00	50000.00	\$
Total	472.77	472.77	\$K
Rectifier System			
#Engineers	2.00	1.00	Engr
#Technicians	2.00	1.00	Tech
Engineer Cost/Day	868.00	868.00	\$
Technician Cost/Day	414.00	414.00	\$
Annual Operator Cost	566644.00	283322.00	\$
M&S	25000.00	25000.00	\$
Total	591.64	308.32	\$K
Grand Total	1896.39	1422.00	\$K

With the revised assumptions the annual cost differential is reduced to \approx \$500K.

It is important to note that the above includes only the electrical energy costs associated with the operation of the "experimental" power systems. Those loads associated with the "house power" (HVAC and lighting, \approx 2 to 3 MW) and "auxiliary systems" (pumps, motors, etc., TBD depending on NSTX requirements) are not included. In fact the latter energy costs exceed the former.

Also worth noting is that, since the D-site facility is separately metered whereas the C-site experimental facilities are not, as I understand it the D-site energy costs are presently charged directly to TFTR whereas the PBX-M/PLT energy costs are indirectly covered in the overhead.

cc:

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NSTX File