

NCSX Work Approval Form (WAF)

WBS Number: 132

WBS Title: PF Coils

Job Numbers: 1302 and 1352

Job Title: PF Coil Design (1302) and PF Coil Procurements (1352)

Job Manager: Mike Kalish

Description:

This WBS element consists of the manufacturing design and fabrication of the PF conductor assembly of the PF winding packs including interface elements for connections to power and cooling supply at the coils, and integration of the PF1a coils with the central solenoid structural elements.

Schedule:

See Attached

Approvals:

_____	_____
Job Manager	Date
_____	_____
Responsible Line Manager	Date
_____	_____
Project Manager	Date
_____	_____
Engineering Department Head	Date

NCSX June 2007 ETC
TABLE II - Materials and Subcontracts

Materials and Subcontracts (M&S)																									
Description:	FY07\$K										HOURS														Basis of Estimate
	41MS	48MS	37STK	35TRV	L	31OT	ORNL EM	ORNL DSN	EMEM	EMSM	EMSB	EMTB	EAEM	EASB	EEEM	EESM	EESB	EETB	ECEM	ECSB	ECTB	RM2	RM3		
Procurement & Fabrication																									Past Experience with procurement of TF Coils
PF Coil RFQ and Procurement													120												Travel to Evaluate Vendors (2trips)
Procurement Vendor Evaluation				5.00								40												Outokumpu (Luvata) estimate and internal calculation of weight of CU (adjusted for COMEX prices in mid-May 2007) - See Table V	
Conductor Procurement PF4	29.80											16												Outokumpu (Luvata) estimate and internal calculation of weight of CU (adjusted for COMEX prices in mid-May 2007) - See Table V	
Conductor Procurement PF5	38.20											16												Outokumpu (Luvata) estimate and internal calculation of weight of CU (adjusted for COMEX prices in mid-May 2007) - See Table V	
Conductor Procurement PF6	27.30											16												Outokumpu (Luvata) estimate and internal calculation of weight of CU (adjusted for COMEX prices in mid-May 2007) - See Table V	
Conductor Procurement Spare	19.10																							Enough copper to build one spare of any coil, Outokumpu (Luvata) estimate and internal calculation of weight of CU (adjusted for COMEX prices in mid-May 2007) - See Table V	
PF 4 Materials	40.90																							Internal PF4 Estimate - See Table V	
PF 5 Materials	52.77											24												Internal PF5 Estimate - See Table V	
PF 6 Materials	42.00											24												Internal PF6 Estimate - See Table V	
PF 4 Tooling	72.00																							Everson e-mail (B. Umbenaur to M. Kalish) of 4/12/07 - see Table V	
Fabrication of PF4	40.20																							Everson e-mail (B. Umbenaur to M. Kalish) of 4/12/07 - see Table V	
Fabrication of PF 5, Including Tooling	415.00																							Everson e-mail (B. Umbenaur to M. Kalish) of 12/5/06 - see Table V	
Fabrication of PF 6, Including Tooling	485.00																							Everson e-mail (B. Umbenaur to M. Kalish) of 12/5/06 - see Table V	
Fabrication Oversight												784												During fabrication at vendor, 2days per week +80hrs drafting. Based on experience supporting TF Coil Procurement, Coverage is 2 days per week instead of 2.5 because coils are simpler than TF Coils	
Refurbish PF1a												80												Based on engineering evaluation of condition of PF1A	
PF Inspection and Testing												120	60											One week per fcoil set (upper & lower) for EMTB - basis of estimate	
PF1a Assembly												160	40											two technicians for two weeks with oversight - includes assembly of buswork but not fabrication of buswork, Based on engineering judgement and evaluation of the number of parts to assemble	

NCSX June 2007 ETC
TABLE III - Fabrication/Assembly Installation

In-house Fabrication and Assembly and Installation																												
Description: Incl in Field Period Assembly and Machine Assembly Jobs																												

NCSX June 2007 ETC
TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

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Uncertainty of the Estimate					
	<u>High</u>	<u>Medium</u>	<u>Low</u>	<u>Uncertainty Range (%)</u>	<u>Comments/Other Considerations</u>
Job 1302				-15%/+25%	
Design Maturity			X		Still in initial design phases - although much design work accomplished, still haven't held PDR. Interfaces with coil structures still not finalized.
Design Complexity			X		PPPL has significant experience designing conventional solid copper round coils (e.g., TFTR, PLT, PBX-M, etc.)
Job 1352				-15%/+25%	
Design Maturity			X		Still in initial design phases - although much design work accomplished, still haven't held PDR. Interfaces with coil structures still not determined.
Design Complexity			X		Both PPPL and outside vendors have significant experience manufacturing conventional solid copper round coils (e.g., TFTR, PLT, PBX-M, etc.)

Other Comments: Have budget estimates from a single vendor, risk that final estimate could increase. See COMEX quote on 5/10/2007. Original pricing based on April COMEX quote @ \$3.14/lb => as of May 10, 2007, now at ~\$3.60/lb => used this COMEX quote as of mid-May.

Note: High/Medium/Low uncertainty assessment from Job Manager. Uncertainty range based on AACEI recommended practice 18R-97 as amended for NCSX.

Residual Impacts								
<u>Job</u>	<u>Risk Description</u>	<u>Likelihood of Occurring</u>	<u>Mitigation Plan</u>	<u>Basis of estimate</u>	<u>Cost Impact</u>		<u>Schedule Impact</u>	
					<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
1302 - NONE								
1352 PF vendor produces a non-compliant coil requiring fabrication of an additional coil		VU	Conductor for extra coil will be procured in advance and available to wind a new coil if required. Float in schedule appears adequate to avoid critical path impact.	Increase PPPL Title III by ~1 man-month	+\$15	+\$35	+ 0.00	+ 0.00
No suitable PF coil vendor submits bid. PC coils need to be built in-house.		U	PF is last major, special procurement. Sources sought received two qualified respondents. Capability to build at PPPL exists if needed.	Cost impact estimated to be up to \$300k (1/3 of fabrication costs) for potentially higher labor rates at PPPL. No impact on critical path expected.	+\$0	+\$300	+ 0.00	+ 0.00

- Notes:
- Low cost and schedule impacts are considered the minimum (0-percentile) impacts should the event occur. High cost and schedule impacts are considered the maximum (100-percentile) impacts should the event occur
 - Cost impacts should be entered as man-hours (by demographic) and M&S direct cost under basis of estimate. Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact. Project control is responsible for quantifying the low and high cost impacts based on the labor hours and M&S identified
 - The schedule impacts should be entered as the min and max impacts on the critical path. If there is no critical path impact then the schedule entries should be zero.
 - Likelihood of occurrence should be entered consistent with our risk classification methodology, i.e. VL= Very Likely (P>80%), L=Likely (80%>P>40%), U=Unlikley (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)

**NCSX June 2007 ETC
TABLE V - Basis of Estimate**

WBS Number: 132
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M&S Estimate Backup

Internal Estimate of Materials - based on quotes (Outokumpo), past procurements, & engineering

NCSX PF Fabrication Material Cost Estimate

PF Coil Manufacturing Cost Details				
II. Materials M&S		PF4	PF5	PF6
Copper extrusion cost		\$/kg	\$/kg	\$/kg
Copper order factor		factor	factor	factor
Copper cost - 2 coils	\$	\$29,812	\$38,174	\$27,267
Misc matl - \$ per lb of Cu in coils	2.0	\$/kg	\$/kg	\$/kg
glass insul width	mm	25.4	25.4	25.4
turn insul - length/meter of cond./layer	m/m	3.15	3.15	3.15
turn ins. Tape Thickness	mm	0.19	0.19	0.19
No. half lapped layers	#	2	2	2
meters of ins. roll	m	10.00	10.00	10.00
no. rolls/coil	#	330.4	422.1	301.3
insulation waste factor	multiplier	1.3	1.3	1.3
total rolls of turn ins. reqd. - 2 coils	#	858.9	1097.6	783.5
turn insulation cost per roll	\$/roll	4	4	4
Kapton insul width	mm	25.4	25.4	25.4
turn insul - length/meter of cond./layer	m/m	3.15	3.15	3.15
turn ins. Tape Thickness	mm	0.19	0.19	0.19
No. half lapped layers	#	1	1	1
meters of ins. roll	m	10.00	10.00	10.00
no. rolls/coil	#	195.2	211.1	150.7
insulation waste factor	multiplier	1.3	1.3	1.3
total rolls of turn ins. reqd. - 2 coils	#	429.5	548.8	391.7
turn insulation cost per roll	\$/roll	40	40	40
turn insulation total cost - 2 coils	\$	\$29,376	\$37,537	\$26,784
ground wall tape thickness	mm	0.38	0.38	0.38
No. half lapped layers	#	2.00	2.00	2.00
total ground wall thick	mm	1.52	1.52	1.52
ground wall tape width	cm	6	6	6
gw tape length reqd	m	96	240	267
meters of ins. roll	m	10	10	10
no. rolls/coil	#	10	24	27
insulation waste factor	multiplier	1.30	1.30	1.30
no. rolls of GW insulation, pair of coils	#	25	62	69
GW tape cost per roll	\$	50	50	50
GW insulation cost - 2 coils	\$	\$1,880	\$4,716	\$5,241
Epoxy volume reqd. (15% void fraction)	l	23	33	24
Epoxy cost/ liter	\$/l	30	30	30
Epoxy cost for pair of coils	\$	\$2,066	\$2,963	\$2,175
Leads and coolant connections/tool	\$	2500	2500	2500
Leads & coolant coils - pair of coils	\$	\$7,550	\$7,550	\$7,550
Material Costs Insulation and Leads Only, Coil Pair		\$40,902	\$52,786	\$41,781
Total Material Cost Including Copper Conductor		\$70,714	\$90,940	\$69,020

From: B. Umbenhaur [bumbenhaur@eversontesla.com]
 Sent: Tuesday, December 05, 2006 10:52 AM
 To: Michael R. Kalish; Rodney D. Templon
 Cc: jstafiniak@eversontesla.com
 Subject: PF Coils

Hi Mike,
 For the PF Coil Budgetary, please use the following numbers based on some assumptions. The costs shown are for the coils only and no shipping or facilities related costs are included. The shipping costs will have an impact at the coils are so large. The coils are a little too large for the current configuration of the clean space we are using to wind the TF coils.

The coils are also too large for our ovens so we would plan to use steam to cure the coils during the VPI process. We have done this successfully in the past.

We have a material supply configuration as on the TF coils where the conductor and insulation is supplied by PPPL.

The current winding specification calls for a difficult winding scheme.

PF5 Coils (Quantity 2)

\$415,000 for two coils including tooling

PF6 Coils (Quantity 2)

\$485,000 for two coils including tooling

Please let me know if you have any questions or concerns. Thanks.
 Bill

Everson Quote on PF5 and PF6 Fabrication and Tooling

NCSX June 2007 ETC
TABLE V - Basis of Estimate

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CU Cost Estimate - Internal

Copper Cost Estimate for PF4, PF5 and PF6
 Note : Includes 25% spare in final cost calculation

CopperPrice := 3.60 dollars

PF 4 The Weight of the conductor is: PF4Length := 262.4m

$$.323 \frac{\text{lb}}{\text{in}^3} \left[(.787\text{in})^2 - \pi \left(\frac{.354\text{-in}}{2} \right)^2 \right] \cdot \text{PF4Length} = 1.738 \times 10^3 \text{ lb}$$

$$\text{PF4Weight} := .323 \frac{\text{lb}}{\text{in}^3} \left[(.787\text{in})^2 - \pi \left(\frac{.354\text{-in}}{2} \right)^2 \right] \cdot \text{PF4Length}$$

For 2 coils using Outo Kumpu Quote

$$\text{PF4Weight} \cdot 2 \cdot 1.25 \left(\frac{3.10 + 1.57}{\text{lb}} \right) = 2.029 \times 10^4 \text{ dollars} \quad \text{at time of quote}$$

$$\text{PF4Weight} \cdot 2 \cdot 1.25 \left(\frac{3.10 + \text{CopperPrice} + .16}{\text{lb}} \right) = 25812 \text{ dollars}$$

inflated to 5/07
 3.10=engineering
 3.60=copper
 .16= silver bearing

PF 5 The Weight of the conductor is: PFSLength := 336m

$$.323 \frac{\text{lb}}{\text{in}^3} \left[(.787\text{in})^2 - \pi \left(\frac{.354\text{-in}}{2} \right)^2 \right] \cdot \text{PFSLength} = 2.226 \times 10^3 \text{ lb}$$

$$\text{PF5Weight} := .323 \frac{\text{lb}}{\text{in}^3} \left[(.787\text{in})^2 - \pi \left(\frac{.354\text{-in}}{2} \right)^2 \right] \cdot \text{PFSLength}$$

For 2 coils using Outo Kumpu Quote

$$\text{PF5Weight} \cdot 2 \cdot 1.25 \left(\frac{3.10 + 1.57}{\text{lb}} \right) = 2.599 \times 10^4 \text{ dollars} \quad \text{at time of quote}$$

$$\text{PF5Weight} \cdot 2 \cdot 1.25 \left(\frac{3.10 + \text{CopperPrice} + .16}{\text{lb}} \right) = 38174 \text{ dollars}$$

inflated to 5/07
 3.10=engineering
 3.60=copper
 .16= silver bearing

CopperPrice = 3.6 dollars

PF 6 The Weight of the conductor is: PF6Length := 240m

$$.323 \frac{\text{lb}}{\text{in}^3} \left[(.787\text{in})^2 - \pi \left(\frac{.354\text{-in}}{2} \right)^2 \right] \cdot \text{PF6Length} = 1.59 \times 10^3 \text{ lb}$$

$$\text{PF6Weight} := .323 \frac{\text{lb}}{\text{in}^3} \left[(.787\text{in})^2 - \pi \left(\frac{.354\text{-in}}{2} \right)^2 \right] \cdot \text{PF6Length}$$

For 2 coils using Outo Kumpu Quote

$$\text{PF6Weight} \cdot 2 \cdot 1.25 \left(\frac{3.10 + 1.57}{\text{lb}} \right) = 1.856 \times 10^4 \text{ dollars} \quad \text{at time of quote}$$

$$\text{PF6Weight} \cdot 2 \cdot 1.25 \left(\frac{3.10 + \text{CopperPrice} + .16}{\text{lb}} \right) = 27267 \text{ dollars}$$

inflated to 5/07
 3.10=engineering
 3.60=copper
 .16= silver bearing

$$(\text{PF6Weight} + \text{PF5Weight}) \cdot 2 \cdot 1.25 \left(\frac{3.10 + 3.14 + .16}{\text{lb}} \right) + 4000 = 6.505 \times 10^4$$

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PRINCETON PLASMA PHYSICS

FAX 609-243-3248
Tel 609-243-2277

OUTOKUMPU

RFQ on copper conductor

1 (1)
May 9, 2007

Dear Mike,

Outokumpu Quote

Please find our offer as follows:

Product specification and quantity:

- * CDA102 Copper, soft temper
- * Size 20mm Square with round 9mm ID, Outokumpu tool # 8456
- * In pancake coils of approximately 100 ft
- * Qty to be determined later.

Pricing:

Fabrication cost:	Up to 500lbs	One lump sum \$3,980 plus copper value
	1,000lbs	FAB \$ 4.90/lb plus copper value
	2,000lbs	FAB \$ 3.10/lb plus copper value

For Silver-bearing copper (CDA 107) add \$0.16/lb

The copper value based on the Comex market for November 2004 shipments is currently \$ 1.57/ lb.

The copper value may be firm for the month of shipment the day an order is placed, up to two weeks prior to the confirmed ex mill date, or will be automatically firm at Outokumpu published price the Friday preceding the confirmed ex mill date.

Payment terms:

60 days from the date of invoice. Subject to credit approval.

Lead time and delivery terms:

Ex mill Pon, Finland, November 4, 2004 plus 4 weeks (estimated) ocean transit. Delivered Duty Paid (DDP Incoterms 2000) to Princeton, NJ.

Other Terms:

According to the Outokumpu Poricopper Oy's General Terms for Sales (has been supplied earlier). The interest rate in the USA for overdue payment is 12%.

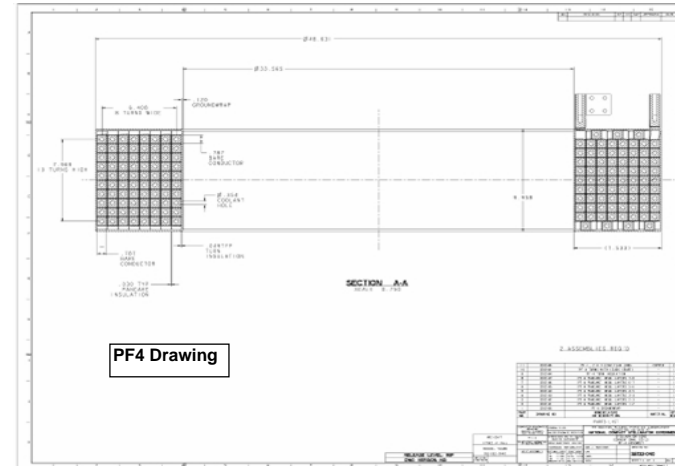
Sincerely,

Outokumpu Copper – Electrical Power & Components

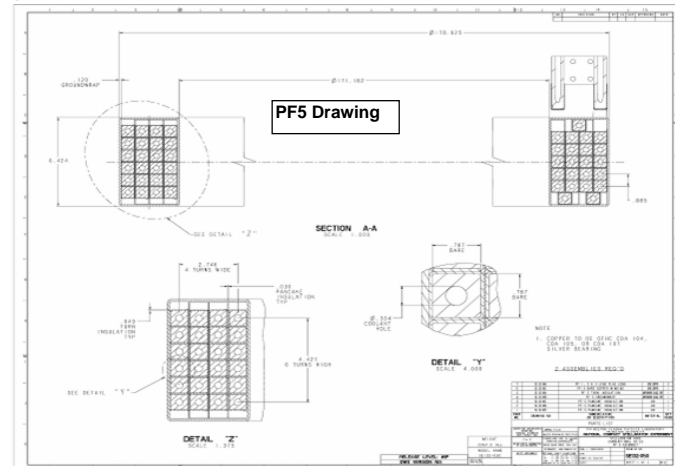
Petri Nordling
Sales Manager

Cc: Asko Hakkinen, Paivi Nieminen, Denise Nolan

OUTOKUMPU COPPER – EPC Europe Division
801 Pittsburgh Drive, Delaware OH 43015 / Tel. 740-368-7946 / Fax 740-363-3847



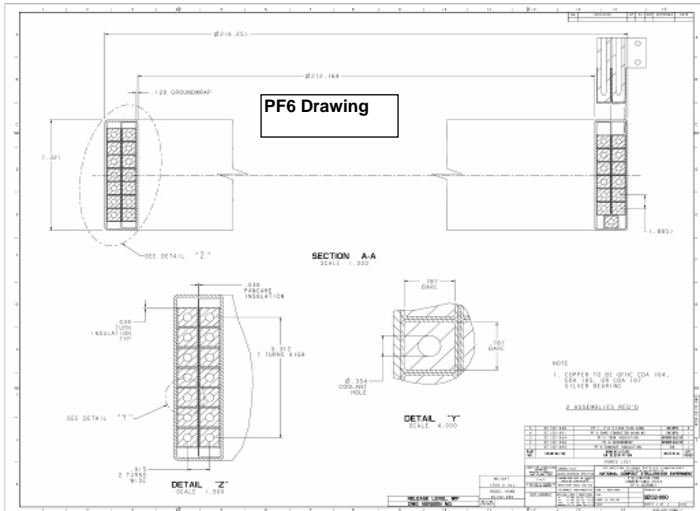
PF4 Drawing



PF5 Drawing

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COMEX Copper High Grade Futures Quotes and Market Prices

Page 1 of 2



Commodity Futures Price Quotes For
COMEX Copper High Grade

(Price quotes for COMEX Copper High Grade delayed at least 30 minutes as per exchange requirements)

[Click here to refresh data](#)

Month	Session								Pr. Day		Options
	Open	High	Low	Last	Time	Sett	Chg	Vol	Sett	OpInt	
May 07	3.6040	3.6040	3.5820	3.5820	May 10, 08:40	-	-0.0935	583	3.6755	-	Call Put
Jun 07	-	-	-	3.6790 *	May 09, 17:34	-	-	423	3.6790	-	Call Put
Jul 07	3.6275	3.6300	3.5750	3.6080	May 10, 09:21	-	-0.0710	13039	3.6790	-	Call Put
Aug 07	-	-	-	3.6700 *	May 09, 17:34	-	-	-	3.6700	-	Call Put
Sep 07	-	-	-	3.6600 *	May 09, 17:34	-	-	2323	3.6600	-	Call Put
Oct 07	-	-	-	3.6375 *	May 09, 17:34	-	-	-	3.6375	-	Call Put
Nov 07	-	-	-	3.6510 *	May 09, 17:35	-	-	1	3.6150	-	Call Put
Dec 07	-	-	-	3.5925 *	May 09, 17:34	-	-	510	3.5925	-	Call Put
Jan 08	-	-	-	3.6200 *	May 09, 17:35	-	-	-	3.5660	-	Call Put
Feb 08	-	-	-	3.5955 *	May 09, 17:34	-	-	-	3.5390	-	Call Put
Mar 08	-	-	-	3.5100 *	May 09, 17:34	-	-	-	3.5100	-	Call Put
Apr 08	-	-	-	3.3855 *	May 09, 17:34	-	-	-	3.4785	-	Call Put
May 08	-	-	-	3.4755 *	May 09, 17:34	-	-	-	3.4465	-	Call Put
Jun 08	-	-	-	3.4735 *	May 09, 17:34	-	-	-	3.4145	-	Call Put
Jul 08	-	-	-	3.3180 *	May 09, 17:34	-	-	-	3.3825	-	Call Put
Aug 08	-	-	-	2.3330 *	May 09, 17:34	-	-	-	3.3505	-	Call Put
Sep 08	-	-	-	3.1900 *	May 09, 17:35	-	-	-	3.3185	-	Call Put
Oct 08	-	-	-	3.0900 *	May 09, 17:34	-	-	-	3.2865	-	Call Put
Nov 08	-	-	-	3.0400 *	May 09, 17:34	-	-	-	3.2545	-	Call Put
Dec 08	-	-	-	3.1580 *	May 10, 09:22	-	-	-	3.2225	-	Call Put
Jan 09	-	-	-	3.0580 *	May 09, 17:35	-	-	-	3.1905	-	Call Put
Feb 09	-	-	-	2.4875 *	May 09, 17:34	-	-	-	3.1585	-	Call Put
Mar 09	-	-	-	2.6760 *	May 09, 17:34	-	-	-	3.1265	-	Call Put
Apr 09	-	-	-	2.9735 *	May 09, 17:34	-	-	-	3.0945	-	Call Put

[Click here to refresh data](#)

Times indicate exchange local time.

* An asterisk beside the last price indicates that the price is from a previous session

<http://quotes.tradingcharts.com/futures/quotes/HG.html>

5/10/2007

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Everson Quote on PF Fabrication
and Tooling

From: B. Umbenhour [bumbenhour@eversontesla.com]
Sent: Thursday, April 12, 2007 12:30 PM
To: Michael R. Kalish
Subject: PF4 Coil
Hi Mike,
Budgetary pricing for the PF4 Coil

Tooling: - \$72,000
PF4 Coil - \$20,100/coil (\$40,200 for two coils)

Thanks.
Bill

Visit Everson Tesla Inc. on the web at <http://www.eversontesla.com>

Activity ID	MILE-stones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Job: 1302 - PF Design -KALISH																
FY07 Rebaseline Exercise																
ECP53RBX02		FY07 Rebaseline exercise	22*	01MAY07A	31MAY07A				4,529.98	EA/EM =40hr ;						
1302-200		Complete PF Coil SRD	20	01AUG07*	28AUG07			15	4,181.52	EA/EM =24hr ;						
1302-205		Update PF Analysis	40	29AUG07	24OCT07			67	28,706.96	EA/EM =160hr ;						
1302-210		Update PF Coil SDD	40	25OCT07	21DEC07			67	4,458.24	EA/EM =24hr ;						
1302-211		Complete PF4 PDR Model	20	29AUG07	26SEP07			15	13,938.40	EA/EM =00hr ; EA/DM =80 ;						
1302-212		Complete PF5 PDR Model	20	27SEP07	24OCT07			15	14,768.56	EA/EM =00hr ; EA/DM =80 ;						
1302-213		Complete PF6 PDR Model	20	25OCT07	21NOV07			15	14,860.80	EA/EM =00hr ; EA/DM =80 ;						
1302-251		PDR Level Design Support Support	62	29AUG07	23NOV07			23	10,900.12	EA/EM =60hr ;						
1302-220		Prepare for PDR	10	22NOV07	07DEC07			15	16,346.88	EA/EM =52hr ; EA/DM =36 ;						
1302-225	2	PDR	2	10DEC07	11DEC07			15	2,972.16	EA/EM =16hr ;						
1302-214		Prepare,Review & Approve conductor spec	20	02JAN08*	29JAN08			32	2,972.16	EA/EM =16hr ; EA/SB =00hr ;						
1302-216		Prepare,Review & Approve coil spec	20	30JAN08	26FEB08			32	8,916.48	EA/EM =48hr ; EA/SB =00hr ;						
1302-240		Disposition PDR Chits	20	12DEC07	17JAN08			55	4,458.24	EA/EM =24hr ;						
1302-235		Detail Drawings PF4	20	12DEC07	17JAN08			15	14,860.80	EA/DM =80 ;						
1302-245		Detail Drawings PF5	20	18JAN08	14FEB08			15	14,860.80	EA/DM =80 ;						
1302-260		Detail Drawings PF6	20	15FEB08	13MAR08			15	14,860.80	EA/DM =80 ;						
1302-250		Analysis Support	60	12DEC07	13MAR08			15	13,003.20	EA/EM =70hr ;						
1302-217		Drawing Support	60	12DEC07	13MAR08			15	11,145.60	EA/EM =60hr ; EA/SB =00hr ;						
1302-218		PF Stress Analysis with leads	30	12DEC07	31JAN08			45	22,291.20	EA/EM =120hr ; EA/SB =00hr ;						
1302-265		Prepare for FDR	5	14MAR08	20MAR08			15	16,346.88	EA/EM =52hr ; EA/DM =36 ;						
1302-270	3	PF FDR	2	21MAR08	24MAR08			15	2,972.16	EA/EM =16hr ;						
1302-275		Resolve Chits	20	25MAR08	21APR08			110	14,860.80	EA/EM =80hr ;						
Subtotal			0		21APR08			110	257,212.74							

Activity ID	MILEstones (level 2 & 3)	Activity Description	Duration (work days)	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted							
										FY07	FY08	FY09	FY10	FY11	FY12	
Job: 1352 - PF Coil Procurement-KALISH																
PF Coil Fabrication																
141-035		Bid & Award PF Coil Fabrication	45	25MAR08	27MAY08		15		35,811.60	EA/EM =160hr ; 35=05\$K ;						
141-036	2	PF Coils Awarded	0		27MAY08		15		0.00	▼						
141-037		Bid & Award Conductor	25	22APR08	27MAY08		85		8,916.48	EA/EM =48hr ;						
141-038	3	PF Conductor Awarded	0		27MAY08*		85		0.00	▼						
141-038.1		PF Conductor Delivery	65	28MAY08	27AUG08		85		149,635.20	EA=114.4\$K ;						
141-039		Bid & Award Materials	25	27JUN08	01AUG08		58		8,916.48	EA/EM =48hr ;						
141-040		PF Materials Awarded	0		01AUG08*		58		0.00	▼						
1352-100		Materials Delivery PF 4,5,6	45	04AUG08	06OCT08		58		178,529.66	EA=136\$K ;						
1352-121		Design/Fab Tooling for PF 5	80	28MAY08	18SEP08		15		280,747.50	EA=273.9\$K ;						
1352-122		Design/Fab Tooling for PF 6	80	28JUL08*	17NOV08		18		331,639.61	EA=320.1\$K ;						
1352-120		Tooling for PF 4	55	25JUL08*	10OCT08		54		74,072.29	EA=72\$K ;						
1352-150		Fabricate/Dlvr PF 4 lower	35	13OCT08	02DEC08		54		21,125.10	EA=20.1 ;						
1352-151		Fabricate/Dlvr PF 4 upper	45	03DEC08	12FEB09		405		21,125.10	EA=20.1 ;						
1352-165		Fabricate/Dlvr PF 5 Lower	45	19SEP08	20NOV08		15		73,821.95	EA=70.55 ;						
1352-145		Fabricate/Dlvr PF 6 Lower	45	21NOV08	04FEB09		15		86,654.95	EA=82.45 ;						
1352-166		Fabricate/Dlvr PF 5 Upper	35	05FEB09	25MAR09		341		74,148.05	EA=70.55 ;						
1352-146		Fabricate/Dlvr PF 6 Upper	35	26MAR09	13MAY09		341		86,654.95	EA=82.45 ;						
141-031		Title III engr WBS 132	241	28MAY08	14MAY09		846	LOE	148,348.45	EA/EM =784hr ;						
141-900		PF4 Lower Inspection & Test	5	03DEC08	09DEC08		54		3,561.30	EA/EM =10hr ; EM/TB =20hr ;						
141-900A		PF4 Upper Inspection & Test	5	13FEB09	19FEB09		405		3,561.30	EA/EM =10hr ; EM/TB =20hr ;						
141-901		PF5 Lower Inspection & Test	5	21NOV08	01DEC08		60		3,561.30	EA/EM =10hr ; EM/TB =20hr ;						
141-902		PF6 Lower Inspection & Test	5	05FEB09	11FEB09		15		3,561.30	EA/EM =10hr ; EM/TB =20hr ;						
141-905		PF5 Upper Inspection & Test	5	26MAR09	01APR09		376		3,561.30	EA/EM =10hr ; EM/TB =20hr ;						
141-906		PF6 Upper Inspection & Test	5	14MAY09	20MAY09		341		3,561.30	EA/EM =10hr ; EM/TB =20hr ;						
141-903		Refurbish PF 1a	20	18FEB10*	17MAR10		101		6,820.80	EM/TB =80hr ;						
141-904		Assemble PF1a and CS structure	30	18MAR10	28APR10		101		21,550.00	EM/TB =160hr ; EA/EM =40hr ;						
Subtotal			522	25MAR08	28APR10		610		1,629,885.97	▼						