NOνA Schedule – Gantt Chart

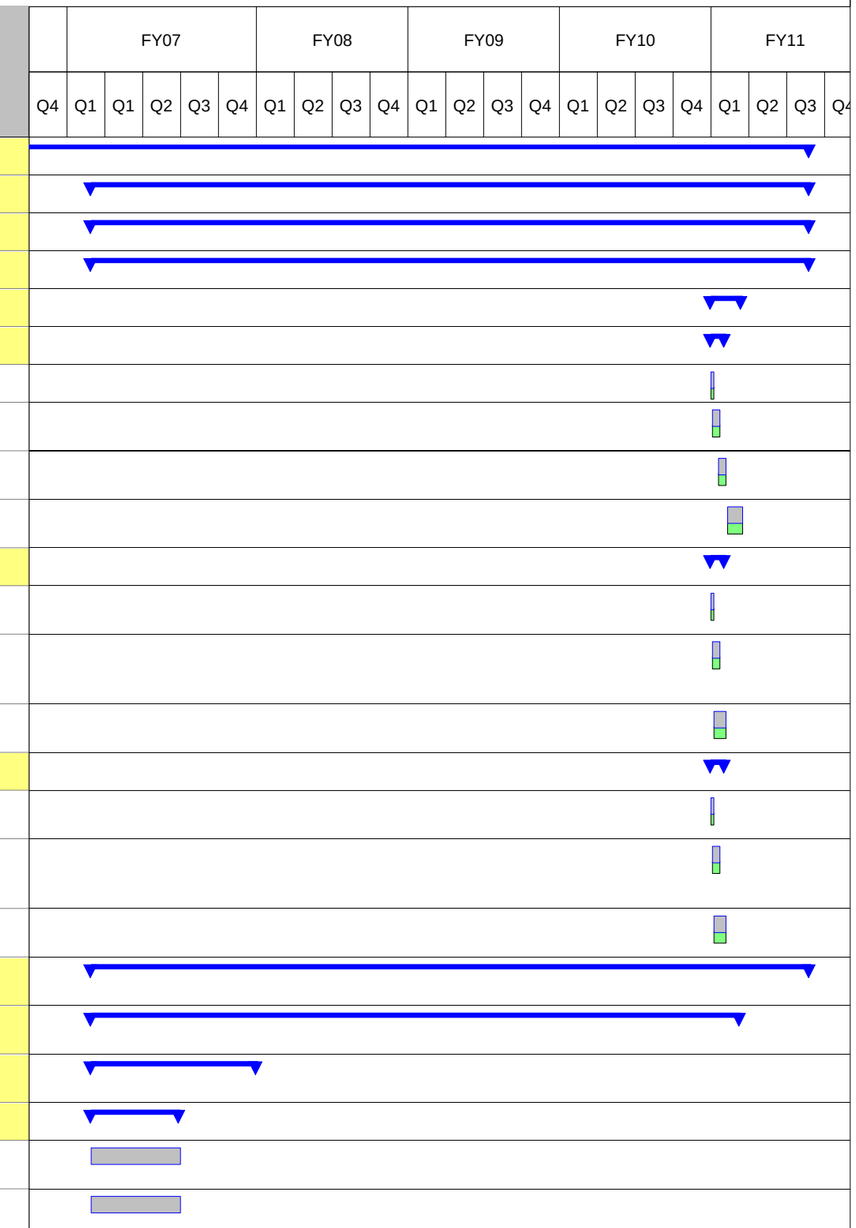
R & D

CD-2/3a Director's Review
June 4-6, 2007

Nova Project
WBS 1.x - R & D
Gantt Chart

CD-2/3a Director's Review
June 4-6, 2007

WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1	**Research and Development**	**1419d**	**03Oct05**	**26May11**		
1.0	**ANU Planning, Engineering & Design**	**1126d**	**01Dec06**	**26May11**		
1.0.1	**Recycler Upgrades**	**1126d**	**01Dec06**	**26May11**		
1.0.1.1	**Recycler Ring Modifications**	**1126d**	**01Dec06**	**26May11**		
1.0.1.1.1	**Decommission Pbars Devices in Recycler**	**50d**	**01Oct10**	**13Dec10**		
1.0.1.1.1.1	**Removal of Stochastic cooling tanks**	**24d**	**01Oct10**	**03Nov10**		
1.0.1.1.1.1.1	Recycler - Remove Electronics Equipment	2d	**01Oct10**	**04Oct10**	**2.0.4.1.5[FS]**	**L.FNAL.AD.TECH.RF_W,22.00,**
1.0.1.1.1.1.2	Recycler - Remove Tanks Q103-Q104 & Q211-Q212	12d	**05Oct10**	**20Oct10**	**1.0.1.1.1.1.1[FS]**	**L.FNAL.AD.ENG.ME,10.00,;M.FNAL.AD. MANDS,1000.00,;L.FNAL.AD.TECH.MT_W,288.00,**
1.0.1.1.1.1.3	Recycler - Reconstitute Vacuum System	10d	**21Oct10**	**03Nov10**	**1.0.1.1.1.1.2[FS]**	**L.FNAL.AD.TECH.MT_W,240.00,;M.FNAL.AD. MANDS,1000.00,**
1.0.1.1.1.2	Remove Ecool Magnets & Devices	20d	**12Nov10**	**13Dec10**	**1.0.1.1.2.2.2.1[FS]**	**L.FNAL.AD.TECH.MT_W,960.00,;M.FNAL.AD. MANDS,5000.00,**
1.0.1.1.1.3	**R22 Line Removal**	**25d**	**01Oct10**	**04Nov10**		
1.0.1.1.1.3.1	Recycler - Remove Lambertsons at Q214/MI221	3d	**01Oct10**	**05Oct10**	**2.0.4.1.5[FS]**	**L.FNAL.AD.TECH.MT_W,96.00,;L.FNAL.AD.ENG. ME,5.00,**
1.0.1.1.1.3.2	Recycler - Reconstitute Vacuum System Q214 & MI221	10d	**06Oct10**	**19Oct10**	**1.0.1.1.1.3.1[FS]**	**L.FNAL.AD.ENG.ME,4.00,;L.FNAL.TD.TECH. WELD,16.00,;L.FNAL.AD.TECH.MT_W,160.00,;M. FNAL.AD.MANDS,2000.00,**
1.0.1.1.1.3.3	R22 Remove Instrumentation/Trim Magnets	20d	**08Oct10**	**04Nov10**	**1.0.1.1.2.1.7.1[FS]; 2.0.4.1.5[FS]**	**L.FNAL.AD.ENG.ME,32.00,;L.FNAL.AD.TECH. MT_W,640.00,**
1.0.1.1.1.4	**R32 Line Removal**	**25d**	**01Oct10**	**04Nov10**		
1.0.1.1.1.4.1	Recycler - Remove Lambertsons at Q328/MI321	3d	**01Oct10**	**05Oct10**	**2.0.4.1.5[FS]**	**L.FNAL.AD.TECH.MT_W,96.00,;L.FNAL.AD.ENG. ME,5.00,**
1.0.1.1.1.4.2	Recycler - Reconstitute Vacuum System Q328 & MI Q321	10d	**06Oct10**	**19Oct10**	**1.0.1.1.1.4.1[FS]**	**L.FNAL.AD.TECH.MT_W,160.00,;M.FNAL.AD. MANDS,2000.00,;L.FNAL.AD.ENG.ME,4.00,;L. FNAL.TD.TECH.WELD,16.00,**
1.0.1.1.1.4.3	R32 Remove Instrumentation/Trim & Mirror Magnets	20d	**08Oct10**	**04Nov10**	**1.0.1.1.2.1.7.1[FS]; 2.0.4.1.5[FS]**	**L.FNAL.AD.TECH.MT_W,640.00,;L.FNAL.AD.ENG. ME,32.00,**
1.0.1.1.2	**Beam Lines (Transfer, Abort & RR 30 Straight)**	**1126d**	**01Dec06**	**26May11**		
1.0.1.1.2.1	**Beam Lines (Transfer, Abort & RR 30 Straight) - R&D**	**1011d**	**01Dec06**	**10Dec10**		
1.0.1.1.2.1.1	**Initial Design/Parameter Assessment**	**211d**	**01Dec06**	**03Oct07**		
1.0.1.1.2.1.1.1	**Design Lattice**	**81d**	**01Dec06**	**30Mar07**		
1.0.1.1.2.1.1.1.1	Design IL Lattice	81d	**01Dec06**	**30Mar07**	**2.0.4.3.1[FS]**	**L.FNAL.AD.ENG.DES,215.00,;L.FNAL.AD.SCI. PHY,322.00,**
1.0.1.1.2.1.1.1.2	Design EL Lattice	81d	**01Dec06**	**30Mar07**	**2.0.4.3.1[FS]**	**L.FNAL.AD.ENG.DES,216.00,;L.FNAL.AD.SCI. PHY,324.00,**



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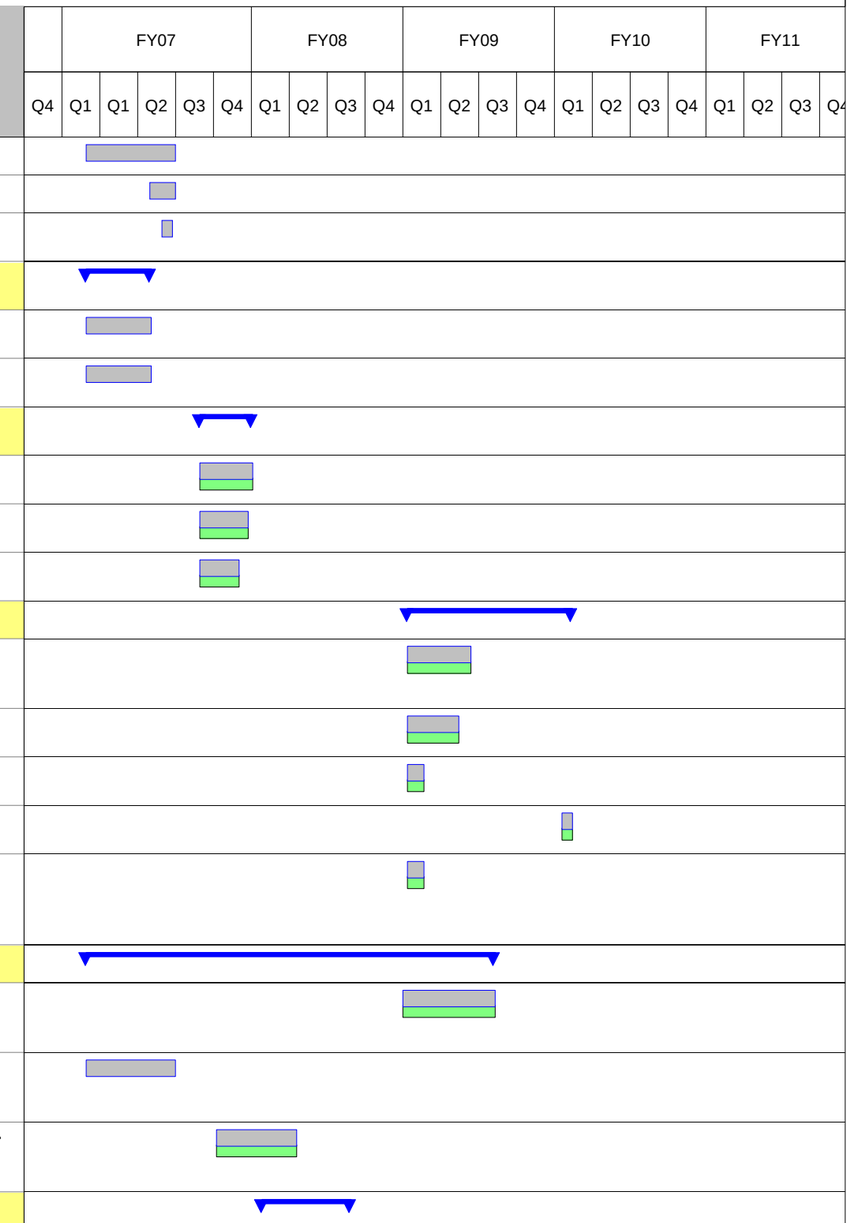
1.0.1.1.2.1.1.1.3	Design RR-30 SS Lattice	81d	01Dec06	30Mar07	2.0.4.3.1[FS]	L.FNAL.AD.SCI.PHY,81.00,
1.0.1.1.2.1.1.1.4	Design Abort Lattice	42d	01Feb07	30Mar07		L.FNAL.AD.SCI.PHY,44.00,
1.0.1.1.2.1.1.2	Investigate Need of Removal of Vacuum Window	15d	01Mar07	21Mar07		L.FNAL.AD.SCI.PHY,24.00,
1.0.1.1.2.1.1.3	**Magnetic Shielding Assessment**	**40d**	**01Dec06**	**01Feb07**		
1.0.1.1.2.1.1.3.1	RR Determine Need for Magnetic Shielding of IL Beam Pipe	40d	01Dec06	01Feb07	2.0.4.3.1[FS]	L.FNAL.AD.SCI.PHY,96.00,
1.0.1.1.2.1.1.3.2	Determine Need for Magnetic Shielding of EL Beam Pipe	40d	01Dec06	01Feb07	2.0.4.3.1[FS]	L.FNAL.AD.SCI.PHY,96.00,
1.0.1.1.2.1.1.4	**Preliminary Installation Planning**	**90d**	**29May07**	**03Oct07**		
1.0.1.1.2.1.1.4.1	Preliminary IL Installation Planning	90d	29May07	03Oct07	1.0.1.1.2.1.1.1.1[FS+40d]	L.FNAL.AD.ENG.ME,194.00,;L.FNAL.AD.ENG.DES,288.00,;L.FNAL.AD.ENG.ME_SR,22.00,
1.0.1.1.2.1.1.4.2	Preliminary EL Installation Planning	80d	29May07	19Sep07	1.0.1.1.2.1.1.1.2[FS+40d]	L.FNAL.AD.ENG.ME,173.00,;L.FNAL.AD.ENG.DES,256.00,;L.FNAL.AD.ENG.ME_SR,19.00,
1.0.1.1.2.1.1.4.3	Preliminary RR-30 SS Installation Planning	65d	29May07	28Aug07	1.0.1.1.2.1.1.1.3[FS+40d]	L.FNAL.AD.ENG.DES,208.00,;L.FNAL.AD.ENG.ME,140.00,;L.FNAL.AD.ENG.ME_SR,16.00,
1.0.1.1.2.1.2	**Magnet Stands**	**273d**	**15Oct08**	**13Nov09**		
1.0.1.1.2.1.2.1	Design IL Magnet Stands	100d	15Oct08	12Mar09	2.0.4.3.7[FS]; 2.0.1.1.1.14.2[SS+10d]; 1.0.1.1.2.1.8.1[FF+20d]	L.FNAL.AD.ENG.DES,600.00,;L.FNAL.AD.ENG.ME,432.00,;L.FNAL.AD.ENG.ME_SR,48.00,
1.0.1.1.2.1.2.2	Design EL Magnet Stands	80d	15Oct08	12Feb09	2.0.4.3.7[FS+10d]; 2.0.1.1.1.14.7[SS]	L.FNAL.AD.ENG.DES,480.00,;L.FNAL.AD.ENG.ME,346.00,;L.FNAL.AD.ENG.ME_SR,38.00,
1.0.1.1.2.1.2.3	Design RR-30 SS Magnet Stands	25d	15Oct08	18Nov08	2.0.4.3.7[FS]; 2.0.1.1.1.14.13[SS+10d]	L.FNAL.AD.ENG.ME,108.00,;L.FNAL.AD.ENG.DES,150.00,;L.FNAL.AD.ENG.ME_SR,12.00,
1.0.1.1.2.1.2.4	Design BA Kicker Stands	19d	20Oct09	13Nov09	2.0.4.3.7[FS]; 2.0.1.1.1.14.21[SS+10d]	L.FNAL.AD.ENG.DES,114.00,;L.FNAL.AD.ENG.ME,82.00,;L.FNAL.AD.ENG.ME_SR,9.00,
1.0.1.1.2.1.2.5	Design Instrumentation Stands	25d	15Oct08	18Nov08	2.0.4.3.7[FS]; 2.0.1.1.1.14.2[SS+10d]; 2.0.1.1.1.14.7[SS+10d]; 2.0.1.1.1.14.13[SS+10d]	L.FNAL.AD.ENG.ME,108.00,;L.FNAL.AD.ENG.ME_SR,12.00,;L.FNAL.AD.ENG.DES,150.00,
1.0.1.1.2.1.3	**Vertical Dipole Magnets**	**610d**	**01Dec06**	**07May09**		
1.0.1.1.2.1.3.1	Design Vertical Dipole Magnet Power Supplies	150d	01Oct08	07May09	1.0.1.1.2.1.1.1.2[FS]; 1.0.1.1.2.1.1.1.1[FS]; 2.0.4.3.5[FS]; 2.0.4.3.7[FS]	L.FNAL.AD.ENG.EE,1080.00,;L.FNAL.AD.ENG.EE_SR,120.00,
1.0.1.1.2.1.3.2	Spec & Initial Design for Bending Magnets	81d	01Dec06	30Mar07	2.0.4.3.1[FS]	L.FNAL.AD.ENG.ME,39.00,;L.FNAL.TD.SCI.PHY,43.00,;L.FNAL.AD.SCI.PHY,43.00,;L.FNAL.TD.ENG.ME,43.00,;L.FNAL.AD.ENG.ME_SR,4.00,
1.0.1.1.2.1.3.4	Engineering Design of Bending Magnets	130d	09Jul07	15Jan08	1.0.1.1.2.1.3.2[FS+68d]	L.FNAL.TD.ENG.ME,168.00,;L.FNAL.TD.ENG.EP,28.00,;L.FNAL.TD.SCI.PHY,28.00,;L.FNAL.TD.ENG.DRFT,168.00,
1.0.1.1.2.1.4	**Permanent Quadrupoles**	**145d**	**29Oct07**	**28May08**		



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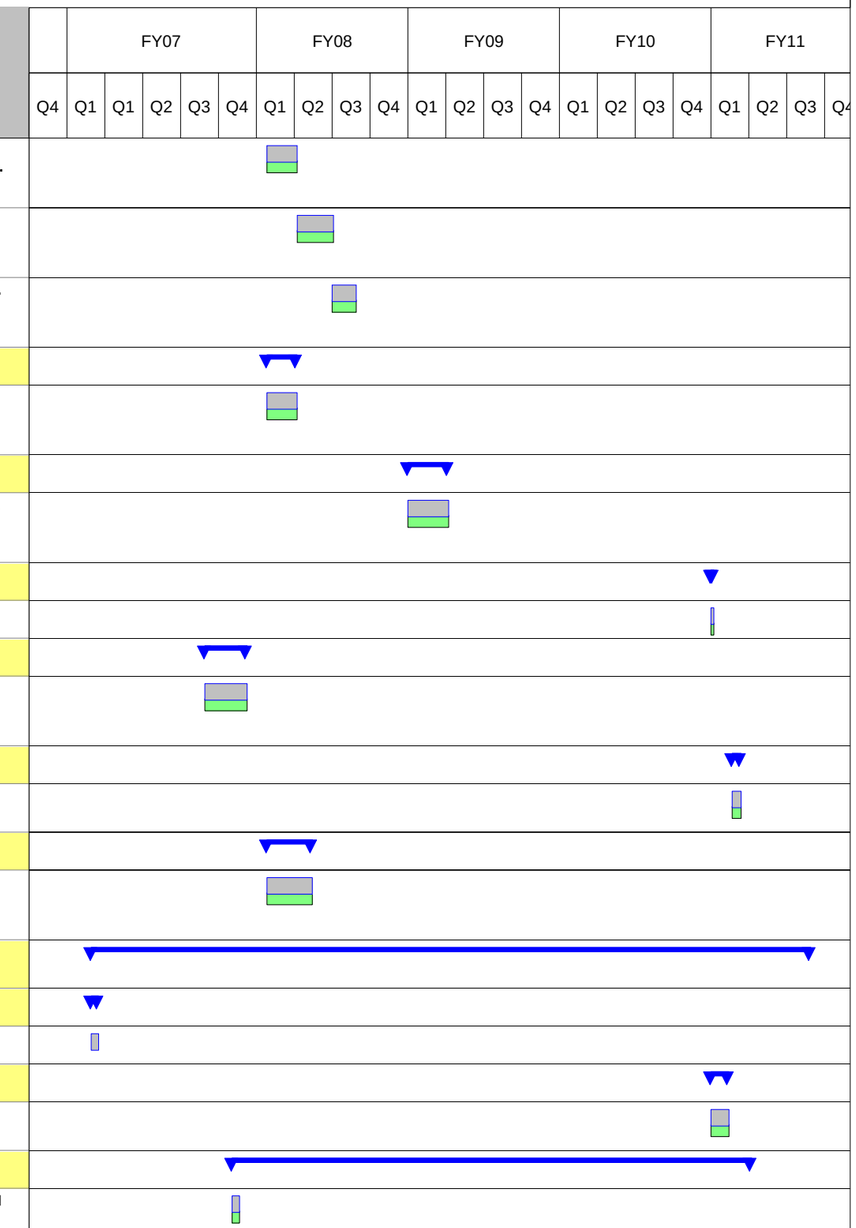
1.0.1.1.2.1.4.2	RR Evaluate Ferrite Capabilities	45d	29Oct07	07Jan08	2.0.4.3.5[FS]	L.FNAL.TD.TECH.MT_W,72.00,;L.FNAL.TD.SCI.PHY,18.00,;L.FNAL.TD.ENG.ME,36.00,;M.FNAL.AD.MANDS,3000.00,
1.0.1.1.2.1.4.3	RR Assemble Test Magnets	60d	08Jan08	01Apr08	1.0.1.1.2.1.4.2[FS]	L.FNAL.TD.ENG.ME,24.00,;L.FNAL.TD.ENG.EP,19.00,;L.FNAL.TD.SCI.PHY,19.00,;L.FNAL.TD.TECH.MT_W,288.00,
1.0.1.1.2.1.4.4	Engineering Design	40d	02Apr08	28May08	2.0.4.3.6[FS]; 1.0.1.1.2.1.4.3[FS]	L.FNAL.TD.SCI.PHY,32.00,;L.FNAL.TD.ENG.ME,96.00,;L.FNAL.TD.ENG.DRFT,96.00,;L.FNAL.TD.ENG.EP,32.00,
1.0.1.1.2.1.5	**PDD Magnets**	**45d**	**29Oct07**	**07Jan08**		
1.0.1.1.2.1.5.1	Review PDD Design & Tooling	45d	29Oct07	07Jan08	2.10.8.4[FS]; 2.0.4.3.5[FS]	L.FNAL.TD.ENG.DRFT,43.00,;L.FNAL.TD.ENG.EP,29.00,;L.FNAL.TD.ENG.ME,43.00,;L.FNAL.TD.SCI.PHY,29.00,
1.0.1.1.2.1.6	**IL PDDW Magnets**	**65d**	**01Oct08**	**07Jan09**		
1.0.1.1.2.1.6.1	IL PDDW Magnets Engineering Design Review	65d	01Oct08	07Jan09	1.0.1.1.2.1.5.1[FS]; 2.0.4.3.7[FS]	L.FNAL.TD.SCI.PHY,62.00,;L.FNAL.TD.ENG.EP,62.00,;L.FNAL.TD.ENG.ME,156.00,;L.FNAL.TD.ENG.DRFT,156.00,
1.0.1.1.2.1.7	**Trim Magnets**	**5d**	**01Oct10**	**07Oct10**		
1.0.1.1.2.1.7.1	Corrector Reassignment	5d	01Oct10	07Oct10	2.0.4.1.5[FS]	L.FNAL.AD.SCI.PHY,16.00,
1.0.1.1.2.1.8	**Mirror Magnets**	**68d**	**01Jun07**	**06Sep07**		
1.0.1.1.2.1.8.1	Design Mirror Magnets	68d	01Jun07	06Sep07	1.0.1.1.2.1.1.1.1[FS]	L.FNAL.TD.ENG.DRFT,163.00,;L.FNAL.TD.ENG.EP,65.00,;L.FNAL.TD.SCI.PHY,65.00,;L.FNAL.TD.ENG.ME,163.00,
1.0.1.1.2.1.9	**MGS Mirror Magnets**	**12d**	**23Nov10**	**10Dec10**		
1.0.1.1.2.1.9.1	MGS Mirror Magnets Engineering Design Review	12d	23Nov10	10Dec10	2.0.1.1.1.12.1[FS]	L.FNAL.TD.ENG.PRCS,5.00,;L.FNAL.TD.ENG.DRFT,19.00,;L.FNAL.TD.ENG.ME,19.00,
1.0.1.1.2.1.10	**Lambertson, 8GEV**	**70d**	**29Oct07**	**12Feb08**		
1.0.1.1.2.1.10.1	Engineering Design Wide Gap MLA	70d	29Oct07	12Feb08	2.0.4.3.5[FS]	L.FNAL.TD.ENG.DRFT,336.00,;L.FNAL.TD.ENG.EP,56.00,;L.FNAL.TD.SCI.PHY,56.00,;L.FNAL.TD.ENG.ME,336.00,
1.0.1.1.2.2	**Beam Lines (Transfer, Abort & RR 30 Straight) - OP**	**1126d**	**01Dec06**	**26May11**		
1.0.1.1.2.2.1	**Vertical Dipole Magnets**	**10d**	**01Dec06**	**14Dec06**		
1.0.1.1.2.2.1.1	Locate 3 Bending Magnets	10d	01Dec06	14Dec06	2.0.4.3.1[FS]	L.FNAL.TD.SCI.PHY,8.00,
1.0.1.1.2.2.2	**Permanent Quadrupoles - OP**	**30d**	**01Oct10**	**11Nov10**		
1.0.1.1.2.2.2.1	Recycler - Remove all 38 Quads from Q301-Q308 & Ship to TD for Refurbishing	30d	01Oct10	11Nov10	2.0.4.1.5[FS]	L.FNAL.AD.ENG.ME,43.00,;L.FNAL.AD.TECH.MT_W,960.00,;L.FNAL.AD.ENG.ME_SR,5.00,
1.0.1.1.2.2.3	**Stakeout Beamlines**	**857d**	**06Aug07**	**05Jan11**		
1.0.1.1.2.2.3.1	IL Stakeout Beamline	11d	06Aug07	20Aug07	2.0.4.1.1[FS]; 1.0.1.1.6.2[FS]	L.FNAL.PPD.OTH.ALIGN,176.00,;L.FNAL.PPD.OTH.MET,88.00,



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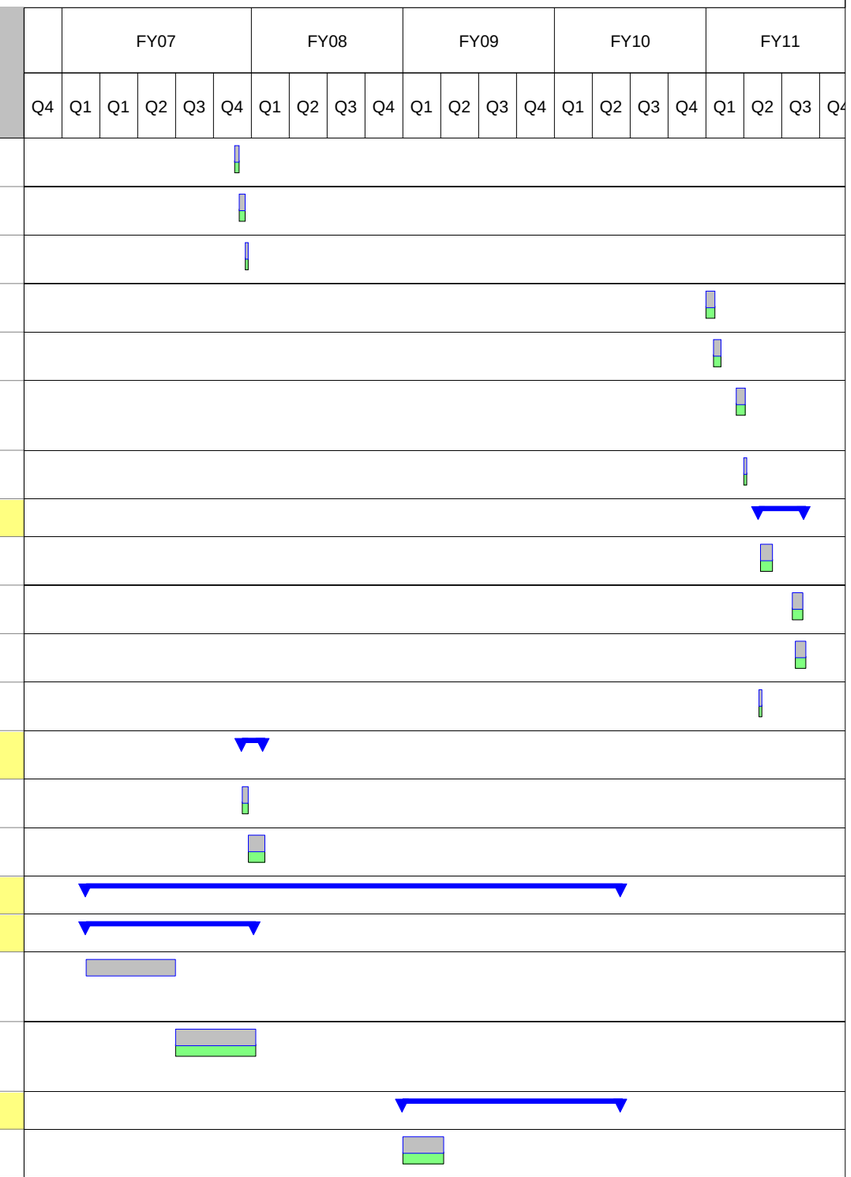
1.0.1.1.2.2.3.2	EL Stakeout Beamline	9d	21Aug07	31Aug07	1.0.1.1.2.2.3.1[FS]	L.FNAL.PPD.OTH.MET,72.00,;L.FNAL.PPD.OTH. ALIGN,144.00,
1.0.1.1.2.2.3.3	RR30 Stakeout Beamline	9d	04Sep07	14Sep07	1.0.1.1.2.2.3.2[FS]	L.FNAL.PPD.OTH.ALIGN,144.00,;L.FNAL.PPD.OTH .MET,72.00,
1.0.1.1.2.2.3.4	BA Mods Stakeout Beamline	2d	17Sep07	18Sep07	1.0.1.1.2.1.1.1.4[FS]; 1.0.1.1.2.2.3.3[FS]	L.FNAL.PPD.OTH.MET,16.00,;L.FNAL.PPD.OTH. ALIGN,32.00,
1.0.1.1.2.2.3.5	IL Installation Stakeout	14d	01Oct10	20Oct10	2.0.4.1.5[FS]	L.FNAL.PPD.OTH.MET,112.00,;L.FNAL.PPD.OTH. ALIGN,224.00,
1.0.1.1.2.2.3.6	EL Installation Stakeout	12d	21Oct10	05Nov10	1.0.1.1.2.2.3.5[FS]	L.FNAL.PPD.OTH.MET,96.00,;L.FNAL.PPD.OTH. ALIGN,192.00,
1.0.1.1.2.2.3.7	RR-30 SS Installation Stakeout	12d	14Dec10	03Jan11	1.0.1.1.2.2.2.1[FS]; 1.0.1.1.1.2[FS]; 1.0.1.1.2.2.3.6[FS]	L.FNAL.PPD.OTH.MET,96.00,;L.FNAL.PPD.OTH. ALIGN,192.00,
1.0.1.1.2.2.3.8	BA Mods Installation Stakeout	2d	04Jan11	05Jan11	1.0.1.1.2.2.3.7[FS]	L.FNAL.PPD.OTH.MET,16.00,;L.FNAL.PPD.OTH. ALIGN,32.00,
1.0.1.1.2.2.5	**Alignment**	**78d**	**08Feb11**	**26May11**		
1.0.1.1.2.2.5.1	Final IL Alignment	18d	10Feb11	07Mar11	2.0.1.1.1.14.18[FS]	L.FNAL.PPD.OTH.ALIGN,288.00,;L.FNAL.PPD.OTH .MET,144.00,
1.0.1.1.2.2.5.2	Final EL Alignment	16d	27Apr11	18May11	2.0.1.1.1.14.19[FS]	L.FNAL.PPD.OTH.MET,128.00,;L.FNAL.PPD.OTH. ALIGN,256.00,
1.0.1.1.2.2.5.3	RR30 Final Alignment	16d	05May11	26May11	2.0.1.1.1.14.20[FS]	L.FNAL.PPD.OTH.ALIGN,256.00,;L.FNAL.PPD.OTH .MET,128.00,
1.0.1.1.2.2.5.4	BA Mods Final Alignment	2d	08Feb11	09Feb11	2.0.1.1.1.14.22[FS]	L.FNAL.PPD.OTH.MET,16.00,;L.FNAL.PPD.OTH. ALIGN,32.00,
1.0.1.1.2.2.6	**Common Tooling for Permanent Magnet Assembly**	**40d**	**10Sep07**	**02Nov07**		
1.0.1.1.2.2.6.1	Ensure Availability of Tooling	10d	10Sep07	21Sep07	2.0.4.3.3[FS+112d]	L.FNAL.TD.ENG.EP,16.00,;L.FNAL.TD.SCI.PHY,16. 00,
1.0.1.1.2.2.6.2	Verify Design Compatibility	30d	24Sep07	02Nov07	1.0.1.1.2.2.6.1[FS]	L.FNAL.TD.ENG.DRFT,96.00,;L.FNAL.TD.ENG. ME,24.00,
1.0.1.1.3	**53 Mhz RF System**	**819d**	**01Dec06**	**10Mar10**		
1.0.1.1.3.1	**53 Mhz RF System**	**214d**	**01Dec06**	**08Oct07**		
1.0.1.1.3.1.1	Prel Design 53 Mhz RF System	81d	01Dec06	30Mar07	2.0.4.3.1[FS]	L.FNAL.AD.ENG.RF,200.00,;L.FNAL.AD.ENG. DES,100.00,;L.FNAL.AD.ENG.ME,180.00,;L.FNAL. AD.ENG.ME_SR,20.00,
1.0.1.1.3.1.2	Final Design 53 Mhz RF System	133d	02Apr07	08Oct07	1.0.1.1.3.1.1[FS]	L.FNAL.AD.ENG.RF,532.00,;L.FNAL.AD.ENG. ME_SR,53.00,;L.FNAL.AD.ENG.ME,479.00,;L.FNAL .AD.ENG.DRFT,532.00,
1.0.1.1.3.2	**53 Mhz RF System - OP**	**359d**	**01Oct08**	**10Mar10**		
1.0.1.1.3.2.1	Purchase S&C Disconnect	65d	01Oct08	07Jan09	2.0.4.3.7[FS]	L.FNAL.AD.ENG.RF,42.00,;M.FNAL.AD. MANDS,20000.00,



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WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.1.3.2.2	Assembly of MI60 Anode Supply Room	30d	30Jan09	12Mar09	2.0.4.4.1.6[FS]; 1.0.1.1.3.2.1[FS]	L.FNAL.AD.ENG.RF,41.00,;L.FNAL.TM.RIG. IRNWRKR,65.00,;L.FNAL.AD.TECH.RF_W,480. 00,;M.FNAL.AD.MANDS,9000.00,;L.FNAL.TM. ELEC.ELEC,82.00,
1.0.1.1.3.2.3	Test 53 Mhz RF System	83d	05Nov09	10Mar10	1.0.1.1.3.2.2[FS]; 2.0.1.1.2.7[FS]	L.FNAL.AD.TECH.RF_W,332.00,;L.FNAL.AD.ENG. RF,332.00,;M.FNAL.AD.MANDS,25200.00,;L.FNAL. AD.SCI.PHY,664.00,
1.0.1.1.4	**Recycler Cooling System**	**535d**	**05Sep07**	**20Oct09**		
1.0.1.1.4.1	Analyze RR Cooling System Capacities	382d	05Sep07	16Mar09	2.0.4.3.5[FS-38d]	L.FNAL.AD.ENG.DRFT,88.00,;L.FNAL.AD.ENG. ME,396.00,;L.FNAL.AD.ENG.EE,79.00,;L.FNAL.AD. ENG.EE_SR,9.00,;L.FNAL.AD.SCI.PHY,88.00,;L. FNAL.AD.ENG.ME_SR,44.00,
1.0.1.1.4.2	**Design Injection Line Water System Mods**	**138d**	**07Apr09**	**20Oct09**		
1.0.1.1.4.2.1	Design Connections for Magnet Change/Move	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.ENG.DRFT,55.00,;L.FNAL.AD.ENG. ME_SR,5.00,;L.FNAL.AD.ENG.ME,50.00,;L.FNAL. AD.ENG.EE,49.00,;L.FNAL.AD.ENG.EE_SR,6.00,
1.0.1.1.4.2.2	Design Pipe/Bus Move	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.ENG.EE,149.00,;L.FNAL.AD.ENG. EE_SR,17.00,;L.FNAL.AD.ENG.ME_SR,33.00,;L. FNAL.AD.ENG.ME,298.00,;L.FNAL.AD.ENG. DRFT,331.00,
1.0.1.1.4.2.3	Design Water Line Installation to MI-14	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.ENG.ME,99.00,;L.FNAL.AD.ENG. ME_SR,11.00,;L.FNAL.AD.ENG.DRFT,110.00,
1.0.1.1.4.2.4	Design Connections for Flourinert & Power Supplies for MI-14	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.SCI.PHY,55.00,;L.FNAL.AD.ENG. ME_SR,5.00,;L.FNAL.AD.ENG.ME,50.00,;L.FNAL. AD.ENG.DRFT,55.00,
1.0.1.1.4.3	**Design Extraction Line Water System Mods**	**138d**	**07Apr09**	**20Oct09**		
1.0.1.1.4.3.1	Design Connections for Magnet Change/Move	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.ENG.DRFT,55.00,;L.FNAL.AD.ENG. ME_SR,5.00,;L.FNAL.AD.ENG.EE_SR,6.00,;L.FNAL. AD.ENG.ME,50.00,;L.FNAL.AD.ENG.EE,49.00,
1.0.1.1.4.3.2	Design Water Line Installation to MI-30	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.ENG.DRFT,55.00,;L.FNAL.AD.ENG. ME,55.00,
1.0.1.1.4.3.3	Design Connections for Flourinert & Power Supplies for MI-30	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.SCI.PHY,55.00,;L.FNAL.AD.ENG. ME_SR,5.00,;L.FNAL.AD.ENG.ME,50.00,;L.FNAL. AD.ENG.DES,55.00,
1.0.1.1.4.4	**Design Abort Line Water System Mods**	**138d**	**07Apr09**	**20Oct09**		
1.0.1.1.4.4.1	Design Connections for Magnet Change/Move	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.ENG.EE,49.00,;L.FNAL.AD.ENG. DRFT,55.00,;L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL. AD.ENG.ME,50.00,;L.FNAL.AD.ENG.EE_SR,6.00,
1.0.1.1.4.4.2	Design Water Line Installation to MI-39	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.ENG.DRFT,110.00,;L.FNAL.AD.ENG. ME_SR,11.00,;L.FNAL.AD.ENG.ME,99.00,
1.0.1.1.4.4.3	Design Connections for Flourinert & Power Supplies for MI-39	138d	07Apr09	20Oct09	1.0.1.1.5.3[FS]	L.FNAL.AD.ENG.DRFT,55.00,;L.FNAL.AD.ENG. ME_SR,5.00,;L.FNAL.AD.SCI.PHY,55.00,;L.FNAL. AD.ENG.ME,50.00,

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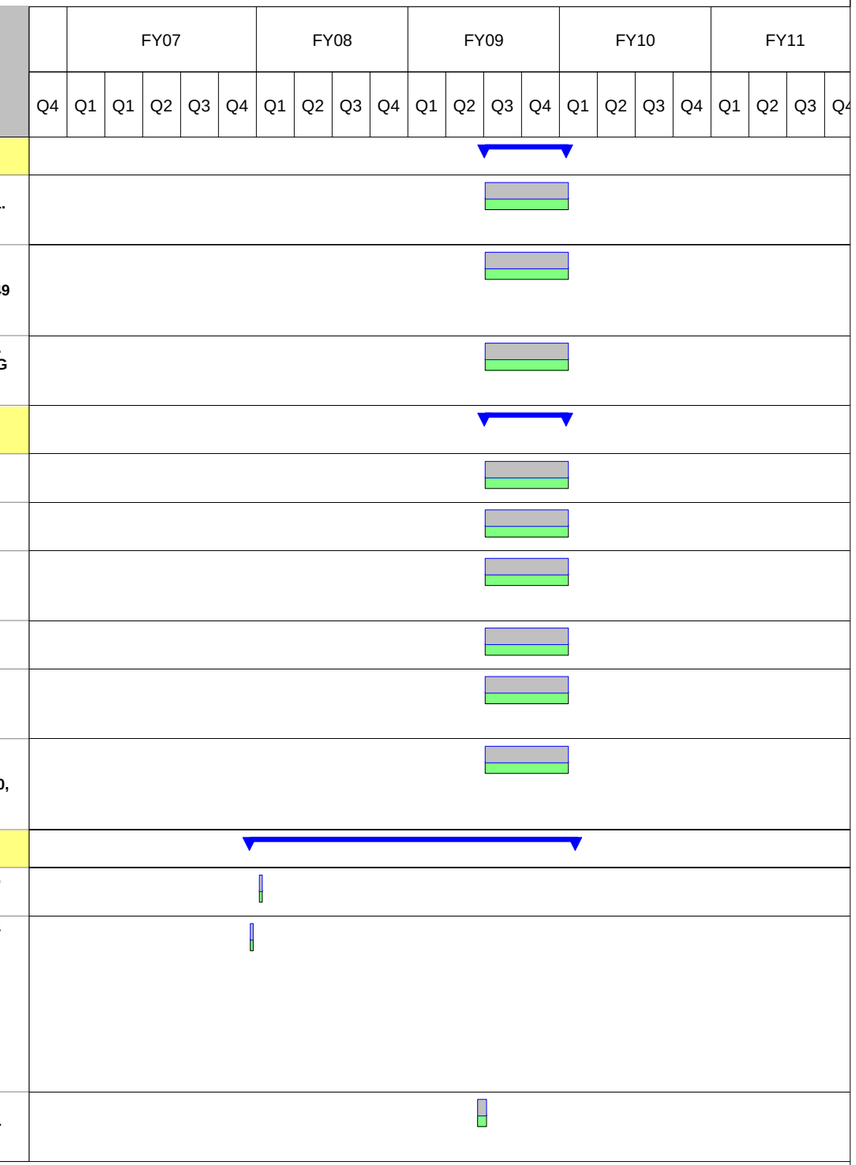
1.0.1.1.4.5	**Design RF Cavity Water System Mods**	**138d**	**07Apr09**	**20Oct09**		
1.0.1.1.4.5.1	Design Connections for Magnet Change/Move	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.EE_SR,6.00,;L.FNAL.AD.ENG.DRFT,55.00,;L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL.AD.ENG.ME,50.00,;L.FNAL.AD.ENG.EE,49.00,**
1.0.1.1.4.5.2	Design Mods for RF Cavities Q600 Area	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.ME,99.00,;L.FNAL.AD.ENG.EE_SR,6.00,;L.FNAL.AD.ENG.ME_SR,11.00,;L.FNAL.AD.ENG.DRFT,110.00,;L.FNAL.AD.ENG.EE,49.00,**
1.0.1.1.4.5.3	Design Mods for Power Supplies MI-60 Gallery	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.EE,49.00,;L.FNAL.AD.ENG.ME,99.00,;L.FNAL.AD.ENG.ME_SR,11.00,;L.FNAL.AD.ENG.EE_SR,6.00,;L.FNAL.AD.ENG.DRFT,110.00,**
1.0.1.1.4.6	**Design MI-8 Pump Room Water System Installation**	**138d**	**07Apr09**	**20Oct09**		
1.0.1.1.4.6.1	Determine Basic Pump Room Needs	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.DRFT,110.00,;L.FNAL.AD.ENG.ME_SR,11.00,;L.FNAL.AD.ENG.ME,99.00,**
1.0.1.1.4.6.2	Determine Heat Exchanger Size	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.DRFT,22.00,;L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL.AD.ENG.ME,50.00,**
1.0.1.1.4.6.3	Determine Pond Pump Size	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.DRFT,110.00,;L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL.FESS.ENG.ENG,55.00,;L.FNAL.AD.ENG.ME,50.00,**
1.0.1.1.4.6.4	Design Pump Room Layout	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.ME,198.00,;L.FNAL.AD.ENG.ME_SR,22.00,;L.FNAL.AD.ENG.DRFT,220.00,**
1.0.1.1.4.6.5	Design Electrical Service Modifications	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.DRFT,110.00,;L.FNAL.AD.ENG.EE,49.00,;L.FNAL.AD.ENG.ME,22.00,;L.FNAL.AD.ENG.EE_SR,6.00,**
1.0.1.1.4.6.6	Design Instrumentation & Controls Systems	138d	**07Apr09**	**20Oct09**	**1.0.1.1.5.3[FS]**	**L.FNAL.AD.ENG.EE_SR,6.00,;L.FNAL.AD.ENG.DRFT,110.00,;L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL.AD.ENG.EE,49.00,;L.FNAL.AD.ENG.ME,50.00,**
1.0.1.1.5	**Recycler Ring Modifications Reviews**	**540d**	**19Sep07**	**10Nov09**		
1.0.1.1.5.1	53 Mhz RF System Design Review	1d	**09Oct07**	**09Oct07**	**1.0.1.1.3.1.2[FS]**	**L.FNAL.AD.SCI.PHY,16.00,;L.FNAL.AD.ENG.ME,16.00,;L.FNAL.AD.ENG.RF,16.00,**
1.0.1.1.5.2	Recycler Transfer Lines Review	1d	**19Sep07**	**19Sep07**	**1.0.1.1.2.1.1.3.2[FS]; 1.0.1.1.6.4[FS]; 1.0.1.1.2.1.1.3.1[FS]; 1.0.1.1.6.2[FS]; 1.0.1.1.2.2.3.4[FS]; 1.0.1.1.2.2.3.1[FS]; 1.0.1.1.2.2.3.2[FS]; 1.0.1.1.2.2.3.3[FS]**	**L.FNAL.AD.SCI.PHY,32.00,;L.FNAL.AD.ENG.ME,24.00,;L.FNAL.AD.ENG.EE,16.00,**
1.0.1.1.5.3	Recycler Cooling Systems Initial Design Review	15d	**17Mar09**	**06Apr09**	**1.0.1.1.4.1[FS]**	**L.FNAL.AD.ENG.DES,30.00,;L.FNAL.AD.ENG.ME_SR,12.00,;L.FNAL.AD.SCI.PHY,120.00,;L.FNAL.AD.ENG.ME,108.00,**



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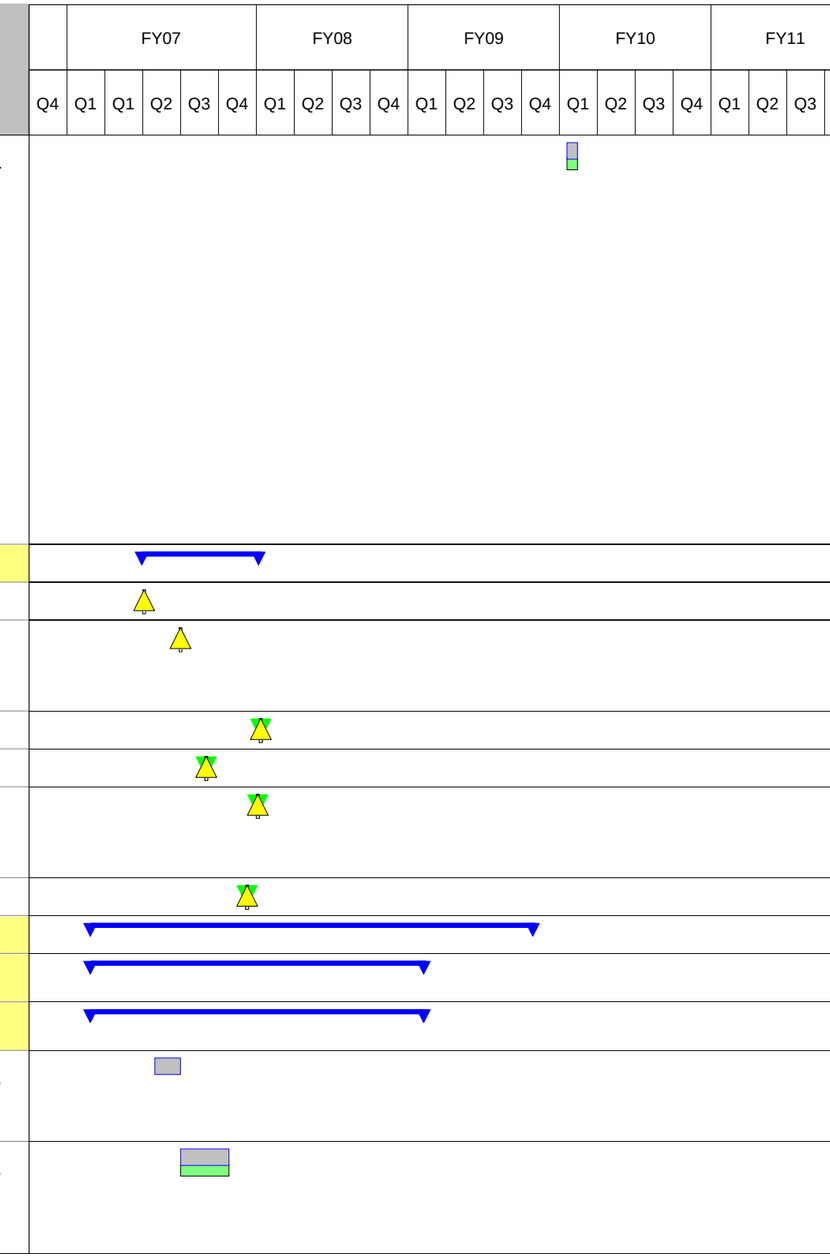
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.1.5.4	Recycler Cooling System Engineering Design Review	15d	21Oct09	10Nov09	1.0.1.1.4.2.2[FS]; 1.0.1.1.4.6.6[FS]; 1.0.1.1.4.5.3[FS]; 1.0.1.1.4.4.3[FS]; 1.0.1.1.4.3.3[FS]; 1.0.1.1.4.3.2[FS]; 1.0.1.1.4.6.2[FS]; 1.0.1.1.4.6.1[FS]; 1.0.1.1.4.4.1[FS]; 1.0.1.1.4.5.1[FS]; 1.0.1.1.4.5.2[FS]; 1.0.1.1.4.3.1[FS]; 1.0.1.1.4.4.2[FS]; 1.0.1.1.4.6.4[FS]; 1.0.1.1.4.6.3[FS]; 1.0.1.1.4.6.5[FS]; 1.0.1.1.4.2.3[FS]; 1.0.1.1.4.2.4[FS]; 1.0.1.1.4.2.1[FS]	L.FNAL.AD.ENG.ME,108.00,;L.FNAL.AD.ENG.ME_SR,12.00,;L.FNAL.AD.SCI.PHY,120.00,;L.FNAL.AD.ENG.DES,30.00,
1.0.1.1.6	**Recycler Ring Modifications Milestones**	**195d**	**03Jan07**	**09Oct07**		
1.0.1.1.6.1	RR All 3 ADC Magnets Found	0	03Jan07	03Jan07	1.0.1.1.2.2.1.1[SS+20d]	
1.0.1.1.6.2	RR Lattice Designs Complete	0	30Mar07	30Mar07	1.0.1.1.2.1.1.1.4[FS]; 1.0.1.1.2.1.1.1.3[FS]; 1.0.1.1.2.1.1.1.1[FS]; 1.0.1.1.2.1.1.1.2[FS]	
1.0.1.1.6.3	RR 53 Mhz RF Design Review Complete	0	09Oct07	09Oct07	1.0.1.1.5.1[FS]	
1.0.1.1.6.4	RR Vacuum Window to be Removed Finalized	0	01Jun07	01Jun07	1.0.1.1.2.1.1.2[FS]	
1.0.1.1.6.5	RR Beamline Modifications Design Review Complete	0	03Oct07	03Oct07	1.0.1.1.5.2[FS]; 1.0.1.1.2.1.1.4.3[FS]; 1.0.1.1.2.1.1.4.1[FS]; 1.0.1.1.2.1.1.4.2[FS]	
1.0.1.1.6.6	RR Mirror Magnet Design Finalized	0	06Sep07	06Sep07	1.0.1.1.2.1.8.1[FS]	
1.0.1.2	**Recycler Kicker Systems**	**668d**	**01Dec06**	**30Jul09**		
1.0.1.2.1	**RR Injection & Gap Clearing Prototype Magnet**	**491d**	**01Dec06**	**12Nov08**		
1.0.1.2.1.1	**Design RR Injection Line Prototype Kicker**	**491d**	**01Dec06**	**12Nov08**		
1.0.1.2.1.1.1	Design Prototype RR Injection & Cleanup Kicker Magnets - Preliminary	40d	01Feb07	28Mar07		L.FNAL.AD.ENG.EE,180.00,;L.FNAL.AD.ENG.ME,180.00,;L.FNAL.AD.ENG.ME_SR,20.00,;L.FNAL.AD.ENG.EE_SR,20.00,;L.FNAL.AD.ENG.DES,320.00,;L.FNAL.TD.ENG.EE,320.00,
1.0.1.2.1.1.2	Design Prototype RR Injection & Cleanup Kicker Magnets	80d	02Apr07	24Jul07	1.0.1.2.1.1.1[FS]	L.FNAL.AD.ENG.EE,180.00,;L.FNAL.AD.ENG.ME,180.00,;L.FNAL.AD.ENG.ME_SR,20.00,;L.FNAL.TD.ENG.EE,320.00,;L.FNAL.TD.ENG.DRFT,480.00,;L.FNAL.AD.ENG.DES,80.00,;L.FNAL.AD.ENG.EE_SR,20.00,



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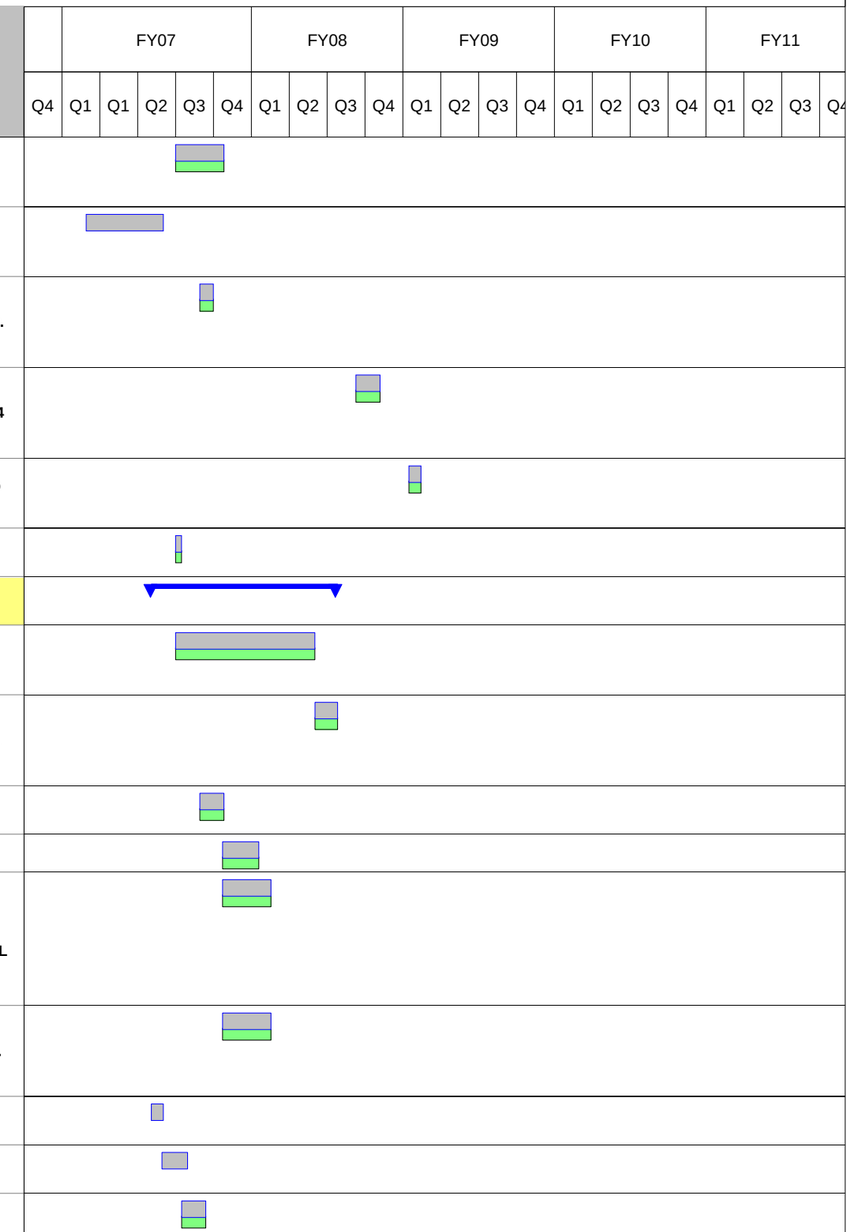
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.2.1.1.3	Ceramic Beamtube Brazing Test	80d	02Apr07	24Jul07	2.0.4.3.11[FS]	L.FNAL.AD.ENG.ME_SR,4.00,;M.FNAL.AD.MANDS,14000.00,;L.FNAL.TD.TECH.MACH,16.00,;L.FNAL.AD.ENG.ME,36.00,
1.0.1.2.1.1.4	Des RR Inject & Gap Clearing Prototype Mag prototype fluorinert temp control syst	60d	01Dec06	01Mar07	2.0.4.3.1[FS]	L.FNAL.AD.ENG.DES,638.00,;L.FNAL.AD.ENG.EE,140.00,;L.FNAL.AD.ENG.ME_SR,31.00,;L.FNAL.AD.ENG.ME,273.00,;L.FNAL.AD.ENG.EE_SR,16.00,
1.0.1.2.1.1.5	RR Injection & Gap Clearing Design Prototype Magnet PFL Cable Spool Assy	20d	01Jun07	28Jun07	1.0.1.2.7.1[FS+42d]	L.FNAL.TD.ENG.EE,40.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.DES,80.00,;L.FNAL.AD.ENG.EE,36.00,;L.FNAL.AD.ENG.EE_SR,4.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.TD.ENG.ME,80.00,
1.0.1.2.1.1.6	Revise RR Inject & Gap Clearing Prototype Magnet Design & Fab Revised Parts (After 3rd Test)	40d	10Jun08	05Aug08	1.0.1.2.1.3.8[FS]; 1.0.1.2.1.3.6[FS]	L.FNAL.AD.ENG.ME,144.00,;M.FNAL.AD.MANDS,5000.00,;L.FNAL.AD.ENG.ME_SR,16.00,;L.FNAL.AD.ENG.DES,160.00,;L.FNAL.AD.ENG.EE,144.00,;L.FNAL.AD.ENG.EE_SR,16.00,
1.0.1.2.1.1.7	Revise RR Inject & Gap Clearing Magnet Design for Production & Choose Ferrite (After 4th Test)	20d	16Oct08	12Nov08	1.0.1.2.1.3.12[FS]; 1.0.1.2.7.5[FS]	L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG.DES,160.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.ENG.EE_SR,8.00,
1.0.1.2.1.1.8	Design Load & Adaptor	10d	02Apr07	13Apr07	2.0.4.3.11[FS]	L.FNAL.AD.ENG.DRFT,80.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,
1.0.1.2.1.2	**Procurement RR Injection Line Prototype Kicker**	**311d**	**02Feb07**	**25Apr08**		
1.0.1.2.1.2.1	Oversight for Procurement of Ceramic Beamtubes Off Project	230d	02Apr07	29Feb08	1.0.1.2.6.1[FS]	L.FNAL.AD.ENG.EE,45.00,;L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL.AD.ENG.ME,45.00,;L.FNAL.AD.ENG.EE_SR,5.00,
1.0.1.2.1.2.2	RR Injection Kicker Magnet Measure Tubes as Received	40d	03Mar08	25Apr08	2.0.4.4.1.3[FS]; 1.0.1.2.1.2.1[FS]	L.FNAL.AD.ENG.EE_SR,24.00,;L.FNAL.AD.ENG.DRFT,400.00,;L.FNAL.AD.ENG.ME_SR,24.00,;L.FNAL.AD.ENG.ME,216.00,;L.FNAL.AD.ENG.EE,216.00,
1.0.1.2.1.2.3	Prep Req & Award PO for Proto Ferrites (2 Designs)	40d	29May07	24Jul07	1.0.1.2.1.1.2[SS+40d]	L.FNAL.AD.ENG.EE,19.00,;L.FNAL.AD.ENG.ME,19.00,
1.0.1.2.1.2.4	Receive Prototype Ferrites (2 Designs)	60d	25Jul07	17Oct07	1.0.1.2.1.2.3[FS]	M.FNAL.AD.MANDS,40000.00,
1.0.1.2.1.2.5	Procure Tooling for Magnet Potting & Measurement	80d	25Jul07	14Nov07	1.0.1.2.1.1.2[FS]	L.FNAL.TD.ENG.ME,160.00,;M.FNAL.AD.MANDS,10000.00,;L.FNAL.AD.ENG.ME,288.00,;L.FNAL.TD.ENG.DRFT,160.00,;L.FNAL.AD.ENG.EE,288.00,;L.FNAL.AD.ENG.ME_SR,32.00,;L.FNAL.TD.ENG.EE,160.00,;L.FNAL.AD.ENG.EE_SR,32.00,;L.FNAL.AD.ENG.DES,160.00,
1.0.1.2.1.2.6	Procure parts & Fluorinert for prototype magnets	80d	25Jul07	14Nov07	1.0.1.2.1.1.2[FS]	L.FNAL.AD.ENG.ME_SR,16.00,;M.FNAL.AD.MANDS,62610.00,;L.FNAL.AD.ENG.ME,144.00,;L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG.EE_SR,8.00,
1.0.1.2.1.2.7	Prep Req & Award PO for Parts & Fluorinert for 1 Prototype Fluorinert Cooling Skid	20d	02Feb07	01Mar07	1.0.1.2.1.1.4[FF]	L.FNAL.AD.ENG.ME,36.00,;L.FNAL.AD.ENG.ME_SR,4.00,
1.0.1.2.1.2.8	Receive Parts & Fluorinert for 1 Prototype Cooling Skid	40d	02Mar07	26Apr07	1.0.1.2.1.2.7[FF+40d]	M.FNAL.AD.MANDS,63000.00,;L.FNAL.AD.ENG.ME,80.00,
1.0.1.2.1.2.9	Purchase Prototype Load & Adaptor	40d	16Apr07	11Jun07	1.0.1.2.1.1.8[FS]	L.FNAL.AD.ENG.ME,288.00,;L.FNAL.AD.ENG.ME_SR,32.00,;M.FNAL.AD.MANDS,12000.00,



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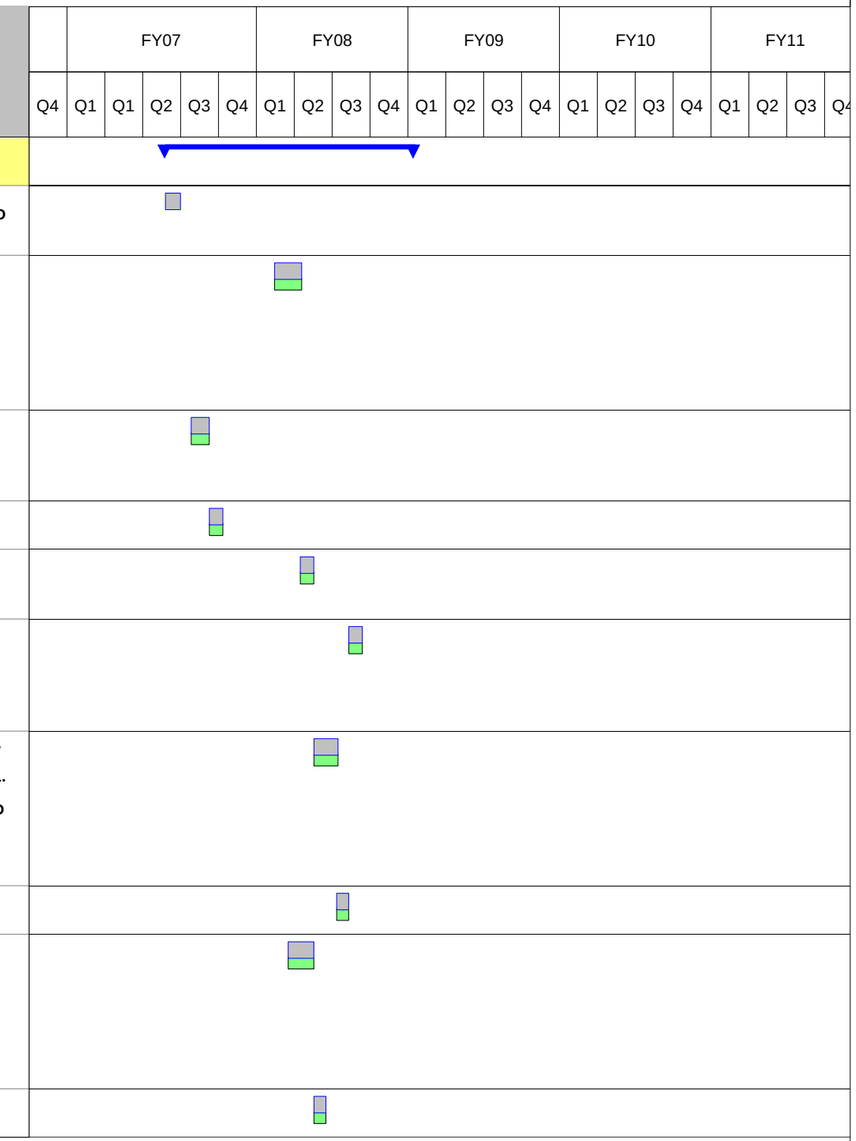
1.0.1.2.1.3	**Assembly & Testing RR Injection Line Prototype Kicker**	**415d**	**26Feb07**	**15Oct08**		
1.0.1.2.1.3.1	RR Injection Measure Response of Existing Cables	25d	**26Feb07**	**30Mar07**	**2.0.4.3.1[FS]**	**M.FNAL.AD.MANDS,5000.00,;L.FNAL.AD.TECH.ET_W,80.00,;L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG.EE_SR,8.00,**
1.0.1.2.1.3.2	Assemble 1st Design prototype magnet & Existing Ceramic	40d	**15Nov07**	**17Jan08**	**1.0.1.2.1.2.6[FS]; 1.0.1.2.1.2.5[FS]; 1.0.1.2.1.2.4[FS]**	**L.FNAL.TD.TECH.ET_W,80.00,;L.FNAL.AD.ENG.EE,144.00,;L.FNAL.TD.ENG.EE,80.00,;L.FNAL.AD.ENG.EE_SR,16.00,;L.FNAL.AD.TECH.ET_W,160.00,;L.FNAL.TD.TECH.MT_W,80.00,;L.FNAL.AD.TECH.MT_W,160.00,;L.FNAL.TD.ENG.ME,80.00,;L.FNAL.AD.ENG.ME_SR,16.00,;L.FNAL.AD.ENG.ME,144.00,**
1.0.1.2.1.3.3	Assemble 1 Prototype Load Temperature Control Fluorinert Skid	30d	**27Apr07**	**08Jun07**	**1.0.1.2.1.2.8[FS]**	**L.FNAL.AD.TECH.MT_W,240.00,;L.FNAL.AD.ENG.ME,54.00,;L.FNAL.AD.ENG.ME_SR,6.00,;L.FNAL.AD.ENG.EE_SR,1.00,;L.FNAL.AD.TECH.ET_W,240.00,;L.FNAL.AD.ENG.EE,11.00,**
1.0.1.2.1.3.4	Assemble Prototype Load & Adaptor	20d	**12Jun07**	**10Jul07**	**1.0.1.2.1.2.9[FS]**	**L.FNAL.AD.TECH.MT_W,40.00,;L.FNAL.AD.ENG.EE,16.00,;L.FNAL.AD.TECH.ET_W,32.00,**
1.0.1.2.1.3.5	Low voltage testing 1a of Prototype Magnet	20d	**18Jan08**	**15Feb08**	**1.0.1.2.1.3.2[FS]**	**L.FNAL.AD.TECH.ET_W,160.00,;M.FNAL.AD.MANDS,1000.00,;L.FNAL.AD.ENG.EE,144.00,;L.FNAL.AD.ENG.EE_SR,16.00,**
1.0.1.2.1.3.6	High voltage testing of Prototype Magnets	20d	**12May08**	**09Jun08**	**1.0.1.2.2.3.2[FS]; 1.0.1.2.1.3.10[FS]; 1.0.1.2.1.3.8[FS]; 1.0.1.2.2.1.1[FS]; 1.0.1.2.1.3.3[FS]**	**L.FNAL.AD.TECH.ET_W,160.00,;L.FNAL.AD.ENG.EE,144.00,;L.FNAL.AD.ENG.EE_SR,16.00,**
1.0.1.2.1.3.7	Assemble 1st Design Prototype Magnet with 2nd ferrite	40d	**18Feb08**	**11Apr08**	**1.0.1.2.1.3.5[FS]; 1.0.1.2.1.2.5[FS]; 1.0.1.2.1.2.4[FS]**	**L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.EE,72.00,;L.FNAL.TD.TECH.MT_W,80.00,;L.FNAL.AD.ENG.EE_SR,8.00,;L.FNAL.AD.TECH.ET_W,80.00,;L.FNAL.TD.ENG.ME,40.00,;L.FNAL.TD.TECH.ET_W,40.00,;L.FNAL.TD.ENG.EE,40.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.TECH.MT_W,160.00,**
1.0.1.2.1.3.8	Repeat low voltage & high voltage test of Proto Mag	20d	**14Apr08**	**09May08**	**1.0.1.2.1.3.7[FS]**	**L.FNAL.AD.TECH.ET_W,120.00,;L.FNAL.AD.ENG.EE,108.00,;L.FNAL.AD.ENG.EE_SR,12.00,**
1.0.1.2.1.3.9	Assemble 2nd Design Prototype magnet	40d	**17Dec07**	**15Feb08**	**1.0.1.2.1.2.5[FS]; 1.0.1.2.1.2.4[FS+40d]; 1.0.1.2.1.2.6[FS]**	**L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.TECH.MT_W,160.00,;L.FNAL.TD.ENG.EE,40.00,;L.FNAL.AD.ENG.EE_SR,8.00,;L.FNAL.AD.TECH.ET_W,80.00,;L.FNAL.TD.TECH.MT_W,80.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.TD.ENG.ME,40.00,;L.FNAL.TD.TECH.ET_W,40.00,;L.FNAL.AD.ENG.ME,72.00,**
1.0.1.2.1.3.10	Repeat low voltage & high voltage test of Proto Mag	20d	**18Feb08**	**14Mar08**	**1.0.1.2.1.3.9[FS]; 1.0.1.2.1.3.5[FS]**	**L.FNAL.AD.TECH.ET_W,120.00,;L.FNAL.AD.ENG.EE,108.00,;L.FNAL.AD.ENG.EE_SR,12.00,**



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Nova Project
WBS 1.x - R & D
Gantt Chart

CD-2/3a Director's Review
June 4-6, 2007

WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.2.1.3.11	Pot prototype magnet	20d	06Aug08	03Sep08	1.0.1.2.1.1.6[FS]	L.FNAL.TD.TECH.MT_W,80.00,;M.FNAL.AD.MANDS,2000.00,;L.FNAL.TD.ENG.EE,40.00,;L.FNAL.AD.ENG.EE_SR,8.00,;L.FNAL.AD.TECH.MT_W,160.00,;L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.TD.ENG.ME,40.00,;L.FNAL.AD.ENG.ME,72.00,
1.0.1.2.1.3.12	Repeat low voltage 4a & high voltage 4b testing of Prototype Magnet	30d	04Sep08	15Oct08	1.0.1.2.1.3.4[FS]; 1.0.1.2.1.3.11[FS]	L.FNAL.AD.TECH.ET_W,240.00,;L.FNAL.AD.ENG.EE,216.00,;L.FNAL.AD.ENG.EE_SR,24.00,
1.0.1.2.2	**RR Injection & Gap Clearing Prototype Pulser**	**561d**	**01Dec06**	**27Feb09**		
1.0.1.2.2.1	**Design of RR Injection & Gap Clearing Prototype Pulser & Final Pulser Enclosure**	**292d**	**01Dec06**	**04Feb08**		
1.0.1.2.2.1.1	RR Injection & Gap Clearing Design Prototype Thyratron Pulser Enclosures (2 variations)	60d	01Dec06	01Mar07	2.0.4.3.1[FS]	L.FNAL.AD.ENG.ME,144.00,;L.FNAL.AD.ENG.DES,480.00,;L.FNAL.AD.ENG.ME_SR,16.00,;L.FNAL.AD.ENG.EE,288.00,;L.FNAL.AD.ENG.EE_SR,32.00,
1.0.1.2.2.1.2	RR Injection & Gap Clearing Design Pulse Forming Network (2 types)	24d	04Sep07	05Oct07		L.FNAL.AD.ENG.EE_SR,8.00,;L.FNAL.AD.ENG.EE,76.00,;L.FNAL.AD.ENG.DES,84.00,
1.0.1.2.2.1.3	RR Injection & Gap Clearing Revise Design of Pulsers	20d	07Jan08	04Feb08	1.0.1.2.2.3.2[FS]	L.FNAL.AD.ENG.ME_SR,4.00,;L.FNAL.AD.ENG.EE,36.00,;L.FNAL.AD.ENG.ME,36.00,;L.FNAL.AD.ENG.DES,160.00,;L.FNAL.AD.ENG.EE_SR,4.00,
1.0.1.2.2.1.4	RR Injection & Gap Clearing Design Resonant Charger (2) Types	24d	29Oct07	03Dec07	2.10.8.4[FS]; 2.0.4.3.5[FS]	L.FNAL.AD.ENG.EE_SR,8.00,;L.FNAL.AD.ENG.DES,84.00,;L.FNAL.AD.ENG.EE,60.00,
1.0.1.2.2.2	**Procurement RR Injection & Gap Clearing Prototype Pulser**	**378d**	**01Dec06**	**04Jun08**		
1.0.1.2.2.2.1	RR Injection & Gap Clearing Prep Req & Award PO for Parts & Fluorinert for 2 Prototype pulsers	20d	01May07	29May07	1.0.1.2.2.1.1[FS+42d]	L.FNAL.AD.ENG.ME,108.00,;L.FNAL.AD.ENG.EE,108.00,;L.FNAL.AD.ENG.ME_SR,12.00,;L.FNAL.AD.ENG.EE_SR,12.00,
1.0.1.2.2.2.2	RR Injection & Gap Clearing Receive Parts & Fluorinert for 2 Prototype pulsers	60d	30May07	22Aug07	1.0.1.2.2.2.1[FS]	L.FNAL.AD.ENG.EE,38.00,;M.FNAL.AD.MANDS,35000.00,;L.FNAL.AD.ENG.ME,38.00,
1.0.1.2.2.2.3	RR Injection & Gap Clearing Prep Req & Award PO for Thyratrons for 2 HV Prototype pulsers	20d	01Dec06	03Jan07	2.0.4.3.1[FS]	L.FNAL.AD.ENG.EE,32.00,
1.0.1.2.2.2.4	RR Injection & Gap Clearing Receive Thyratrons for 2 HV Prototype pulsers	80d	04Jan07	26Apr07	1.0.1.2.2.2.3[FS]	M.FNAL.AD.MANDS,24000.00,;L.FNAL.AD.ENG.EE,13.00,
1.0.1.2.2.2.5	RR Injection & Gap Clearing Pre-production Pulser Prep Req & Award PO for 10 PFL	40d	29Oct07	27Dec07	2.0.4.3.5[FS]; 2.10.8.4[FS]; 1.0.1.2.1.1.5[FS]	L.FNAL.TD.ENG.ME,10.00,;L.FNAL.TD.ENG.EE,5.00,
1.0.1.2.2.2.6	RR Injection & Gap Clearing Pre-production Pulser Receive 10 PFL Frames	30d	28Dec07	12Feb08	1.0.1.2.2.2.5[FS]	M.FNAL.AD.MANDS,15000.00,;L.FNAL.TD.ENG.EE,7.00,;L.FNAL.TD.ENG.ME,14.00,
1.0.1.2.2.2.7	RR Inj & Gap Clearing Pre-prod Pulser Procure 6 Spare PFL Frames	80d	15Oct07	12Feb08	1.0.1.2.2.2.6[FF]	M.FNAL.AD.MANDS,9000.00,
1.0.1.2.2.2.8	RR Injection & Gap Clearing Pre-production Pulser Prep Req & Award PO for All Cable	30d	29Oct07	11Dec07	2.0.4.3.5[FS]; 2.10.8.4[FS]; 1.0.1.2.1.3.1[FS]	L.FNAL.AD.ENG.EE,36.00,;L.FNAL.AD.ENG.EE_SR,4.00,
1.0.1.2.2.2.9	RR Injection & Gap Clearing Pre-production Pulser Receive All Cable	90d	30Jan08	04Jun08	1.0.1.2.2.2.8[FF+120d]	L.FNAL.AD.ENG.EE,7.00,;M.FNAL.AD.MANDS,120000.00,
1.0.1.2.2.2.10	RR Injection & Gap Clearing Pre-production Pulser Procure Spare Cable (6 spools)	120d	29Oct07	22Apr08	2.0.4.3.5[FS]; 2.10.8.4[FS]; 1.0.1.2.1.3.1[FS]	M.FNAL.AD.MANDS,72000.00,

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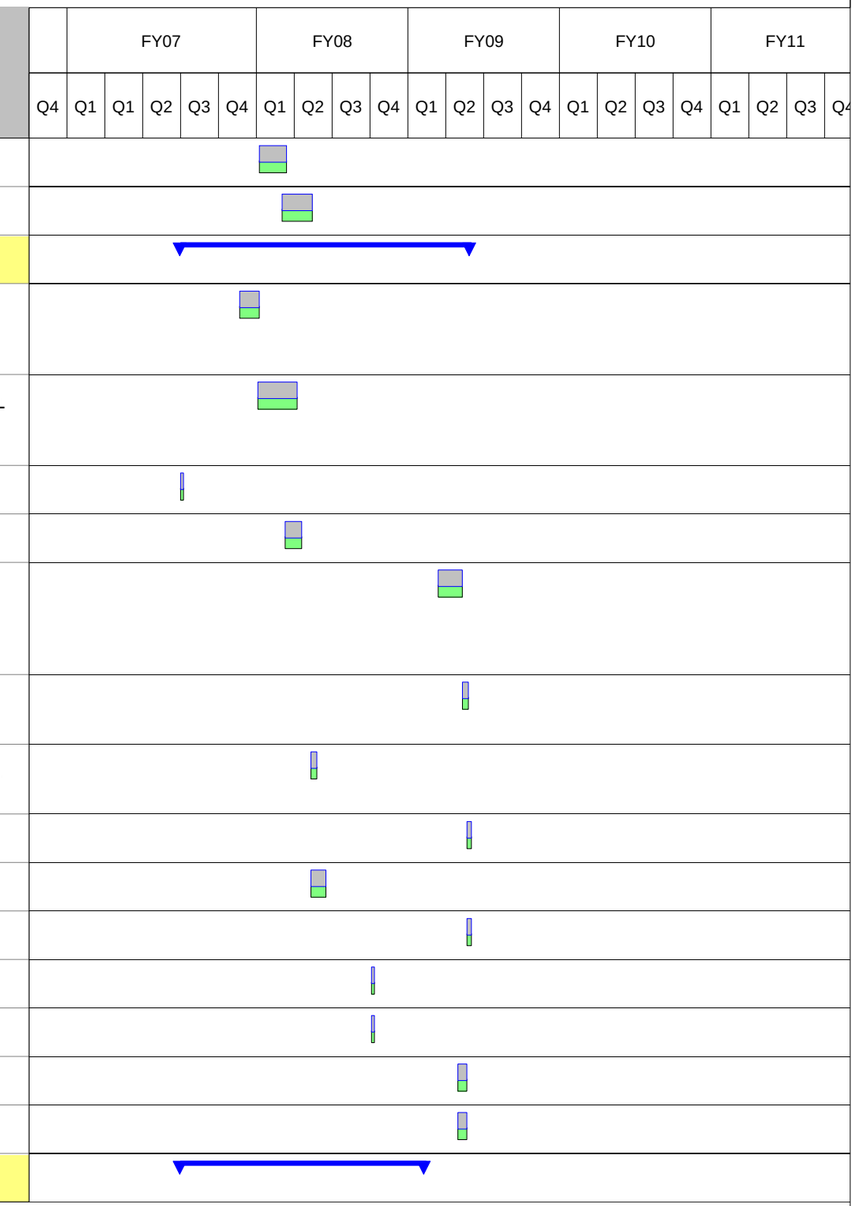
Nova Project
WBS 1.x - R & D
Gantt Chart

CD-2/3a Director's Review
June 4-6, 2007

WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.2.2.2.11	RR Injection & Gap Clearing Pulse Forming Network Procure Parts for (2) PFNs	45d	08Oct07	11Dec07	1.0.1.2.2.1.2[FS]	M.FNAL.AD.MANDS,100000.00,;L.FNAL.AD.ENG. EE,34.00,
1.0.1.2.2.2.12	RR Injection & Gap Clearing Resonant Charger Procure Parts for 2 Assys	45d	04Dec07	11Feb08	1.0.1.2.2.1.4[FS]	L.FNAL.AD.ENG.EE,34.00,;M.FNAL.AD. MANDS,100000.00,
1.0.1.2.2.3	**Assembly/Testing/Install RR Injection & Gap Clearing Prototype Pulser**	**480d**	**02Apr07**	**27Feb09**		
1.0.1.2.2.3.1	RR Injection & Gap Clearing Assemble Prototype pulsers (2)	30d	23Aug07	04Oct07	1.0.1.2.2.2.4[FS]; 1.0.1.2.2.2.2[FS]	L.FNAL.AD.ENG.ME_SR,16.00,;L.FNAL.AD.ENG. ME,144.00,;L.FNAL.AD.TECH.ET_W,320.00,;L. FNAL.AD.ENG.EE,144.00,;L.FNAL.AD.ENG. EE_SR,16.00,
1.0.1.2.2.3.2	RR Injection & Gap Clearing Testing of Prototype Pulsers (2)	60d	05Oct07	04Jan08	1.0.1.2.2.3.3[FS]; 1.0.1.2.2.3.1[FS]	M.FNAL.AD.MANDS,5000.00,;L.FNAL.AD.ENG. EE,142.00,;L.FNAL.AD.TECH.ET_W,322.00,;L.FNAL .AD.TECH.MT_W,158.00,;L.FNAL.AD.ENG. EE_SR,16.00,
1.0.1.2.2.3.3	RR Injection Clear Transfer Gallery Cage for Prototype Testing	5d	02Apr07	06Apr07	2.0.4.3.11[FS]	M.FNAL.AD.MANDS,8400.00,;L.FNAL.TM.ELEC. ELEC,80.00,
1.0.1.2.2.3.4	RR Injection & Gap Clearing Pulse Forming Network Assemble & Test (2) PFNs	24d	12Dec07	18Jan08	1.0.1.2.2.2.11[FS]	L.FNAL.AD.TECH.ET_W,168.00,;L.FNAL.AD.ENG. EE,34.00,
1.0.1.2.2.3.5	RR Injection & Gap Clearing HV & Impedance Testing of Cable	35d	15Dec08	06Feb09	2.0.1.2.4.1.14[FS]; 2.0.1.2.4.1.12[FS]; 2.0.1.2.4.1.13[FS]; 1.0.1.2.2.2.10[FS]; 1.0.1.2.2.2.9[FS]	L.FNAL.AD.TECH.ET_W,160.00,;L.FNAL.AD.ENG. EE,108.00,;L.FNAL.AD.ENG.EE_SR,12.00,
1.0.1.2.2.3.6	RR Inj & Gap Clearing Wind Cables on 10 PFL frames	10d	09Feb09	20Feb09	1.0.1.2.2.3.5[FS]; 1.0.1.2.2.2.6[FS]	L.FNAL.TD.ENG.EE,15.00,;L.FNAL.TD.ENG.ME,15. 00,;L.FNAL.TD.TECH.ET_W,160.00,;L.FNAL.TD. TECH.MT_W,160.00,
1.0.1.2.2.3.7	RR Inj Gap Clearing Wind Cables on 6 Spare PFL Frames	6d	13Feb08	20Feb08	1.0.1.2.2.2.7[FS]	L.FNAL.TD.ENG.ME,8.00,;L.FNAL.TD.TECH. MT_W,96.00,;L.FNAL.TD.ENG.EE,8.00,;L.FNAL.TD. TECH.ET_W,96.00,
1.0.1.2.2.3.8	RR Injection & Gap Clearing Install 5 PFL Frames in MI-14 Bldg	5d	23Feb09	27Feb09	1.0.1.2.2.3.6[FS]	L.FNAL.AD.TECH.MT_W,80.00,
1.0.1.2.2.3.9	RR Injection & Gap Clearing Resonant Charger Assemble & Test 2 Assys	24d	12Feb08	14Mar08	1.0.1.2.2.2.12[FS]	L.FNAL.AD.ENG.EE,34.00,;L.FNAL.AD.TECH. ET_W,188.00,
1.0.1.2.2.3.10	RR Injection & Gap Clearing Install 5 PFL Frames in MI-39 Bldg	5d	23Feb09	27Feb09	1.0.1.2.2.3.6[FS]	L.FNAL.AD.TECH.MT_W,80.00,
1.0.1.2.2.3.11	RR Injection & Gap Clearing Install 3 Spare PFL Frames in MI-14 Bldg	3d	07Jul08	09Jul08	1.0.1.2.2.3.7[FS]	L.FNAL.AD.TECH.MT_W,48.00,
1.0.1.2.2.3.12	RR Injection & Gap Clearing Install 3 Spare PFL Frames in MI-39 Bldg	3d	07Jul08	09Jul08	1.0.1.2.2.3.7[FS]	L.FNAL.AD.TECH.MT_W,48.00,
1.0.1.2.2.3.13	RR Injection & Gap Clearing Install PFNs in Bldgs MI-14 & MI-39	12d	30Jan09	16Feb09	2.0.4.4.1.4[FS]; 1.0.1.2.2.3.4[FS]; 2.0.4.4.1.5[FS]	L.FNAL.AD.ENG.EE_SR,8.00,;L.FNAL.AD.ENG. EE,72.00,;L.FNAL.AD.TECH.ET_W,160.00,
1.0.1.2.2.3.14	RR Injection & Gap Clearing Install Resonant Chargers in MI-14 & MI-39	12d	30Jan09	16Feb09	2.0.4.4.1.4[FS]; 2.0.4.4.1.5[FS]; 1.0.1.2.2.3.9[FS]	L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG. EE_SR,8.00,;L.FNAL.AD.TECH.ET_W,160.00,
1.0.1.2.3	**RR Injection & Gap Clearing Prototype Bumper Power Supply**	**410d**	**02Apr07**	**12Nov08**		



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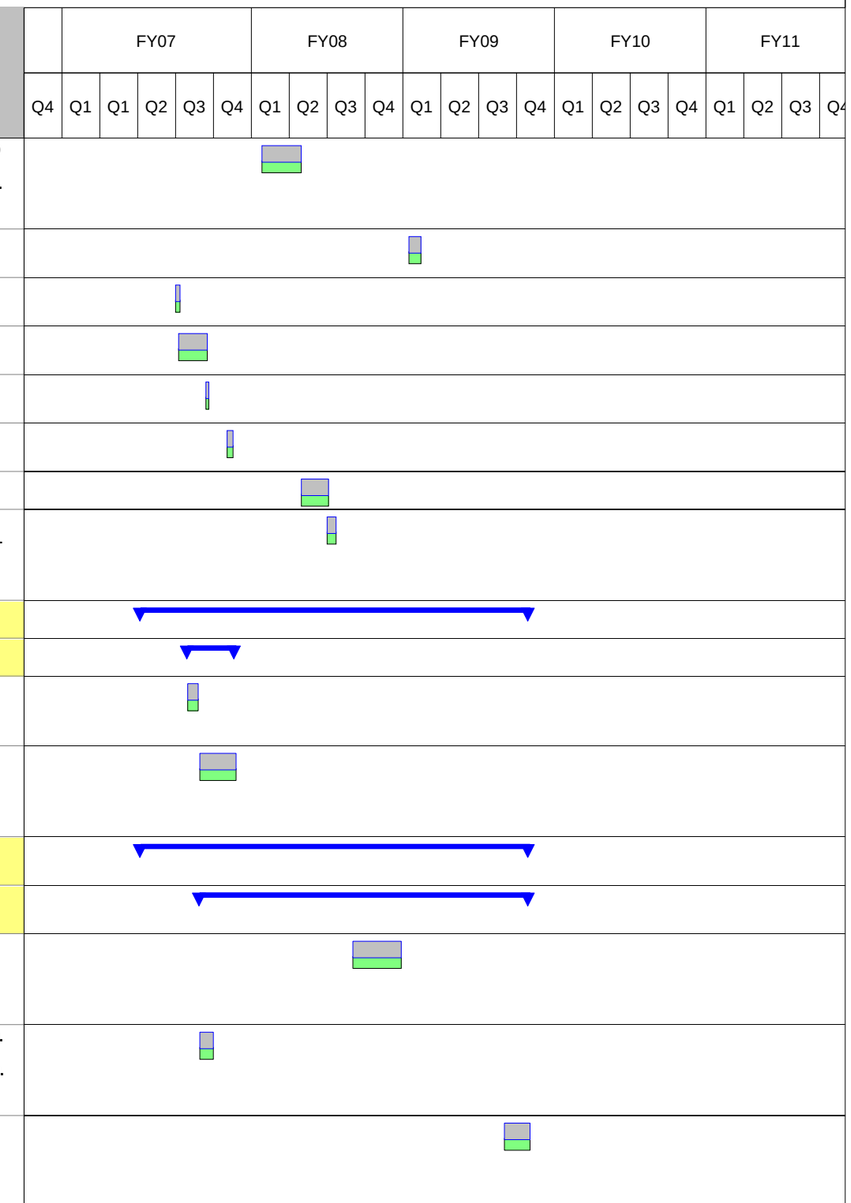
Nova Project
WBS 1.x - R & D
Gantt Chart

CD-2/3a Director's Review
June 4-6, 2007

WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.2.3.1	Design & Build Prototype Flattop Bumper Power Supply	60d	29Oct07	29Jan08	2.10.8.4[FS]; 2.0.4.3.5[FS]	L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.EE,290.00,;M.FNAL.AD.MANDS,50000.00,;L.FNAL.AD.ENG.EE_SR,30.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.TECH.ET_W,320.00,
1.0.1.2.3.2	Testing of Flattop Bumper PS with Prototype Magnet	20d	16Oct08	12Nov08	1.0.1.2.3.1[FS]; 1.0.1.2.1.3.12[FS]	L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.TECH.ET_W,80.00,;L.FNAL.AD.ENG.EE_SR,8.00,
1.0.1.2.3.3	Design Vacuum Layout for RR Injection Bumper Beam Test	7d	02Apr07	10Apr07	2.0.4.3.11[FS]	L.FNAL.AD.ENG.ME_SR,4.00,;L.FNAL.AD.ENG.ME,36.00,;L.FNAL.AD.ENG.DRFT,40.00,
1.0.1.2.3.4	Procure Vacuum Parts & Stands for RR Injection Bumper Magnet	45d	11Apr07	13Jun07	1.0.1.2.3.3[FS]	M.FNAL.AD.MANDS,5000.00,;L.FNAL.AD.ENG.DRFT,7.00,;L.FNAL.AD.ENG.ME,17.00,
1.0.1.2.3.5	Procure Bumper Magnet from Spares	3d	14Jun07	18Jun07	1.0.1.2.3.4[FS]	M.FNAL.AD.MANDS,72000.00,;L.FNAL.AD.ENG.EE,8.00,
1.0.1.2.3.6	Pull Cables & Install Magnet in MI @Q103	7d	06Aug07	14Aug07	2.0.4.1.1[FS]; 1.0.1.2.3.5[FS]	L.FNAL.TD.TECH.WELD,8.00,;L.FNAL.AD.TECH.MT_W,80.00,;M.FNAL.AD.MANDS,5000.00,
1.0.1.2.3.7	Testing of Flattop Bumper w/Beam	45d	30Jan08	01Apr08	1.0.1.2.3.1[FS]; 2.0.4.1.2[FS]	L.FNAL.AD.SCI.PHY,40.00,
1.0.1.2.3.8	Update Design of Bumper Pulser PS	14d	02Apr08	21Apr08	1.0.1.2.3.7[FS]	L.FNAL.AD.ENG.ME_SR,4.00,;L.FNAL.AD.ENG.DRFT,160.00,;L.FNAL.AD.ENG.EE_SR,8.00,;L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG.ME,36.00,
1.0.1.2.4	**RR Extraction Line Kicker Magnets**	**644d**	**10Jan07**	**30Jul09**		
1.0.1.2.4.1	**RR Extraction Kicker Magnets**	**82d**	**01May07**	**24Aug07**		
1.0.1.2.4.1.1	RR Extraction/MI Injection Kicker Magnet Design Mods to Existing Magnets	15d	01May07	21May07	2.0.4.3.11[FS+21d]	L.FNAL.AD.ENG.DRFT,160.00,;L.FNAL.AD.ENG.EE,108.00,;L.FNAL.AD.ENG.ME_SR,12.00,;L.FNAL.AD.ENG.ME,108.00,;L.FNAL.AD.ENG.EE_SR,12.00,
1.0.1.2.4.1.2	RR Extraction/MI Injection Kicker Design for Fluorinert System	60d	01Jun07	24Aug07	2.0.4.3.11[FS+43d]	L.FNAL.AD.ENG.EE,142.00,;L.FNAL.AD.ENG.ME,290.00,;L.FNAL.AD.ENG.ME_SR,32.00,;L.FNAL.AD.ENG.DES,638.00,;L.FNAL.AD.ENG.EE_SR,16.00,
1.0.1.2.4.2	**MI Injection Kicker Prototype Tail Bumper PS System**	**644d**	**10Jan07**	**30Jul09**		
1.0.1.2.4.2.1	**Design MI Injection Prototype Tail Bumper PS**	**544d**	**01Jun07**	**30Jul09**		
1.0.1.2.4.2.1.1	Design Prototype MI Injection Kicker Tail Bumper Power Supply	80d	02Jun08	23Sep08	2.0.4.3.11[FS+43d]	L.FNAL.AD.ENG.EE,360.00,;L.FNAL.AD.ENG.ME,360.00,;L.FNAL.AD.ENG.DES,640.00,;L.FNAL.AD.ENG.ME_SR,40.00,;L.FNAL.AD.ENG.EE_SR,40.00,
1.0.1.2.4.2.1.2	Design MI Injection/RR Extraction/Beam Abort Prototype Magnet PFL Cable Spool Assy	20d	01Jun07	28Jun07	1.0.1.2.7.2[FS+43d]	L.FNAL.AD.ENG.DES,80.00,;L.FNAL.TD.ENG.EE,40.00,;L.FNAL.TD.ENG.ME,80.00,;L.FNAL.AD.ENG.EE,36.00,;L.FNAL.AD.ENG.EE_SR,4.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,
1.0.1.2.4.2.1.3	Revise MI Injection Kicker Prototype Tail Bumper PS Design & Fab Revised Parts	40d	04Jun09	30Jul09	1.0.1.2.4.2.3.7[FS]; 1.0.1.2.7.4[FS]	L.FNAL.AD.ENG.EE,144.00,;L.FNAL.AD.ENG.ME,144.00,;M.FNAL.AD.MANDS,5000.00,;L.FNAL.AD.ENG.EE_SR,16.00,;L.FNAL.AD.ENG.DES,160.00,;L.FNAL.AD.ENG.ME_SR,16.00,



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Nova Project
WBS 1.x - R & D
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CD-2/3a Director's Review
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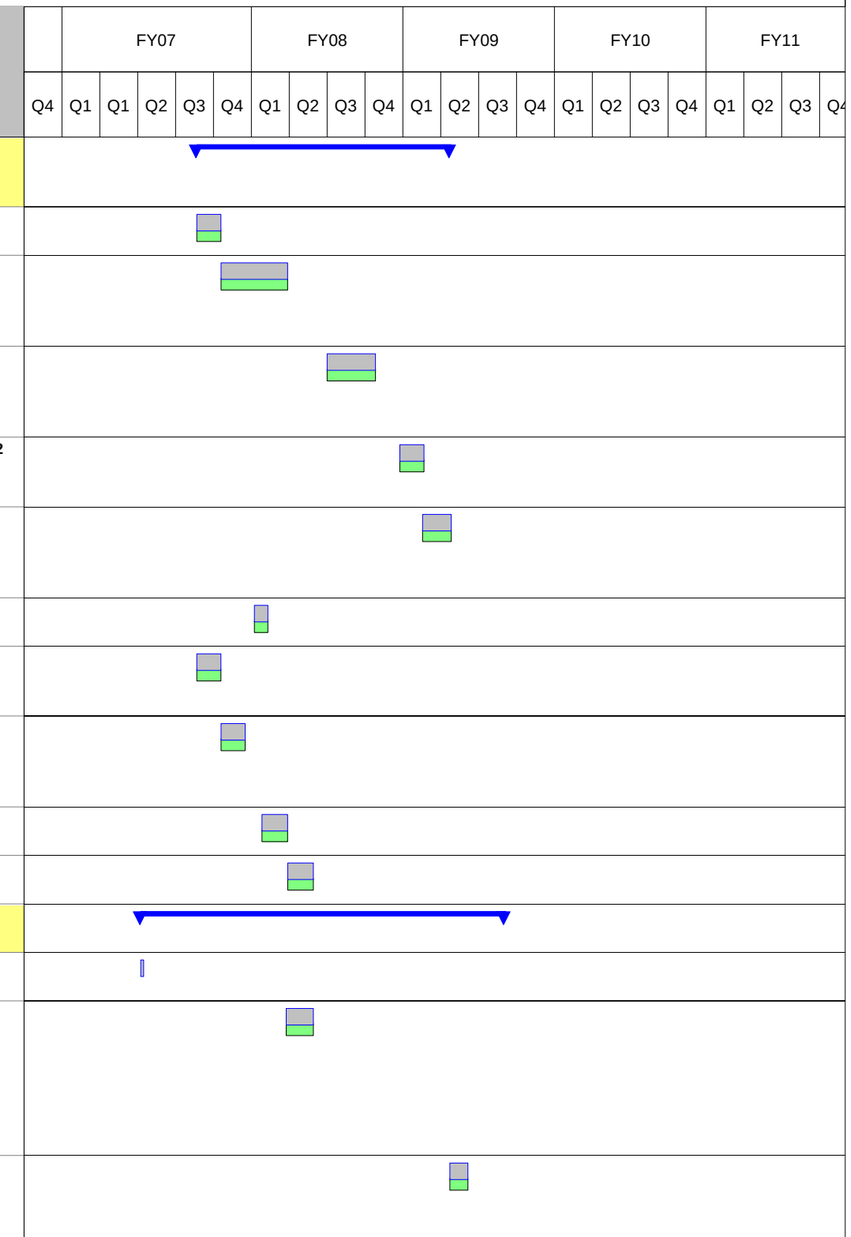
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.2.4.2.2	**Procurement MI Injection Prototype Kicker Tail Bumper Power Supply & Test Magnet**	**418d**	**22May07**	**22Jan09**		
1.0.1.2.4.2.2.1	Prep Req & Award PO for Capacitors & Ferrites for 1 Test Magnet	40d	**22May07**	**18Jul07**	**1.0.1.2.4.1.1[FS]**	**L.FNAL.AD.ENG.ME,25.00,;L.FNAL.AD.ENG.EE,25.00,**
1.0.1.2.4.2.2.2	Receive Capacitors & Ferrites for 1 Test Magnet	110d	**19Jul07**	**26Dec07**	**1.0.1.2.4.2.2.1[FS]**	**L.FNAL.AD.ENG.ME,63.00,;M.FNAL.AD.MANDS,32200.00,;L.FNAL.AD.ENG.EE,63.00,;L.FNAL.AD.ENG.EE_SR,7.00,;L.FNAL.AD.ENG.ME_SR,7.00,**
1.0.1.2.4.2.2.3	MI Inj Resonant Charger Procure	80d	**02Apr08**	**24Jul08**	**2.0.4.3.4[FS]**	**M.FNAL.AD.MANDS,22000.00,;L.FNAL.AD.TECH.ET_W,160.00,;L.FNAL.AD.ENG.DES,160.00,;L.FNAL.AD.ENG.EE_SR,16.00,;L.FNAL.AD.ENG.EE,144.00,**
1.0.1.2.4.2.2.4	Prep Req & Award PO for Parts & Fluorinert for Prototype Tail Bumper PS	40d	**24Sep08**	**18Nov08**	**1.0.1.2.4.2.1.1[FS]**	**L.FNAL.AD.ENG.DES,80.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.ENG.EE_SR,8.00,**
1.0.1.2.4.2.2.5	Receive Parts & Fluorinert for Prototype Tail Bumper PS	40d	**19Nov08**	**22Jan09**	**1.0.1.2.4.2.2.4[FS]**	**L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.EE,72.00,;M.FNAL.AD.MANDS,100000.00,;L.FNAL.AD.ENG.EE_SR,8.00,;L.FNAL.AD.ENG.DES,80.00,;L.FNAL.AD.ENG.ME_SR,8.00,**
1.0.1.2.4.2.2.6	Pulse Forming Network Porcure Parts for (1) PFN	24d	**08Oct07**	**08Nov07**	**1.0.1.2.2.1.2[FS]**	**M.FNAL.AD.MANDS,50000.00,;L.FNAL.AD.ENG.EE,17.00,**
1.0.1.2.4.2.2.7	Prep Req & Award PO for Parts & Fluorinert for 1 Test Magnet	40d	**22May07**	**18Jul07**	**1.0.1.2.4.1.1[FS]**	**L.FNAL.AD.ENG.EE_SR,4.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.EE,40.00,**
1.0.1.2.4.2.2.8	Receive Parts & Fluorinert for 1 Test Magnet	40d	**19Jul07**	**13Sep07**	**1.0.1.2.4.2.2.7[FS]**	**L.FNAL.AD.ENG.ME,75.00,;M.FNAL.AD.MANDS,37000.00,;L.FNAL.AD.ENG.EE,38.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.ENG.EE_SR,4.00,**
1.0.1.2.4.2.2.9	Prep Req & Award PO for Parts & Fluorinert for 1 Prototype Fluorinert Cooling Skid	40d	**29Oct07**	**27Dec07**	**2.10.8.4[FS]; 2.0.4.3.5[FS]; 1.0.1.2.7.3[FS]**	**L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,**
1.0.1.2.4.2.2.10	Receive Parts & Fluorinert for 1 Prototype Fluorinert Cooling Skid	40d	**28Dec07**	**26Feb08**	**1.0.1.2.4.2.2.9[FS]**	**L.FNAL.AD.ENG.ME,72.00,;M.FNAL.AD.MANDS,63000.00,;L.FNAL.AD.ENG.ME_SR,8.00,**
1.0.1.2.4.2.3	**Assembly & Testing MI Injection Prototype Kicker & Pulser System**	**604d**	**10Jan07**	**03Jun09**		
1.0.1.2.4.2.3.1	MI Injection Measure Response of Existing Cables	1d	**10Jan07**	**10Jan07**		**M.FNAL.AD.MANDS,5000.00,**
1.0.1.2.4.2.3.2	MI Injection Assemble Test Magnet	40d	**27Dec07**	**25Feb08**	**1.0.1.2.4.2.2.2[FS]; 1.0.1.2.4.2.2.8[FS]**	**L.FNAL.AD.TECH.ET_W,160.00,;L.FNAL.TD.ENG.EE,80.00,;L.FNAL.TD.TECH.MT_W,80.00,;L.FNAL.AD.ENG.EE_SR,16.00,;L.FNAL.TD.TECH.ET_W,80.00,;L.FNAL.AD.TECH.MT_W,160.00,;L.FNAL.AD.ENG.ME,144.00,;L.FNAL.AD.ENG.EE,144.00,;L.FNAL.TD.ENG.ME,80.00,;L.FNAL.AD.ENG.ME_SR,16.00,**
1.0.1.2.4.2.3.3	MI Inj Assemble Prototype Tail Bumper PS Pulser	30d	**23Jan09**	**05Mar09**	**1.0.1.2.4.2.2.5[FS]**	**L.FNAL.AD.ENG.EE_SR,11.00,;L.FNAL.AD.ENG.EE,97.00,;L.FNAL.AD.TECH.MT_W,240.00,;L.FNAL.AD.ENG.ME,108.00,;L.FNAL.AD.ENG.ME_SR,12.00,;L.FNAL.AD.TECH.ET_W,720.00,**



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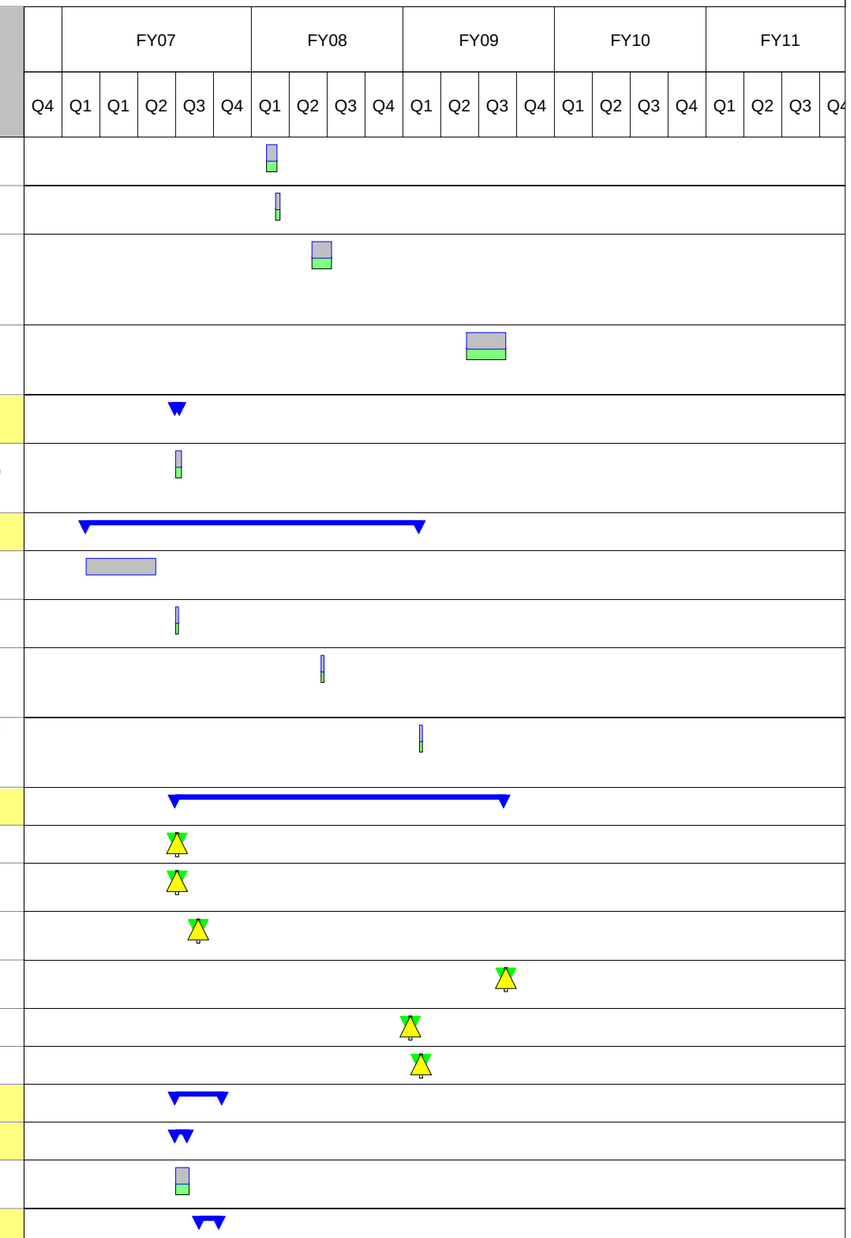
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.2.4.2.3.4	MI Inj Pulse Forming Network Assemble & Test (1) PFN	12d	09Nov07	28Nov07	1.0.1.2.4.2.2.6[FS]	L.FNAL.AD.ENG.EE,16.00,;L.FNAL.AD.TECH.ET_W,80.00,
1.0.1.2.4.2.3.5	MI Inj Install PFN in Bldg MI-30	7d	29Nov07	07Dec07	1.0.1.2.4.2.3.4[FS]	L.FNAL.AD.TECH.ET_W,80.00,;L.FNAL.AD.ENG.EE,36.00,;L.FNAL.AD.ENG.EE_SR,4.00,
1.0.1.2.4.2.3.6	MI Inj Assemble 1 Prototype Load Temperature Control Fluorinert Skid	30d	27Feb08	08Apr08	1.0.1.2.4.2.2.10[FS]	L.FNAL.AD.ENG.ME,54.00,;L.FNAL.AD.ENG.EE,11.00,;L.FNAL.AD.TECH.MT_W,240.00,;L.FNAL.AD.ENG.EE_SR,1.00,;L.FNAL.AD.TECH.ET_W,240.00,;L.FNAL.AD.ENG.ME_SR,6.00,
1.0.1.2.4.2.3.7	MI Inj High Voltage Testing of Prototype Tail Bumper with Test Magnet	63d	06Mar09	03Jun09	1.0.1.2.4.2.2.3[FS]; 1.0.1.2.4.2.3.3[FS]; 1.0.1.2.4.2.3.2[FS]	L.FNAL.AD.ENG.EE,567.00,;L.FNAL.AD.TECH.ET_W,630.00,;L.FNAL.AD.TECH.MT_W,252.00,;L.FNAL.AD.ENG.EE_SR,63.00,
1.0.1.2.5	**RR Extraction Line Kicker Power Supply System**	**10d**	**02Apr07**	**13Apr07**		
1.0.1.2.5.1	Extraction Line Kicker PS Update current HV pulser design	10d	02Apr07	13Apr07	2.0.4.3.11[FS]	L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG.DES,160.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.ENG.EE_SR,8.00,
1.0.1.2.6	**Recycler Kicker Systems Reviews**	**492d**	**01Dec06**	**13Nov08**		
1.0.1.2.6.1	Review ceramic beamtubes Prod Dwgs	46d	01Dec06	09Feb07	2.0.4.3.1[FS]	L.FNAL.AD.ENG.ME,26.00,;L.FNAL.AD.SCI.PHY,96.00,;L.FNAL.AD.ENG.EE,26.00,
1.0.1.2.6.2	Review on Which Cable to Purchase or Re-use Old Cables	1d	02Apr07	02Apr07	1.0.1.2.1.3.1[FS]	L.FNAL.AD.ENG.EE,24.00,
1.0.1.2.6.3	Review Design of RR Injection & Gap Clearing Pulsers	1d	17Mar08	17Mar08	1.0.1.2.2.3.4[FS]; 1.0.1.2.2.3.9[FS]; 1.0.1.2.2.1.3[FS]	L.FNAL.AD.SCI.PHY,8.00,;L.FNAL.AD.ENG.EE,16.00,;L.FNAL.AD.ENG.ME,16.00,
1.0.1.2.6.4	Review Final Design of RR Inject Line Kicker Magnet	1d	13Nov08	13Nov08	1.0.1.2.1.1.7[FS]; 1.0.1.1.5.2[FS]	M.FNAL.AD.MANDS,5000.00,;L.FNAL.AD.ENG.EE,8.00,;L.FNAL.AD.SCI.PHY,16.00,;L.FNAL.AD.ENG.ME,8.00,
1.0.1.2.7	**Recycler Kicker Systems Milestones**	**547d**	**02Apr07**	**03Jun09**		
1.0.1.2.7.1	RR Inj & Gap Clearing Pulser Cables Finalized	0	02Apr07	02Apr07	1.0.1.2.6.2[FS]	
1.0.1.2.7.2	RR Ext/MI Inj Pulser Cables Finalized	0	02Apr07	02Apr07	2.0.4.3.11[FS]; 1.0.1.2.4.2.3.1[FS]	
1.0.1.2.7.3	RR Existing Design for RR Injection Design Fluorinert System Confirmed	0	24May07	24May07	1.0.1.2.1.1.4[FF+60d]	
1.0.1.2.7.4	RR Extraction MI Injection Kicker Prototype Pulser System Complete	0	03Jun09	03Jun09	1.0.1.2.4.2.3.7[FS]	
1.0.1.2.7.5	RR Injection Line Prototype Kicker Complete	0	15Oct08	15Oct08	1.0.1.2.1.3.12[FS]	
1.0.1.2.7.6	RR Ferrite Procurement or Re-design Finalized	0	13Nov08	13Nov08	1.0.1.2.6.4[FS]	
1.0.1.3	**Recycler Instrumentation**	**79d**	**02Apr07**	**23Jul07**		
1.0.1.3.1	**BPMs**	**21d**	**02Apr07**	**30Apr07**		
1.0.1.3.1.1	Design BPM Cables & Transition Boards	21d	02Apr07	30Apr07	2.0.4.3.11[FS]	L.FNAL.AD.ENG.EE,38.00,;L.FNAL.AD.ENG.EE_SR,4.00,
1.0.1.3.2	**Dampers**	**32d**	**01Jun07**	**17Jul07**		



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WBS 1.x - R & D
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WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.1.3.2.1	**Longitudinal**	**32d**	**01Jun07**	**17Jul07**		
1.0.1.3.2.1.1	Design Longitudinal Dampers	32d	**01Jun07**	**17Jul07**		**L.FNAL.AD.SCI.PHY,128.00,**
1.0.1.3.2.2	**Transverse**	**32d**	**01Jun07**	**17Jul07**		
1.0.1.3.2.2.1	Design Transverse Dampers	32d	**01Jun07**	**17Jul07**		**L.FNAL.AD.SCI.PHY,128.00,**
1.0.1.3.3	**Recycler Instrumentation Reviews**	**4d**	**18Jul07**	**23Jul07**		
1.0.1.3.3.1	Instrumentation Design Review	4d	**18Jul07**	**23Jul07**	**1.0.1.3.2.1.1[FS]; 1.0.1.3.2.2.1[FS]; 1.0.1.3.1.1[FS]**	**L.FNAL.AD.ENG.EE,9.00,;L.FNAL.AD.ENG.RF,9.00,;L.FNAL.AD.SCI.PHY,9.00,**
1.0.1.4	**Recycler Radiation Safety**	**250d**	**02Apr07**	**28Mar08**		
1.0.1.4.1	Recycler Radiation Shielding Study	125d	**02Apr07**	**26Sep07**	**2.0.4.3.11[FS]**	**L.FNAL.AD.SCI.PHY,250.00,;M.FNAL.AD.MANDS,10000.00,;L.FNAL.AD.MNG.ESH,100.00,**
1.0.1.4.2	Recycler - Review & Revise Shielding Assessment	125d	**27Sep07**	**28Mar08**	**1.0.1.4.1[FS]**	**L.FNAL.AD.SCI.PHY,250.00,**
1.0.1.4.3	**Recycler Radiation Safety Milestones**	**0**	**28Mar08**	**28Mar08**		
1.0.1.4.3.1	RR Shielding Assessment Complete	0	**28Mar08**	**28Mar08**	**1.0.1.4.2[FS]**	
1.0.2	**Main Injector Upgrades**	**1031d**	**01Feb07**	**09Mar11**		
1.0.2.1	**MI Modifications**	**989d**	**02Apr07**	**09Mar11**		
1.0.2.1.1	**Machine Timing**	**989d**	**02Apr07**	**09Mar11**		
1.0.2.1.1.1	**Machine Timing**	**24d**	**01Oct10**	**03Nov10**		
1.0.2.1.1.1.1	Design & modify Beam Swtch Sum Box	17d	**01Oct10**	**25Oct10**	**2.0.4.1.5[FS]**	**M.FNAL.AD.MANDS,500.00,;L.FNAL.AD.TECH.ET_W,136.00,;L.FNAL.AD.ENG.EE,61.00,;L.FNAL.AD.ENG.EE_SR,7.00,;L.FNAL.AD.ENG.EP,14.00,**
1.0.2.1.1.1.2	Design & modify MI beam sync clock	7d	**01Oct10**	**11Oct10**	**2.0.4.1.5[FS]**	**L.FNAL.AD.TECH.ET_W,56.00,;M.FNAL.AD.MANDS,500.00,;L.FNAL.AD.ENG.EE,28.00,;L.FNAL.AD.ENG.EP,6.00,**
1.0.2.1.1.1.3	Design & modify RR beam sync clock	7d	**01Oct10**	**11Oct10**	**2.0.4.1.5[FS]**	**L.FNAL.AD.ENG.EE,28.00,;L.FNAL.AD.TECH.ET_W,56.00,;M.FNAL.AD.MANDS,500.00,;L.FNAL.AD.ENG.EP,6.00,**
1.0.2.1.1.1.4	Design & modify TClock	7d	**01Oct10**	**11Oct10**	**2.0.4.1.5[FS]**	**L.FNAL.AD.TECH.ET_W,56.00,;M.FNAL.AD.MANDS,500.00,;L.FNAL.AD.ENG.EE,28.00,;L.FNAL.AD.ENG.EP,6.00,**
1.0.2.1.1.1.5	Design & modify MI low level RF system	24d	**01Oct10**	**03Nov10**	**2.0.4.1.5[FS]**	**L.FNAL.AD.ENG.EE,156.00,;L.FNAL.AD.TECH.ET_W,19.00,;L.FNAL.AD.ENG.EE_SR,17.00,;L.FNAL.AD.ENG.EP,10.00,**
1.0.2.1.1.2	**Design & modify RR low level RF system**	**297d**	**02Apr07**	**04Jun08**		
1.0.2.1.1.2.1	RR Low Level RF System Initial Design	34d	**02Apr07**	**17May07**	**2.0.4.3.11[FS]**	**L.FNAL.AD.ENG.EE_SR,27.00,;L.FNAL.AD.ENG.EE,245.00,;L.FNAL.AD.ENG.EP,14.00,**
1.0.2.1.1.2.2	RR Low Level RF System Design	37d	**18May07**	**11Jul07**	**1.0.2.1.1.2.1[FS]**	**L.FNAL.AD.ENG.EE_SR,30.00,;L.FNAL.AD.ENG.EE,266.00,;L.FNAL.AD.ENG.EP,15.00,**

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WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.2.1.1.2.3	RR Low Level RF System Develop Hardware/Software	117d	12Jul07	28Dec07	1.0.2.1.1.2.2[FS]	M.FNAL.AD.MANDS,15000.00,;L.FNAL.AD.ENG.EE_SR,94.00,;L.FNAL.AD.ENG.EE,842.00,;L.FNAL.AD.ENG.EP,47.00,
1.0.2.1.1.2.4	RR Low Level RF System Test Prototype	109d	02Jan08	04Jun08	1.0.2.1.1.2.3[FS]	M.FNAL.AD.MANDS,2000.00,;L.FNAL.AD.ENG.EE_SR,87.00,;L.FNAL.AD.ENG.EE,785.00,;L.FNAL.AD.ENG.EP,44.00,
1.0.2.1.1.3	Design & Install Injection Line Controls	9d	16Nov10	30Nov10	2.0.4.3.11[FS]; 2.0.2.1.2.6[FS]	L.FNAL.AD.ENG.EE,14.00,;L.FNAL.AD.TECH.ET_W,54.00,;M.FNAL.AD.MANDS,14000.00,;L.FNAL.AD.ENG.EP,14.00,
1.0.2.1.1.4	Design & Install Extraction Line Controls	9d	16Nov10	30Nov10	2.0.4.3.11[FS]; 2.0.2.1.3.6[FS]	M.FNAL.AD.MANDS,12000.00,;L.FNAL.AD.TECH.ET_W,54.00,;L.FNAL.AD.ENG.EE,14.00,;L.FNAL.AD.ENG.EP,14.00,
1.0.2.1.1.5	**Machine Timing - OP**	**34d**	**01Oct10**	**17Nov10**		
1.0.2.1.1.5.1	Define & install inputs to RR beam permit system	34d	01Oct10	17Nov10	2.0.4.1.5[FS]	L.FNAL.AD.TECH.ET_W,136.00,;M.FNAL.AD.MANDS,4000.00,;L.FNAL.AD.ENG.EP,82.00,;L.FNAL.AD.ENG.EE,49.00,;L.FNAL.AD.ENG.EE_SR,5.00,
1.0.2.1.1.5.2	Modify Timeline Generator	14d	01Oct10	20Oct10	2.0.4.1.5[FS]	L.FNAL.AD.CP.SD,112.00,;L.FNAL.AD.ENG.EP,6.00,
1.0.2.1.1.5.3	Configure & install kicker timing controls	12d	01Oct10	18Oct10	2.0.4.1.5[FS]	M.FNAL.AD.MANDS,10000.00,;L.FNAL.AD.TECH.ET_W,48.00,;L.FNAL.AD.ENG.EE,43.00,;L.FNAL.AD.ENG.EE_SR,5.00,;L.FNAL.AD.ENG.EP,10.00,
1.0.2.1.1.6	**Modify RR Low Level RF System**	**108d**	**01Oct10**	**09Mar11**		
1.0.2.1.1.6.1	RR Low Level RF System Recover & Test Decommissioned Hardware from Tevatron	29d	01Oct10	10Nov10	2.0.4.1.5[FS]; 1.0.2.1.5.2[FS]	L.FNAL.AD.TECH.ET_W,232.00,;L.FNAL.AD.ENG.EE,12.00,
1.0.2.1.1.6.2	RR Low Level RF System Install	34d	11Nov10	04Jan11	1.0.2.1.1.6.1[FS]	L.FNAL.AD.ENG.EE,245.00,;L.FNAL.AD.ENG.EE_SR,27.00,;L.FNAL.AD.TECH.ET_W,272.00,;M.FNAL.AD.MANDS,1000.00,
1.0.2.1.1.6.3	RR Low Level RF System Test	30d	05Jan11	16Feb11	1.0.2.1.1.6.2[FS]	L.FNAL.AD.TECH.ET_W,48.00,;L.FNAL.AD.ENG.EE_SR,43.00,;L.FNAL.AD.ENG.EE,389.00,;L.FNAL.AD.ENG.EP,24.00,
1.0.2.1.1.6.4	RR Low Level RF System Startup	15d	17Feb11	09Mar11	1.0.2.1.1.6.3[FS]	L.FNAL.AD.ENG.EE,194.00,;L.FNAL.AD.ENG.EE_SR,22.00,;L.FNAL.AD.TECH.ET_W,24.00,;L.FNAL.AD.ENG.EP,12.00,
1.0.2.1.2	**Decommissioning of A1 Line Extraction**	**8d**	**01Oct10**	**12Oct10**		
1.0.2.1.2.1	Removal of 3 Lambertson Magnets	2d	01Oct10	04Oct10	2.0.4.1.5[FS]	L.FNAL.AD.TECH.MT_W,48.00,;L.FNAL.AD.ENG.ME,8.00,;M.FNAL.AD.MANDS,6560.00,
1.0.2.1.2.2	Remove Kicker Magnet	1d	01Oct10	01Oct10	2.0.4.1.5[FS]	L.FNAL.AD.TECH.MT_W,8.00,;L.FNAL.AD.TECH.ET_W,8.00,
1.0.2.1.2.3	Align Beam Pipe	1d	05Oct10	05Oct10	1.0.2.1.2.1[FS]; 1.0.2.1.2.2[FS]	L.FNAL.PPD.OTH.ALIGN,16.00,;L.FNAL.PPD.OTH.MET,8.00,
1.0.2.1.2.4	Reconstitute Vacuum	5d	06Oct10	12Oct10	1.0.2.1.2.3[FS]	L.FNAL.AD.TECH.MT_W,80.00,
1.0.2.1.3	**2.5 Mhz Cavitites (6)**	**9d**	**01Oct10**	**13Oct10**		

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1.0.2.1.3.1	2.5 Mhz Cavity (6) Removal Incl Cables	3d	01Oct10	05Oct10	2.0.4.1.5[FS]	L.FNAL.AD.TECH.MT_W,12.00,;L.FNAL.AD.TECH.RF_W,20.00,
1.0.2.1.3.2	Align Beam Pipe	1d	06Oct10	06Oct10	1.0.2.1.6.1[FS]; 1.0.2.1.3.1[FS]	L.FNAL.PPD.OTH.MET,8.00,;L.FNAL.PPD.OTH.ALIGN,16.00,
1.0.2.1.3.3	Reconstitute Vacuum	5d	07Oct10	13Oct10	1.0.2.1.3.2[FS]	L.FNAL.AD.TECH.MT_W,80.00,
1.0.2.1.4	**Main Injector Cooling System**	**360d**	**01Jun07**	**03Nov08**		
1.0.2.1.4.1	Analyze MI LCW & Pond Cooling System Capacities	360d	01Jun07	03Nov08	2.0.4.3.11[FS+43d]	L.FNAL.AD.ENG.ME,259.00,;L.FNAL.AD.ENG.ME_SR,29.00,;L.FNAL.AD.ENG.DRFT,144.00,;L.FNAL.AD.SCI.PHY,144.00,
1.0.2.1.5	**MI Modifications Reviews**	**222d**	**05Jun08**	**23Apr09**		
1.0.2.1.5.1	MI LCW & Pond Cooling System Initial Design Review	10d	10Apr09	23Apr09	1.0.2.1.4.1[FS]; 1.0.2.2.1.3.1[FS]; 2.0.4.3.7[FS+130d]	L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.SCI.PHY,80.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.ENG.DES,20.00,
1.0.2.1.5.2	Des & Modify RR Low Level RF System Review	2d	05Jun08	06Jun08	1.0.2.1.1.2.4[FS]	L.FNAL.AD.ENG.EE,32.00,;L.FNAL.AD.ENG.EP,32.00,
1.0.2.1.6	**MI Modifications Milestones**	**31d**	**05Oct10**	**17Nov10**		
1.0.2.1.6.1	MI 2.5 Mhz Cavities Removal Complete	0	05Oct10	05Oct10	1.0.2.1.3.1[FF]	
1.0.2.1.6.2	MI Decommissioing of A1 Extraction Line Complete	0	12Oct10	12Oct10	1.0.2.1.2.4[FS]	
1.0.2.1.6.3	MI Machine Timing Complete	0	17Nov10	17Nov10	1.0.2.1.1.1.1[FS]; 1.0.2.1.1.1.5[FS]; 1.0.2.1.1.5.1[FS]; 1.0.2.1.1.1.4[FS]; 1.0.2.1.1.1.3[FS]; 1.0.2.1.1.1.2[FS]	
1.0.2.2	**MI RF Cavities**	**714d**	**01Feb07**	**01Dec09**		
1.0.2.2.1	**MI RF Cavities**	**699d**	**01Feb07**	**06Nov09**		
1.0.2.2.1.1	**Bus Bar**	**63d**	**01Feb07**	**30Apr07**		
1.0.2.2.1.1.1	MI RF Cavities Start Design of Bus Bar	42d	01Feb07	30Mar07		L.FNAL.AD.ENG.RF,64.00,;M.FNAL.AD.MANDS,1440.00,;L.FNAL.AD.ENG.DRFT,31.00,
1.0.2.2.1.1.2	MI RF Cavities Finish Design of Bus Bar	21d	02Apr07	30Apr07	1.0.2.2.1.1.1[FS]	M.FNAL.AD.MANDS,2560.00,;L.FNAL.AD.ENG.RF,4.00,;L.FNAL.AD.ENG.DRFT,12.00,
1.0.2.2.1.3	**MI RF Cavity Cooling System**	**614d**	**01Jun07**	**06Nov09**		
1.0.2.2.1.3.1	Analyze MI Cavity & RF Cooling System Capacities	360d	01Jun07	03Nov08	2.0.4.3.11[FS+43d]	L.FNAL.AD.ENG.DRFT,58.00,;L.FNAL.AD.ENG.ME,130.00,;L.FNAL.AD.ENG.EE,144.00,;L.FNAL.AD.ENG.ME_SR,14.00,
1.0.2.2.1.3.2	Design RF Cavity Connections Q600 Region	138d	24Apr09	06Nov09	1.0.2.2.3.1[FS]; 1.0.2.1.5.1[FS]	L.FNAL.AD.ENG.DRFT,55.00,;L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL.AD.ENG.ME,50.00,
1.0.2.2.1.3.3	Design RF Power Supply Connections MI-61 Gallery	138d	24Apr09	06Nov09	1.0.2.2.3.1[FS]; 1.0.2.1.5.1[FS]	L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL.AD.ENG.ME,50.00,;L.FNAL.AD.ENG.DRFT,55.00,
1.0.2.2.2	**MI RF Cavities - OP**	**125d**	**02Jun08**	**25Nov08**		

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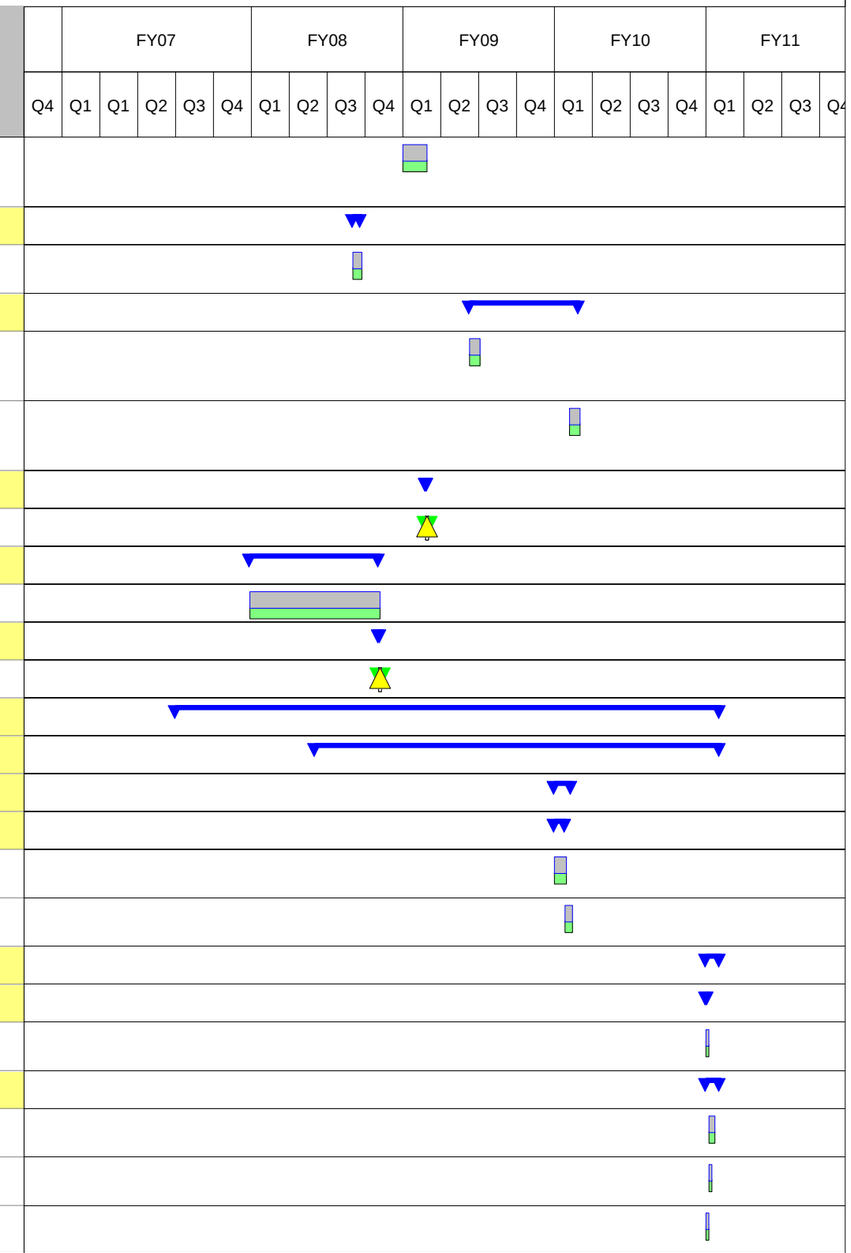
1.0.2.2.2.1	MI RF Cavity Pre-install Testing (Existing)	40d	01Oct08	25Nov08	2.0.4.3.7[FS]	L.FNAL.AD.TECH.MT_W,160.00,;L.FNAL.AD.TECH .RF_W,320.00,;L.FNAL.AD.ENG.RF,122.00,;M.FNAL .AD.MANDS,9000.00,
1.0.2.2.2.2	**Equip Gallery Install/Modification**	**15d**	**02Jun08**	**20Jun08**		
1.0.2.2.2.2.1	MI RF Cavities Utility Modifications	15d	02Jun08	20Jun08	2.0.4.1.3[FS]	L.FNAL.TM.ELEC.ELEC,80.00,;M.FNAL.AD. MANDS,7175.00,
1.0.2.2.3	**MI RF Cavities Reviews**	**184d**	**12Mar09**	**01Dec09**		
1.0.2.2.3.1	MI RF Cavity Cooling System InitialDesign Review	15d	12Mar09	01Apr09	1.0.2.2.1.3.1[FS]	L.FNAL.AD.ENG.ME_SR,12.00,;L.FNAL.AD.ENG. DES,30.00,;L.FNAL.AD.SCI.PHY,120.00,;L.FNAL. AD.ENG.ME,108.00,
1.0.2.2.3.2	MI RF Cavity Cooling System Engineering Design Review	15d	09Nov09	01Dec09	1.0.2.2.1.3.3[FS]; 1.0.2.2.1.3.2[FS]	L.FNAL.AD.ENG.ME,108.00,;L.FNAL.AD.ENG. ME_SR,12.00,;L.FNAL.AD.SCI.PHY,120.00,;L.FNAL .AD.ENG.DES,30.00,
1.0.2.2.4	**MI RF Cavities Milestones**	**0**	**25Nov08**	**25Nov08**		
1.0.2.2.4.1	MI Cavity Pre-install Testing Complete	0	25Nov08	25Nov08	1.0.2.2.2.1[FF]	
1.0.2.3	**MI Radiation Safety**	**215d**	**27Sep07**	**05Aug08**		
1.0.2.3.1	MI Review & Revise Shielding Assessment	215d	27Sep07	05Aug08	1.0.1.4.1[FS]; 2.0.4.3.11[FS]	L.FNAL.AD.SCI.PHY,172.00,
1.0.2.3.2	**MI Radiation Safety Milestones**	**0**	**05Aug08**	**05Aug08**		
1.0.2.3.2.1	MI Shielding Assessment Complete	0	05Aug08	05Aug08	1.0.2.3.1[FS]	
1.0.3	**NuMI Upgrades**	**907d**	**02Apr07**	**05Nov10**		
1.0.3.1	**NuMI Primary Proton Beam**	**677d**	**03Mar08**	**05Nov10**		
1.0.3.1.1	**NuMI Extraction Kicker**	**30d**	**01Oct09**	**11Nov09**		
1.0.3.1.1.1	**Upgraded Charging Power Supply**	**20d**	**01Oct09**	**28Oct09**		
1.0.3.1.1.1.1	Design for Charging PS Upgrades	20d	01Oct09	28Oct09	2.0.4.1.4[FS]; 2.0.4.3.8[FS]	L.FNAL.AD.ENG.EE_SR,16.00,;L.FNAL.AD.ENG. EE,144.00,;L.FNAL.AD.SCI.PHY,8.00,
1.0.3.1.1.2	Design Upgrade for Fluorinert to Water Heat Exchanger	10d	29Oct09	11Nov09	1.0.3.1.1.1.1[FS]; 1.0.3.1.5.1[FS]	L.FNAL.AD.ENG.EE,72.00,;L.FNAL.AD.ENG. EE_SR,8.00,;L.FNAL.AD.SCI.PHY,4.00,
1.0.3.1.2	**3Q120 Quadrupoles**	**26d**	**01Oct10**	**05Nov10**		
1.0.3.1.2.1	**3Q120 Quadrupoles**	**5d**	**01Oct10**	**07Oct10**		
1.0.3.1.2.1.1	Test 3Q120 Quads to be Recovered	5d	01Oct10	07Oct10	2.0.4.1.5[FS]	L.FNAL.AD.TECH.MT_W,80.00,;L.FNAL.AD.TECH. ET_W,80.00,;L.FNAL.AD.SCI.PHY,6.00,
1.0.3.1.2.2	**3Q120 Quadrupoles (5+1)**	**26d**	**01Oct10**	**05Nov10**		
1.0.3.1.2.2.1	Recover A1 Line 3Q120 Quads	11d	08Oct10	22Oct10	1.0.3.1.2.1.1[FS]	L.FNAL.AD.SCI.PHY,13.00,;L.FNAL.AD.TECH. MT_W,440.00,;M.FNAL.AD.MANDS,10000.00,
1.0.3.1.2.2.2	3Q120 Quads Disconnect Water	2d	08Oct10	11Oct10	1.0.3.1.2.2.3[FS]	L.FNAL.AD.TECH.MT_W,32.00,;L.FNAL.AD.SCI. PHY,3.00,
1.0.3.1.2.2.3	Components Alignment as Found Old	5d	01Oct10	07Oct10	2.0.4.1.5[FS]	L.FNAL.PPD.OTH.ALIGN,80.00,;L.FNAL.PPD.OTH. MET,40.00,;L.FNAL.AD.SCI.PHY,8.00,



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1.0.3.1.2.2.4	Disconnect Cables for 5 Quads to be Replaced	2d	12Oct10	13Oct10	1.0.3.1.2.1.1[FS]; 2.0.4.1.5[FS]; 1.0.3.1.2.2.2[FS]	L.FNAL.AD.SCI.PHY,3.00,;L.FNAL.AD.TECH.ET_W,32.00,
1.0.3.1.2.2.5	Bleed up Vacuum & Disconnect Flanges for Component Replacement	2d	14Oct10	15Oct10	1.0.3.1.2.2.4[FS]	L.FNAL.AD.SCI.PHY,3.00,;L.FNAL.AD.TECH.MT_W,32.00,
1.0.3.1.2.2.6	3Q120 Quads: Remove 5 Old Magnets	10d	25Oct10	05Nov10	1.0.3.1.2.2.1[FS]; 1.0.3.1.2.2.5[FS]	L.FNAL.AD.SCI.PHY,16.00,;M.FNAL.AD.MANDS,2000.00,;L.FNAL.TM.RIG.IRNWRKR,320.00,;L.FNAL.AD.TECH.LDR,80.00,
1.0.3.1.3	**NuMI Profile Monitors**	**100d**	**04Mar08**	**23Jul08**		
1.0.3.1.3.1	Design NuMI Profile Monitors	100d	04Mar08	23Jul08	1.0.3.1.5.2[FS]	L.FNAL.AD.SCI.PHY,160.00,;L.FNAL.AD.ENG.DES,320.00,;L.FNAL.AD.ENG.ME,320.00,;M.FNAL.AD.MANDS,20000.00,
1.0.3.1.4	**NuMI Primary Proton Beam Reviews**	**102d**	**03Mar08**	**24Jul08**		
1.0.3.1.4.1	Profile Monitors Initial Design Review	1d	03Mar08	03Mar08	2.0.4.4.2.40[FS]	L.FNAL.AD.ENG.DRFT,2.00,;L.FNAL.AD.ENG.ME,8.00,;L.FNAL.AD.SCI.PHY,8.00,
1.0.3.1.4.2	Profile Monitors Final Design Review	1d	24Jul08	24Jul08	1.0.3.1.3.1[FS]	L.FNAL.AD.SCI.PHY,8.00,;L.FNAL.AD.ENG.ME,8.00,;L.FNAL.AD.ENG.DRFT,2.00,
1.0.3.1.5	**NuMI Primary Proton Beam Milestones**	**419d**	**03Mar08**	**28Oct09**		
1.0.3.1.5.1	NuMI Charging PS Upgrade Design Complete	0	28Oct09	28Oct09	1.0.3.1.1.1.1[FS]	
1.0.3.1.5.2	NuMI Profile Monitor Conceptual Design Review Complete	0	03Mar08	03Mar08	1.0.3.1.4.1[FS]	
1.0.3.1.5.3	NuMI Profile Monitor Technical Design Review Complete	0	24Jul08	24Jul08	1.0.3.1.4.2[FS]	
1.0.3.2	**NuMI Target Hall Technical Components**	**708d**	**02Jan08**	**21Oct10**		
1.0.3.2.1	**ME Target, Carrier & Baffle**	**404d**	**02Jan08**	**06Aug09**		
1.0.3.2.1.1	**Medium Energy Target**	**404d**	**02Jan08**	**06Aug09**		
1.0.3.2.1.1.1	Review of IHEP ME Target Design Study 1	28d	02Jan08	11Feb08	2.0.4.3.11[FS+188d]	L.FNAL.AD.ENG.ME,101.00,;L.FNAL.AD.ENG.ME_SR,11.00,;L.FNAL.AD.SCI.PHY,23.00,;L.FNAL.AD.ENG.EP,23.00,
1.0.3.2.1.1.2	IHEP ME Target Design Study 2	125d	12Feb08	06Aug08	1.0.3.2.1.1.1[FS]	L.FNAL.AD.ENG.ME_SR,9.00,;M.FNAL.AD.MANDS,20000.00,;L.FNAL.AD.ENG.ME,90.00,
1.0.3.2.1.1.3	Assess IHEP ME Target Design Study 2	48d	07Aug08	14Oct08	1.0.3.2.1.1.2[FS]	L.FNAL.AD.ENG.ME_SR,10.00,;L.FNAL.AD.SCI.PHY,138.00,;L.FNAL.AD.ENG.ME,86.00,
1.0.3.2.1.1.4	IHEP Drawing Package for ME Target	84d	12Jan09	08May09	2.0.3.2.3.7[FS]; 1.0.3.2.1.3.1[FS]	M.FNAL.AD.MANDS,25000.00,
1.0.3.2.1.1.5	Integrate mechanical drawings from IHEP	62d	11May09	06Aug09	1.0.3.2.1.1.4[FS]	L.FNAL.AD.ENG.ME_SR,25.00,;L.FNAL.AD.ENG.DES,496.00,;L.FNAL.AD.ENG.ME,223.00,
1.0.3.2.1.2	**Target Carrier**	**222d**	**30Apr08**	**19Mar09**		
1.0.3.2.1.2.1	Analysis of Carrier for 700kW Beam Power	48d	30Apr08	08Jul08	2.10.8.4[FS]; 2.0.4.3.11[FS]; 2.0.4.3.5[FS+125d]	L.FNAL.AD.ENG.DES,384.00,;L.FNAL.AD.ENG.ME_SR,19.00,;L.FNAL.AD.ENG.ME,173.00,
1.0.3.2.1.2.2	Design of new carrier	100d	22Oct08	19Mar09	1.0.3.2.5.1[FS]; 1.0.3.3.5.1[FS]	L.FNAL.AD.ENG.DES,800.00,;L.FNAL.AD.ENG.ME_SR,40.00,;L.FNAL.AD.ENG.ME,360.00,
1.0.3.2.1.3	**Baffle**	**188d**	**05Jun08**	**06Mar09**		

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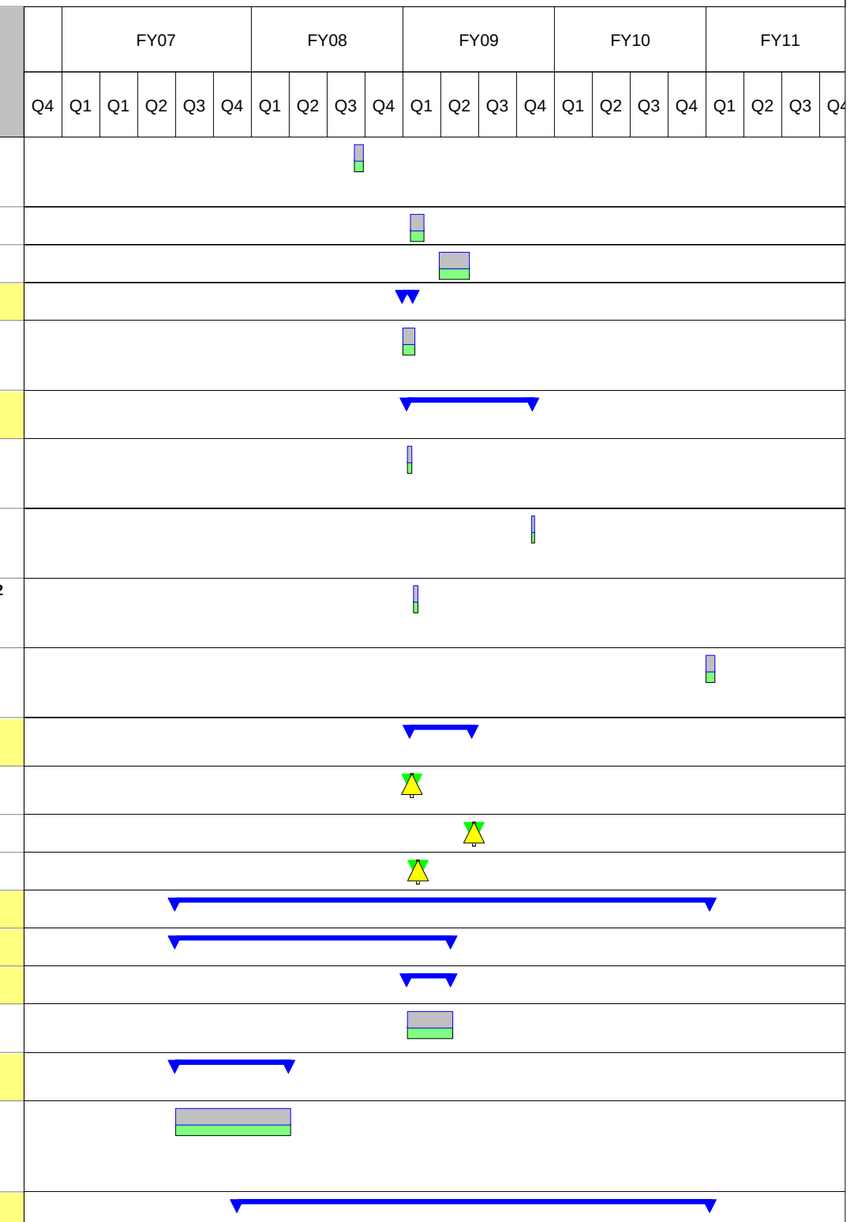
1.0.3.2.1.3.1	Analyze Baffle for Higher Heat Loads	14d	05Jun08	24Jun08	2.0.4.3.11[FS]; 2.0.4.3.5[FS+150d]	L.FNAL.AD.SCI.PHY,56.00,;L.FNAL.AD.ENG.ME_SR,6.00,;L.FNAL.AD.ENG.ME,50.00,;L.FNAL.AD.ENG.EP,56.00,
1.0.3.2.1.3.2	Design Baffle Modifications	20d	22Oct08	18Nov08	1.0.3.2.5.1[FS]	L.FNAL.AD.ENG.ME,32.00,
1.0.3.2.1.3.3	IHEP Modify Baffle Dwg Package	47d	29Dec08	06Mar09	2.0.3.2.1.3.1[FS]	M.FNAL.AD.MANDS,3000.00,
1.0.3.2.2	**Hadron Monitor**	**20d**	**01Oct08**	**28Oct08**		
1.0.3.2.2.1	Analyze Current Hadron Monitor Design for Higher Beam Power.	20d	01Oct08	28Oct08	2.0.4.3.7[FS]	L.FNAL.AD.ENG.ME,144.00,;L.FNAL.AD.ENG.ME_SR,16.00,;L.FNAL.AD.SCI.PHY,160.00,;L.FNAL.AD.ENG.DES,80.00,
1.0.3.2.3	**NuMI Target Hall Technical Components Reviews**	**208d**	**15Oct08**	**13Aug09**		
1.0.3.2.3.1	Target, Baffle & Carrier Initial Design Review	5d	15Oct08	21Oct08	1.0.3.2.1.3.1[FS]; 1.0.3.2.1.2.1[FS]; 1.0.3.2.1.1.3[FS]	L.FNAL.AD.ENG.ME,36.00,;L.FNAL.AD.ENG.ME_SR,4.00,;L.FNAL.AD.SCI.PHY,40.00,;L.FNAL.AD.ENG.DES,10.00,
1.0.3.2.3.2	Target, Baffle & Carrier Design Review	5d	07Aug09	13Aug09	1.0.3.2.1.3.3[FS]; 1.0.3.2.5.3[FS]; 1.0.3.2.1.1.5[FS]	L.FNAL.AD.ENG.ME,36.00,;L.FNAL.AD.ENG.ME_SR,4.00,;L.FNAL.AD.SCI.PHY,40.00,;L.FNAL.AD.ENG.DES,10.00,
1.0.3.2.3.3	Hadron Monitor Design Review	5d	29Oct08	04Nov08	1.0.3.2.2.1[FS]	L.FNAL.AD.ENG.DES,20.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.SCI.PHY,40.00,;L.FNAL.AD.ENG.ME_SR,8.00,
1.0.3.2.4	Design Hadron Monitor Beam Abort	15d	01Oct10	21Oct10	2.0.4.3.9[FS]; 2.0.3.2.2.1[FS]	L.FNAL.AD.SCI.PHY,30.00,;L.FNAL.AD.ENG.EE_SR,12.00,;L.FNAL.AD.CP.SD,120.00,;L.FNAL.AD.ENG.EE,108.00,
1.0.3.2.5	**NuMI Target Hall Technical Components Milestones**	**100d**	**21Oct08**	**19Mar09**		
1.0.3.2.5.1	NuMI Target, Baffle & Carrier Initial Design Review Complete	0	21Oct08	21Oct08	1.0.3.2.3.1[FS]	
1.0.3.2.5.3	NuMI Final Design of Target Carrier Complete	0	19Mar09	19Mar09	1.0.3.2.1.2.2[FS]	
1.0.3.2.5.9	NuMI Hadron Monitor Initial Re-design Complete	0	04Nov08	04Nov08	1.0.3.2.3.3[FS]	
1.0.3.3	**NuMI Target Hall Infrastructure**	**890d**	**02Apr07**	**13Oct10**		
1.0.3.3.1	**Target Hall Operations Space Planning**	**457d**	**02Apr07**	**27Jan09**		
1.0.3.3.1.1	**Target Hall Operations Space Planning**	**69d**	**14Oct08**	**27Jan09**		
1.0.3.3.1.1.1	Design New Equipment for Operations	69d	14Oct08	27Jan09	1.0.3.3.1.2.1[FS]; 2.0.4.3.7[FS]; 1.0.3.3.4.2[FS]	L.FNAL.AD.ENG.ME,298.00,;L.FNAL.AD.ENG.ME_SR,33.00,;L.FNAL.AD.ENG.DES,552.00,
1.0.3.3.1.2	**Target Hall Operations Space Planning - OP**	**189d**	**02Apr07**	**02Jan08**		
1.0.3.3.1.2.1	Overall Target Hall Layout for Operations	189d	02Apr07	02Jan08	2.0.4.3.11[FS]	L.FNAL.AD.ENG.ME,468.00,;L.FNAL.AD.ENG.DRFT,520.00,;L.FNAL.AD.ENG.ME_SR,52.00,;L.FNAL.AD.ENG.DES,520.00,;L.FNAL.AD.SCI.PHY,520.00,
1.0.3.3.2	**Horn2 Re-location to Medium Energy**	**785d**	**29Aug07**	**13Oct10**		



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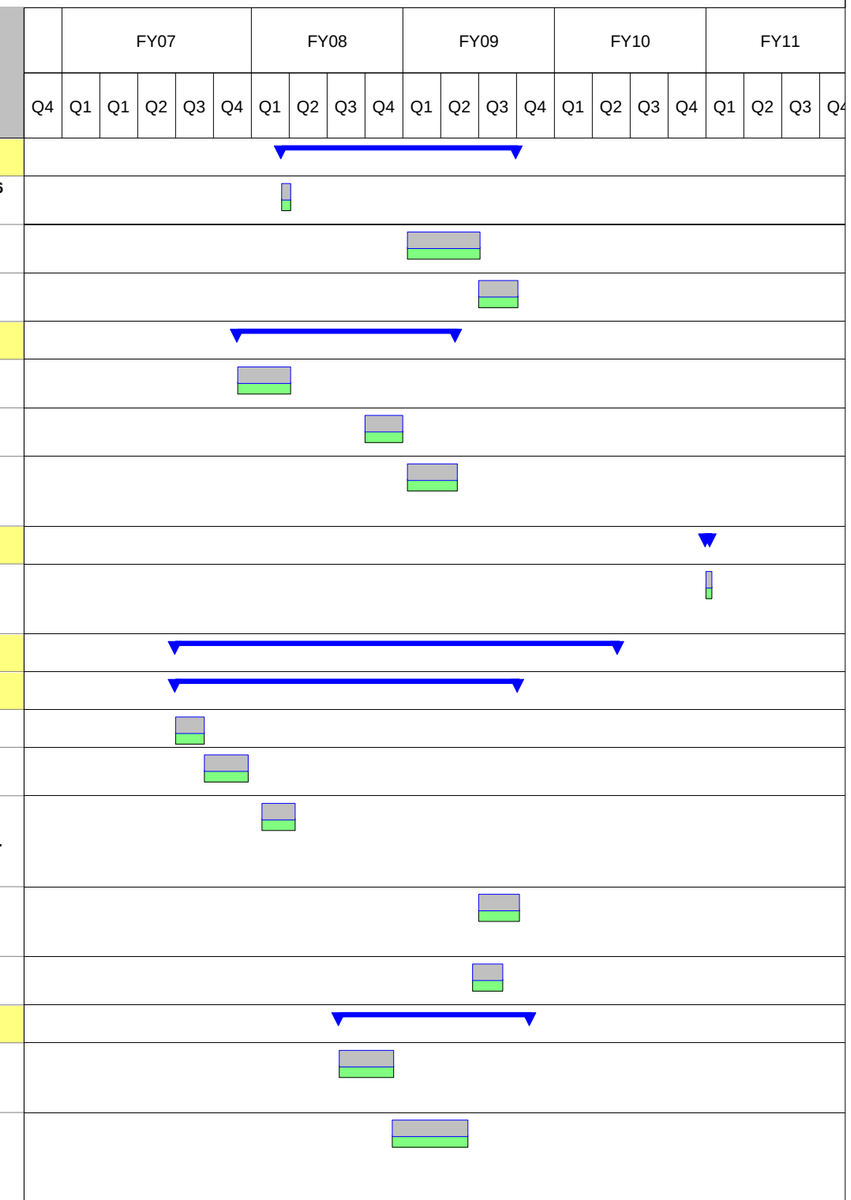
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.3.3.2.1	**Stripline Extension**	**389d**	**13Dec07**	**01Jul09**		
1.0.3.3.2.1.1	Develop Stripline Layout Scheme in Target Hall	11d	**13Dec07**	**02Jan08**	**1.0.3.3.1.2.1[FF]**	**L.FNAL.AD.ENG.ME,18.00,;L.FNAL.AD.ENG.DES,66.00,**
1.0.3.3.2.1.2	Engineering & Design of stripline extension & Stands	114d	**14Oct08**	**31Mar09**	**1.0.3.3.2.1.1[FS]; 2.0.4.3.7[FS]; 1.0.3.3.4.2[FS]**	**L.FNAL.AD.ENG.DES,821.00,;L.FNAL.AD.ENG.ME_SR,82.00,;L.FNAL.AD.ENG.ME,739.00,**
1.0.3.3.2.1.3	Create Assembly Dwgs for Stripline est & Stands	65d	**01Apr09**	**01Jul09**	**1.0.3.3.2.1.2[FS]**	**L.FNAL.AD.ENG.ME,234.00,;L.FNAL.AD.ENG.ME_SR,26.00,;L.FNAL.AD.ENG.DRFT,468.00,**
1.0.3.3.2.2	**Shielding Reconfiguration**	**360d**	**29Aug07**	**06Feb09**		
1.0.3.3.2.2.1	Develop shielding reconfiguration plan	84d	**29Aug07**	**02Jan08**	**1.0.3.3.1.2.1[FF]**	**L.FNAL.AD.ENG.ME,302.00,;L.FNAL.AD.ENG.ME_SR,34.00,;L.FNAL.AD.ENG.DES,672.00,**
1.0.3.3.2.2.2	Develop Blue Block & T-Block Removal/Re-location Plan	63d	**01Jul08**	**29Sep08**	**1.0.3.3.2.2.1[FF]**	**L.FNAL.AD.ENG.ME,227.00,;L.FNAL.AD.ENG.ME_SR,25.00,;L.FNAL.AD.ENG.DES,202.00,**
1.0.3.3.2.2.3	Design of Dummy Module, Associated Shielding & Remote Lifting Components	77d	**14Oct08**	**06Feb09**	**1.0.3.3.2.2.2[FS]; 2.0.4.3.7[FS]; 1.0.3.3.4.2[FS]**	**L.FNAL.AD.ENG.DES,616.00,;L.FNAL.AD.ENG.ME_SR,31.00,;L.FNAL.AD.ENG.DRFT,308.00,;L.FNAL.AD.ENG.ME,277.00,**
1.0.3.3.2.3	**Shielding Reconfiguration - OP**	**9d**	**01Oct10**	**13Oct10**		
1.0.3.3.2.3.1	Removal & Storage of R-Blocks & Radioactive DS Blue Blocks	9d	**01Oct10**	**13Oct10**	**2.0.3.3.2.2.4[FS]; 2.0.4.1.5[FS]**	**M.FNAL.AD.MANDS,2500.00,;L.FNAL.AD.TECH.MT_W,288.00,;L.FNAL.AD.ENG.ME,4.00,;L.FNAL.AD.ENG.DES,4.00,**
1.0.3.3.3	**Target Chase**	**735d**	**02Apr07**	**05Mar10**		
1.0.3.3.3.1	**Target Chase Air Cooling**	**569d**	**02Apr07**	**06Jul09**		
1.0.3.3.3.1.1	MARs Simulations for Energy Deposition	49d	**02Apr07**	**08Jun07**	**2.0.4.3.11[FS]**	**L.FNAL.AD.SCI.PHY,196.00,**
1.0.3.3.3.1.2	FEM 3-D Thermal Analysis	72d	**11Jun07**	**20Sep07**	**1.0.3.3.3.1.1[FS]**	**L.FNAL.AD.ENG.ME,337.00,;L.FNAL.AD.ENG.ME_SR,37.00,;L.FNAL.AD.ENG.DES,57.00,**
1.0.3.3.3.1.3	Analyze all components & chase items for temperature limits	49d	**29Oct07**	**11Jan08**	**2.10.8.4[FS]; 2.0.4.3.5[FS]; 1.0.3.3.5.11[FS]**	**M.FNAL.AD.MANDS,10250.00,;L.FNAL.AD.TECH.MT_W,20.00,;L.FNAL.AD.ENG.ME_SR,16.00,;L.FNAL.AD.ENG.DES,40.00,;L.FNAL.AD.ENG.ME,141.00,;L.FNAL.AD.MNG.ESH,196.00,**
1.0.3.3.3.1.4	Design new chiller coils	65d	**03Apr09**	**06Jul09**	**1.0.3.3.4.4[FS]; 2.0.4.3.7[FS+125d]; 1.0.3.3.3.1.3[FS]**	**L.FNAL.AD.ENG.ME,47.00,;L.FNAL.AD.ENG.ME_SR,5.00,;L.FNAL.FESS.ENG.ENG,520.00,**
1.0.3.3.3.1.5	Design New Water Chiller Surface Unit	49d	**18Mar09**	**26May09**	**1.0.3.3.4.4[FS]; 1.0.3.3.3.1.3[FS]**	**L.FNAL.FESS.ENG.ENG,392.00,;L.FNAL.AD.ENG.ME,39.00,**
1.0.3.3.3.2	**Horn 1 Stripline Block**	**317d**	**30Apr08**	**03Aug09**		
1.0.3.3.3.2.1	Analyze Horn 1 Chase Stripline for Higher Heat Loads (FEA)	90d	**30Apr08**	**05Sep08**	**1.0.3.3.5.11[FS]; 2.0.4.3.5[FS+125d]**	**L.FNAL.AD.SCI.PHY,144.00,;L.FNAL.AD.ENG.ME_SR,43.00,;L.FNAL.AD.ENG.ME,389.00,;L.FNAL.AD.ENG.DES,73.00,**
1.0.3.3.3.2.2	Quantify Air Convection Coefficients (Testing)	120d	**08Sep08**	**03Mar09**	**1.0.3.3.3.2.1[FS]**	**M.FNAL.AD.MANDS,5460.00,;L.FNAL.AD.ENG.DES,240.00,;L.FNAL.AD.ENG.ME_SR,29.00,;L.FNAL.AD.TECH.MT_W,576.00,;L.FNAL.AD.ENG.ME,259.00,**



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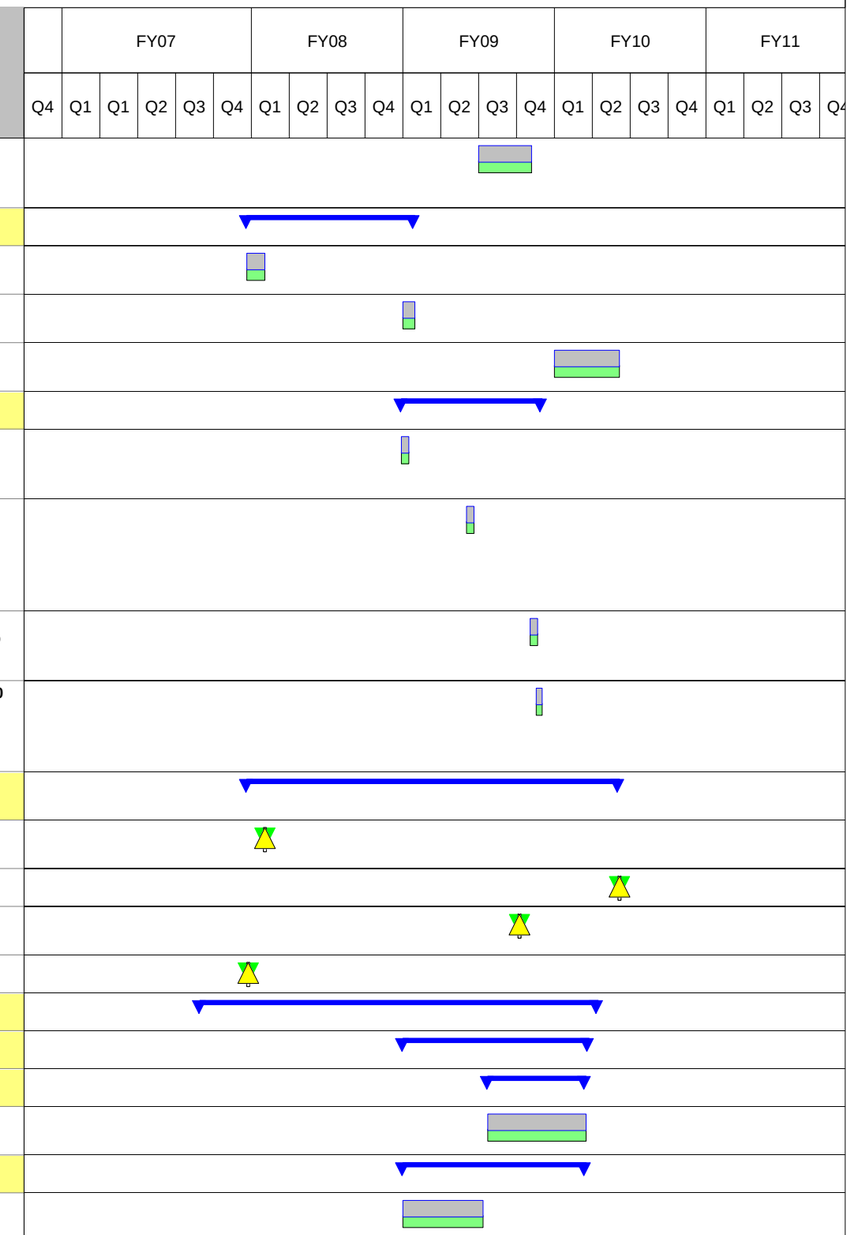
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.3.3.3.2.3	Design Forced Air Cooling for Horn 1 Chase Stripline	85d	03Apr09	03Aug09	2.0.4.3.7[FS+125d]; 1.0.3.3.4.4[FS]	L.FNAL.AD.ENG.ME_SR,34.00,;L.FNAL.AD.ENG.DES,340.00,;L.FNAL.AD.SCI.PHY,68.00,;L.FNAL.AD.ENG.ME,306.00,
1.0.3.3.3.3	**Radiant Heat Loads**	**277d**	**21Sep07**	**27Oct08**		
1.0.3.3.3.3.1	Analyze predicted block temperatures' effects on chase components	30d	21Sep07	01Nov07	1.0.3.3.5.11[FS]	L.FNAL.AD.ENG.ME_SR,24.00,;L.FNAL.AD.ENG.ME,216.00,
1.0.3.3.3.3.2	Design Additional Chase Temperature Monitoring Equipment	19d	01Oct08	27Oct08	1.0.3.3.5.11[FS]; 2.0.4.3.7[FS]	L.FNAL.AD.ENG.DES,152.00,;L.FNAL.AD.ENG.ME,137.00,;L.FNAL.AD.ENG.ME_SR,15.00,
1.0.3.3.3.4	NuMI - Review & Revise Shielding Assessment	105d	01Oct09	05Mar10	2.10.8.4[FS]; 2.0.4.3.8[FS]	L.FNAL.AD.MNG.ESH,294.00,;L.FNAL.AD.SCI.PHY,420.00,
1.0.3.3.4	**NuMI Target Hall Infrastructure Reviews**	**231d**	**30Sep08**	**31Aug09**		
1.0.3.3.4.2	Target Hall Space Planning & Horn 2 Reconfiguration & Equip Initial Design Rev	10d	30Sep08	13Oct08	1.0.3.3.2.1.1[FS]; 1.0.3.3.2.2.1[FS]; 1.0.3.3.2.2.2[FS]	L.FNAL.AD.SCI.PHY,80.00,;L.FNAL.AD.ENG.DES,20.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,
1.0.3.3.4.4	Target Hall Chase Cooling Iniital Design Review	10d	04Mar09	17Mar09	1.0.3.3.5.1[FS]; 1.0.3.3.3.2.1[FS]; 1.0.3.3.3.1.3[FS]; 1.0.3.3.3.2.2[FS]; 1.0.3.2.1.2.1[FS]	L.FNAL.AD.ENG.DES,20.00,;L.FNAL.AD.SCI.PHY,80.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,
1.0.3.3.4.5	Target Hall Chase Cooling Design Review	10d	04Aug09	17Aug09	1.0.3.3.5.3[FS]; 1.0.3.3.3.2.3[FS]	L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.SCI.PHY,80.00,;L.FNAL.AD.ENG.DES,20.00,;L.FNAL.AD.ENG.ME,72.00,
1.0.3.3.4.6	Target Hall Space Planning & Horn 2 Reconfiguration & Equip Design Rev	10d	18Aug09	31Aug09	1.0.3.3.2.2.3[FS]; 1.0.3.3.1.1.1[FS]; 1.0.3.4.1.3.1[FS]; 2.0.4.4.2.39[FS]; 1.0.3.3.4.5[FS]	L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.DES,20.00,;L.FNAL.AD.SCI.PHY,80.00,;L.FNAL.AD.ENG.ME_SR,8.00,
1.0.3.3.5	**NuMI Target Hall Infrastructure Milestones**	**614d**	**20Sep07**	**05Mar10**		
1.0.3.3.5.1	NuMI Analyze Predicted Block Temperatures Effect on Chase Components Complete	0	01Nov07	01Nov07	1.0.3.3.3.3.1[FS]	
1.0.3.3.5.2	NuMI Shielding Assessment Complete	0	05Mar10	05Mar10	1.0.3.3.3.4[FS]	
1.0.3.3.5.3	NuMI Target Chase Cooling Design Complete	0	06Jul09	06Jul09	1.0.3.3.3.1.4[FS]; 1.0.3.3.3.1.5[FS]	
1.0.3.3.5.11	NuMI FEM 3-D Thermal Analysis Complete	0	20Sep07	20Sep07	1.0.3.3.3.1.2[FS]	
1.0.3.4	**NuMI Decay Pipe/Hadron Absorber/Utilities**	**657d**	**01Jun07**	**14Jan10**		
1.0.3.4.1	**NuMI RAW Systems**	**307d**	**01Oct08**	**21Dec09**		
1.0.3.4.1.1	**Target RAW**	**162d**	**24Apr09**	**14Dec09**		
1.0.3.4.1.1.1	Design Target RAW Instrumentation Upgrade	162d	24Apr09	14Dec09	1.0.3.2.1.1.3[FS]; 1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.DRFT,27.00,;L.FNAL.AD.ENG.ME,27.00,
1.0.3.4.1.2	**Horns RAW**	**302d**	**01Oct08**	**14Dec09**		
1.0.3.4.1.2.1	Analyze horn 1 & horn 2 RAW system capacities	130d	01Oct08	09Apr09	2.0.4.3.7[FS]	L.FNAL.AD.ENG.ME,70.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.SCI.PHY,31.00,



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WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.0.3.4.1.2.2	Design Horn 1 RAW Skid Upgrade	162d	24Apr09	14Dec09	1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.ME,140.00,;L.FNAL.AD.ENG.ME_SR,16.00,;L.FNAL.AD.ENG.DES,78.00,
1.0.3.4.1.2.3	Design Horn 2 RAW Skid Upgrade	162d	24Apr09	14Dec09	1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.DES,78.00,;L.FNAL.AD.ENG.ME,140.00,;L.FNAL.AD.ENG.ME_SR,16.00,
1.0.3.4.1.3	**Horn 2 RAW Piping**	**162d**	**14Oct08**	**08Jun09**		
1.0.3.4.1.3.1	Engineering & Design of RAW piping extension for Horn 2 Move	162d	14Oct08	08Jun09	1.0.3.3.4.2[FS]	L.FNAL.AD.ENG.DES,109.00,;L.FNAL.AD.ENG.ME,98.00,;L.FNAL.AD.ENG.ME_SR,11.00,
1.0.3.4.1.4	**Decay Pipe RAW**	**162d**	**24Apr09**	**14Dec09**		
1.0.3.4.1.4.1	Design Decay Pipe US & DS RAW skid upgrade	162d	24Apr09	14Dec09	1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.ME_SR,22.00,;L.FNAL.AD.ENG.DES,109.00,;L.FNAL.AD.ENG.ME,196.00,
1.0.3.4.1.5	**Hadron Absorber RAW & Intermediate**	**307d**	**01Oct08**	**21Dec09**		
1.0.3.4.1.5.1	Document Hadron Absorber for Full Beam Accident Condition	7d	01Oct08	09Oct08	2.0.4.3.7[FS]	L.FNAL.AD.ENG.ME,50.00,;L.FNAL.AD.ENG.ME_SR,6.00,;L.FNAL.AD.SCI.PHY,28.00,
1.0.3.4.1.5.2	Analyze Hadron Absorber for normal long term operation at 700 KW	13d	10Oct08	28Oct08	1.0.3.4.1.5.1[FS]	L.FNAL.AD.SCI.PHY,52.00,;L.FNAL.AD.ENG.ME_SR,10.00,;L.FNAL.AD.ENG.ME,94.00,
1.0.3.4.1.5.3	Design Hadron Absorber skids upgrade	167d	24Apr09	21Dec09	1.0.3.4.4.1[FS]; 1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.ME_SR,32.00,;L.FNAL.AD.ENG.DES,160.00,;L.FNAL.AD.ENG.ME,289.00,
1.0.3.4.2	**NuMI Cooling Water (Non RAW)**	**614d**	**01Jun07**	**06Nov09**		
1.0.3.4.2.1	**LCW**	**614d**	**01Jun07**	**06Nov09**		
1.0.3.4.2.1.1	Analyze LCW capacity	360d	01Jun07	03Nov08	2.0.4.3.11[FS+43d]	L.FNAL.AD.ENG.ME,119.00,;L.FNAL.AD.ENG.ME_SR,13.00,;L.FNAL.AD.SCI.PHY,132.00,
1.0.3.4.2.1.2	Design LCW Upgrade	138d	24Apr09	06Nov09	1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.ME,79.00,;L.FNAL.AD.ENG.DRFT,44.00,;L.FNAL.AD.ENG.ME_SR,9.00,
1.0.3.4.2.2	**CUB**	**614d**	**01Jun07**	**06Nov09**		
1.0.3.4.2.2.1	Analyze CUB chilled water capacity	360d	01Jun07	03Nov08	2.0.4.3.11[FS+43d]	L.FNAL.AD.SCI.PHY,44.00,;L.FNAL.AD.ENG.ME_SR,14.00,;L.FNAL.AD.ENG.ME,130.00,;L.FNAL.FESS.ENG.ENG,144.00,
1.0.3.4.2.2.2	Design CUB Upgrade	138d	24Apr09	06Nov09	1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.DRFT,44.00,;L.FNAL.AD.ENG.ME,79.00,;L.FNAL.AD.ENG.ME_SR,9.00,
1.0.3.4.2.3	**NuMI Sump Cooling Water System Capacity**	**614d**	**01Jun07**	**06Nov09**		
1.0.3.4.2.3.1	Analyze NuMI Sump Cooling Water System Capacity	360d	01Jun07	03Nov08	2.0.4.3.11[FS+43d]	L.FNAL.AD.ENG.ME,130.00,;L.FNAL.AD.ENG.ME_SR,14.00,;L.FNAL.AD.SCI.PHY,44.00,;L.FNAL.FESS.ENG.ENG,144.00,
1.0.3.4.2.3.2	Design NuMI Sump Cooling Water System Upgrade	138d	24Apr09	06Nov09	1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.ME_SR,18.00,;L.FNAL.AD.ENG.DES,88.00,;L.FNAL.AD.ENG.ME,159.00,
1.0.3.4.2.4	**MI-65 Secondary Chilled water capacity**	**614d**	**01Jun07**	**06Nov09**		
1.0.3.4.2.4.1	Analyze Secondary Chilled Water Capacity	360d	01Jun07	03Nov08	2.0.4.3.11[FS+43d]	L.FNAL.AD.ENG.ME_SR,14.00,;L.FNAL.AD.ENG.ME,130.00,;L.FNAL.FESS.ENG.ENG,144.00,;L.FNAL.AD.SCI.PHY,44.00,
1.0.3.4.2.4.2	Design Secondary Skid Upgrade	138d	24Apr09	06Nov09	1.0.3.4.4.2[FS]	L.FNAL.AD.ENG.ME,80.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.ENG.DRFT,44.00,

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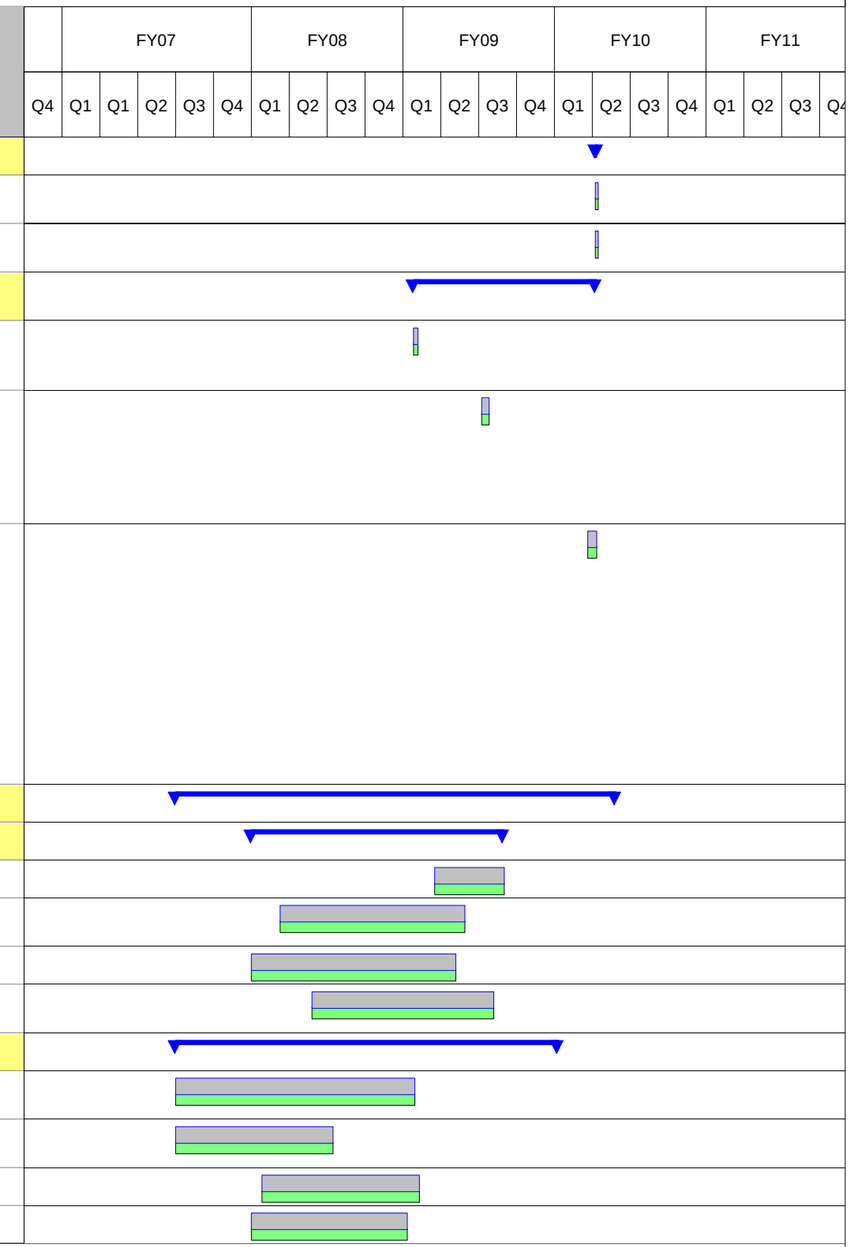
1.0.3.4.3	**NuMI Electrical Infrastructure**	**4d**	**11Jan10**	**14Jan10**		
1.0.3.4.3.1	Analyze & Design Elect Capacity Upgrades for 700kW, Downstream Systems	4d	**11Jan10**	**14Jan10**	**1.0.3.4.4.3[FS]**	**L.FNAL.AD.ENG.ME,16.00,;L.FNAL.AD.ENG.EE,16.00,;L.FNAL.AD.ENG.DRFT,6.00,**
1.0.3.4.3.2	Analyze & Design Elect Capacity Upgrades for 700kW, Upstream Systems	4d	**11Jan10**	**14Jan10**	**1.0.3.4.4.3[FS]**	**L.FNAL.AD.ENG.EE,16.00,;L.FNAL.AD.ENG.ME,16.00,;L.FNAL.AD.ENG.DRFT,6.00,**
1.0.3.4.4	**NuMI Decay Pipe/Hadron Absorber/Utilities Reviews**	**297d**	**29Oct08**	**08Jan10**		
1.0.3.4.4.1	Decay Pipe & Absorber Initial Design Review	5d	**29Oct08**	**04Nov08**	**1.0.3.4.1.5.1[FS]; 1.0.3.4.1.5.2[FS]**	**L.FNAL.AD.SCI.PHY,40.00,;L.FNAL.AD.ENG.ME_SR,4.00,;L.FNAL.AD.ENG.ME,36.00,;L.FNAL.AD.ENG.DES,10.00,**
1.0.3.4.4.2	NuMI Cooling Systems Initial Design Review	10d	**10Apr09**	**23Apr09**	**1.0.3.4.1.2.1[FS]; 1.0.3.4.2.4.1[FS]; 1.0.3.4.2.2.1[FS]; 1.0.3.4.2.3.1[FS]; 1.0.3.4.2.1.1[FS]; 1.0.3.4.4.1[FS]; 2.0.4.3.7[FS]**	**L.FNAL.AD.ENG.DES,20.00,;L.FNAL.AD.SCI.PHY,80.00,;L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,**
1.0.3.4.4.3	NuMI Utilities Systems & RAW Design Review	10d	**22Dec09**	**08Jan10**	**1.0.3.4.2.3.2[FS]; 1.0.3.4.1.5.3[FS]; 1.0.3.4.1.4.1[FS]; 1.0.3.4.1.2.2[FS]; 1.0.3.4.1.1.1[FS]; 1.0.3.2.1.2.2[FS]; 2.0.4.3.8[FS]; 1.0.3.4.2.4.2[FS]; 1.0.3.4.2.1.2[FS]; 1.0.3.4.1.3.1[FS]; 1.0.3.4.1.2.3[FS]; 1.0.3.4.2.2.2[FS]; 1.0.3.4.2.4.1[FS]**	**L.FNAL.AD.ENG.ME,72.00,;L.FNAL.AD.ENG.ME_SR,8.00,;L.FNAL.AD.SCI.PHY,80.00,;L.FNAL.AD.ENG.DES,20.00,**
1.0.4	**Beam Physics**	**727d**	**02Apr07**	**23Feb10**		
1.0.4.1	**ANU Demands on Proton Plan**	**417d**	**01Oct07**	**29May09**		
1.0.4.1.1	Evaluate Booster Performance for ANU	110d	**19Dec08**	**29May09**	**2.0.4.1.4[FS+100d]**	**L.FNAL.AD.SCI.PHY,220.00,**
1.0.4.1.2	Evaluate MI-8 Collimator Performance for ANU	300d	**12Dec07**	**24Feb09**	**2.0.4.1.2[FS+50d]**	**L.FNAL.AD.SCI.PHY,240.00,;L.FNAL.AD.ENG.ME_SR,4.00,;L.FNAL.AD.ENG.ME,36.00,**
1.0.4.1.3	Evaluate Slip-Stacking Performance for ANU	335d	**01Oct07**	**03Feb09**	**2.0.4.1.2[FS]**	**L.FNAL.AD.SCI.PHY,536.00,**
1.0.4.1.4	Evaluate MI Collimator Performance for ANU	300d	**27Feb08**	**05May09**	**2.0.4.1.2[FS+100d]**	**L.FNAL.AD.ENG.ME,36.00,;L.FNAL.AD.ENG.ME_SR,4.00,;L.FNAL.AD.SCI.PHY,600.00,**
1.0.4.2	**Machine & Process Analysis**	**637d**	**02Apr07**	**09Oct09**		
1.0.4.2.1	Slip-Stacking Simulation & Optimization for the Recycler	400d	**02Apr07**	**29Oct08**	**2.0.4.3.11[FS]**	**L.FNAL.AD.SCI.PHY,1280.00,**
1.0.4.2.2	Recycler & MI Beam Dynamics Simulation	260d	**02Apr07**	**11Apr08**	**2.0.4.3.11[FS]**	**L.FNAL.CD.SCI.PHY,1040.00,;L.FNAL.AD.SCI.PHY,1040.00,**
1.0.4.2.3	MI Machine Measurements	260d	**29Oct07**	**07Nov08**	**2.10.8.4[FS]; 2.0.4.3.5[FS]**	**L.FNAL.AD.SCI.PHY,520.00,**
1.0.4.2.4	MI Loss Pattern Measurement	260d	**01Oct07**	**10Oct08**	**2.0.4.1.2[FS]**	**L.FNAL.AD.SCI.PHY,312.00,**



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1.0.4.2.5	Recycler Machine Measurements	285d	01Oct07	14Nov08	2.0.4.1.2[FS]	L.FNAL.AD.SCI.PHY,912.00,;M.FNAL.AD.MANDS,5000.00,
1.0.4.2.6	Electron Cloud Measurement in MI & RR	285d	02Apr07	16May08	2.0.4.3.11[FS]	L.FNAL.AD.TECH.MT_W,46.00,;M.FNAL.AD.MANDS,30000.00,;L.FNAL.AD.ENG.ME_SR,23.00,;L.FNAL.AD.SCI.PHY,912.00,;L.FNAL.AD.ENG.ME,205.00,
1.0.4.2.7	Electron Cloud Simulation & Analysis for ANU	285d	02Apr07	16May08	2.0.4.3.1[FS+50d]	L.FNAL.AD.SCI.PHY,912.00,;L.FNAL.CD.SCI.PHY,1368.00,
1.0.4.2.8	Transfer Line Simulation	110d	14Apr08	17Sep08	1.0.4.2.2[FS]; 1.0.1.1.2.1.1.1.1[FS]; 1.0.1.1.2.1.1.1.2[FS]	L.FNAL.AD.SCI.PHY,352.00,
1.0.4.2.9	Beam Cleaning Analysis	55d	13Nov08	06Feb09	1.0.1.2.1.1.7[FS]	L.FNAL.AD.SCI.PHY,176.00,
1.0.4.2.10	Establish Detailed ANU Loss Patterns	110d	06May09	09Oct09	1.0.4.2.8[FS]; 1.0.4.2.9[FS]; 1.0.4.1.4[FS]; 1.0.4.1.2[FS]; 1.0.4.1.3[FS]	L.FNAL.AD.SCI.PHY,176.00,
1.0.4.3	**Proton Plan Projections**	**727d**	**02Apr07**	**23Feb10**		
1.0.4.3.1	Develop Beam Performance Metrics	107d	02Apr07	30Aug07	2.0.4.3.1[FS+75d]	L.FNAL.AD.SCI.PHY,171.00,
1.0.4.3.2	Maintain Measurements & Predictions of Performance	620d	31Aug07	23Feb10	1.0.4.3.1[FS]	L.FNAL.AD.SCI.PHY,149.00,
1.0.4.4	**Beam Physics Milestones**	**93d**	**29May09**	**09Oct09**		
1.0.4.4.1	Estimate Limits of Proton Plan Performance	0	29May09	29May09	1.0.4.1.3[FS]; 1.0.4.1.1[FS]; 1.0.4.1.4[FS]; 1.0.4.1.2[FS]	
1.0.4.4.2	Beam Physics Preparative Analysis Complete	0	09Oct09	09Oct09	1.0.4.2.5[FS]; 1.0.4.2.10[FS]; 1.0.4.2.4[FS]; 1.0.4.2.7[FS]; 1.0.4.2.6[FS]; 1.0.4.2.9[FS]; 1.0.4.2.8[FS]; 1.0.4.2.2[FS]; 1.0.4.2.1[FS]; 1.0.4.2.3[FS]	
1.0.5	**Project Management**	**208d**	**01Dec06**	**28Sep07**		
1.0.5.1	**Fermi Management & Administration**	**208d**	**01Dec06**	**28Sep07**		
1.0.5.1.1	Management & Administration - 1HFY07	81d	01Dec06	30Mar07		L.FNAL.AD.SCI.PHY,2139.00,;L.FNAL.AD.ENG.RF,194.00,;L.FNAL.AD.MNG.PE,389.00,;L.FNAL.AD.ENG.ME_SR,94.00,;L.FNAL.AD.ENG.EP,583.00,;L.FNAL.AD.MNG.ESH,130.00,;L.FNAL.AD.MNG.DPM,648.00,;L.FNAL.AD.ENG.ME,842.00,
1.0.5.1.2	Management & Administration - 2HFY07	127d	02Apr07	28Sep07	1.0.5.1.1[FS]	L.FNAL.AD.MNG.PE,610.00,;L.FNAL.AD.ENG.RF,305.00,;L.FNAL.AD.MNG.DPM,1016.00,;L.FNAL.TD.ENG.EP,203.00,;L.FNAL.AD.MNG.ESH,203.00,;L.FNAL.AD.ENG.ME,1189.00,;L.FNAL.AD.ENG.ME_SR,132.00,;L.FNAL.AD.ENG.EP,914.00,;L.FNAL.AD.SCI.PHY,3353.00,
1.1	**Site and Building**	**511d**	**03Oct05**	**12Oct07**		
1.1.1	**Site Conditions Investigation**	**333d**	**03Apr06**	**27Jul07**		

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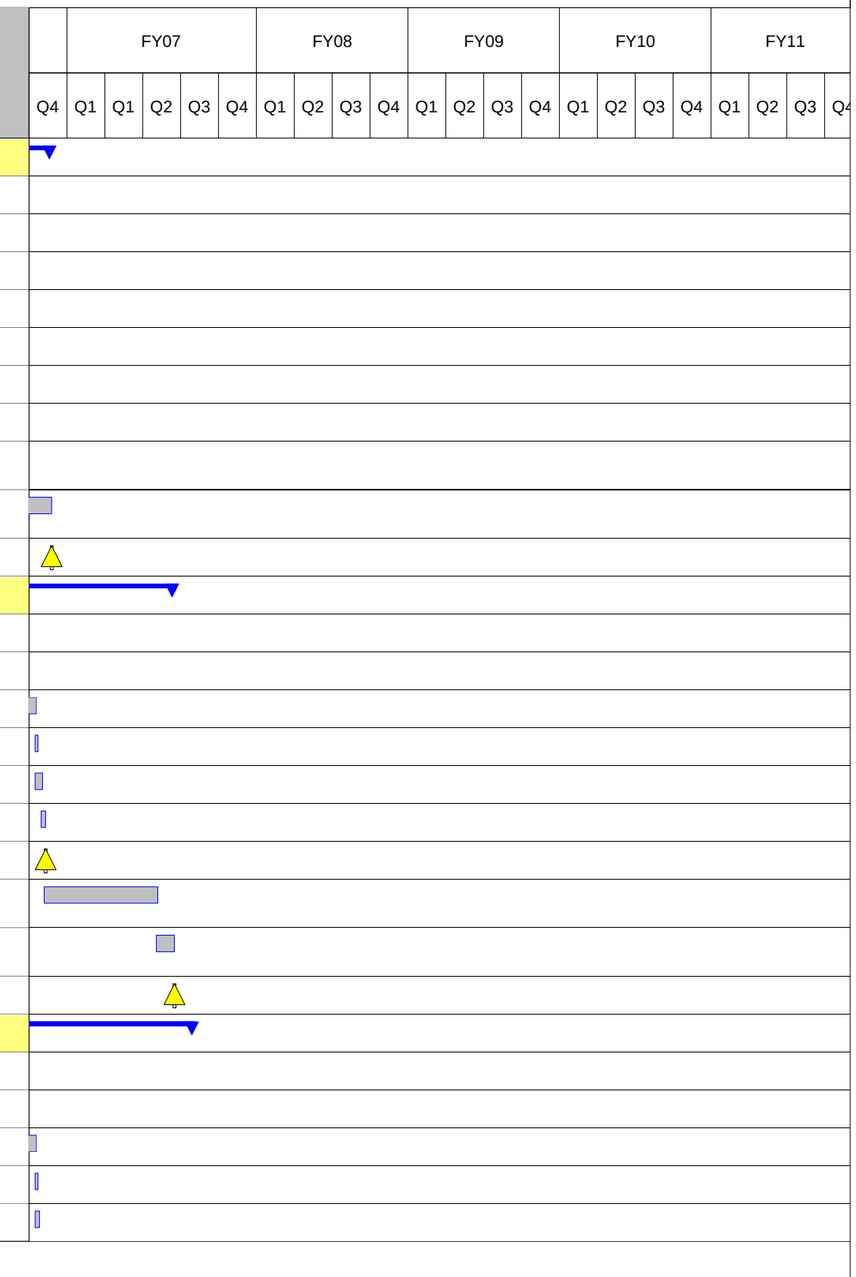
1.1.1.1	**Topographic Survey**	**102d**	**03Apr06**	**24Aug06**		
1.1.1.1.1	Prepare request for proposal	6d	**03Apr06**	**10Apr06**	**1.9.4.1[FS]**	**L.FNAL.FESS.ENG.ENG,24.00,**
1.1.1.1.2	Issue request for proposal	2d	**11Apr06**	**12Apr06**	**1.1.1.1.1[FS]**	**L.FNAL.FESS.ENG.ENG,8.00,**
1.1.1.1.3	Review received proposals	2d	**19Apr06**	**20Apr06**	**1.1.1.1.2[FS+4d]**	**L.FNAL.FESS.ENG.ENG,40.00,**
1.1.1.1.4	Write requisition	3d	**21Apr06**	**25Apr06**	**1.1.1.1.3[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.1.1.5	Circulate requisition 187068	7d	**26Apr06**	**04May06**	**1.1.1.1.4[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.1.1.6	Prepare purchase order 569167	1d	**05May06**	**05May06**	**1.1.1.1.5[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.1.1.7	Purchase order released	0	**05May06**	**05May06**	**1.1.1.1.6[FS]**	
1.1.1.1.8	Survey site	30d	**08May06**	**19Jun06**	**1.1.1.1.7[FS]**	**L.FNAL.FESS.ENG.ENG,90.00,;M.FNAL.FESS. MANDS,45000.00,**
1.1.1.1.9	Prepare report	47d	**20Jun06**	**24Aug06**	**1.1.1.1.8[FS]**	**M.FNAL.FESS.MANDS,15000.00,;L.FNAL.FESS. ENG.ENG,40.00,**
1.1.1.1.10	Topographic survey complete	0	**24Aug06**	**24Aug06**	**1.1.1.1.9[FS]**	
1.1.1.2	**Subsurface Investigation**	**240d**	**03Apr06**	**16Mar07**		
1.1.1.2.1	Prepare request for proposal	45d	**03Apr06**	**05Jun06**	**1.9.4.1[FS]**	**L.FNAL.FESS.ENG.ENG,24.00,**
1.1.1.2.2	Issue request for proposal	1d	**06Jun06**	**06Jun06**	**1.1.1.2.1[FS]**	**L.FNAL.FESS.ENG.ENG,8.00,**
1.1.1.2.3	Review received proposals	18d	**21Jun06**	**17Jul06**	**1.1.1.2.2[FS+10d]**	**L.FNAL.FESS.ENG.ENG,40.00,**
1.1.1.2.4	Write requisition	1d	**18Jul06**	**18Jul06**	**1.1.1.2.3[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.1.2.5	Circulate requisition 188912	10d	**19Jul06**	**01Aug06**	**1.1.1.2.4[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.1.2.6	Prepare purchase order	5d	**02Aug06**	**08Aug06**	**1.1.1.2.5[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.1.2.7	Purchase order released 570728	0	**08Aug06**	**08Aug06**	**1.1.1.2.6[FS]**	
1.1.1.2.8	Perform subsurface borings	120d	**09Aug06**	**02Feb07**	**1.1.1.2.7[FS]**	**M.FNAL.FESS.MANDS,126680.00,;L.FNAL.FESS. ENG.ENG,140.00,**
1.1.1.2.9	Prepare report	30d	**05Feb07**	**16Mar07**	**1.1.1.2.8[FS]**	**M.FNAL.FESS.MANDS,35000.00,;L.FNAL.FESS. ENG.ENG,40.00,**
1.1.1.2.10	Subsurface investigation completed	0	**16Mar07**	**16Mar07**	**1.1.1.2.9[FS]**	
1.1.1.3	**Wetland Delineation**	**271d**	**03Apr06**	**30Apr07**		
1.1.1.3.1	Prepare request for proposal	45d	**03Apr06**	**05Jun06**	**1.9.4.1[FS]**	**L.FNAL.FESS.ENG.ENG,24.00,**
1.1.1.3.2	Issue request for proposal	1d	**06Jun06**	**06Jun06**	**1.1.1.3.1[FS]**	**L.FNAL.FESS.ENG.ENG,8.00,**
1.1.1.3.3	Review received proposals	18d	**21Jun06**	**17Jul06**	**1.1.1.3.2[FS+10d]**	**L.FNAL.FESS.ENG.ENG,40.00,**
1.1.1.3.4	Write requisition	1d	**18Jul06**	**18Jul06**	**1.1.1.3.3[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.1.3.5	Circulate requisition 188169	5d	**19Jul06**	**25Jul06**	**1.1.1.3.4[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**



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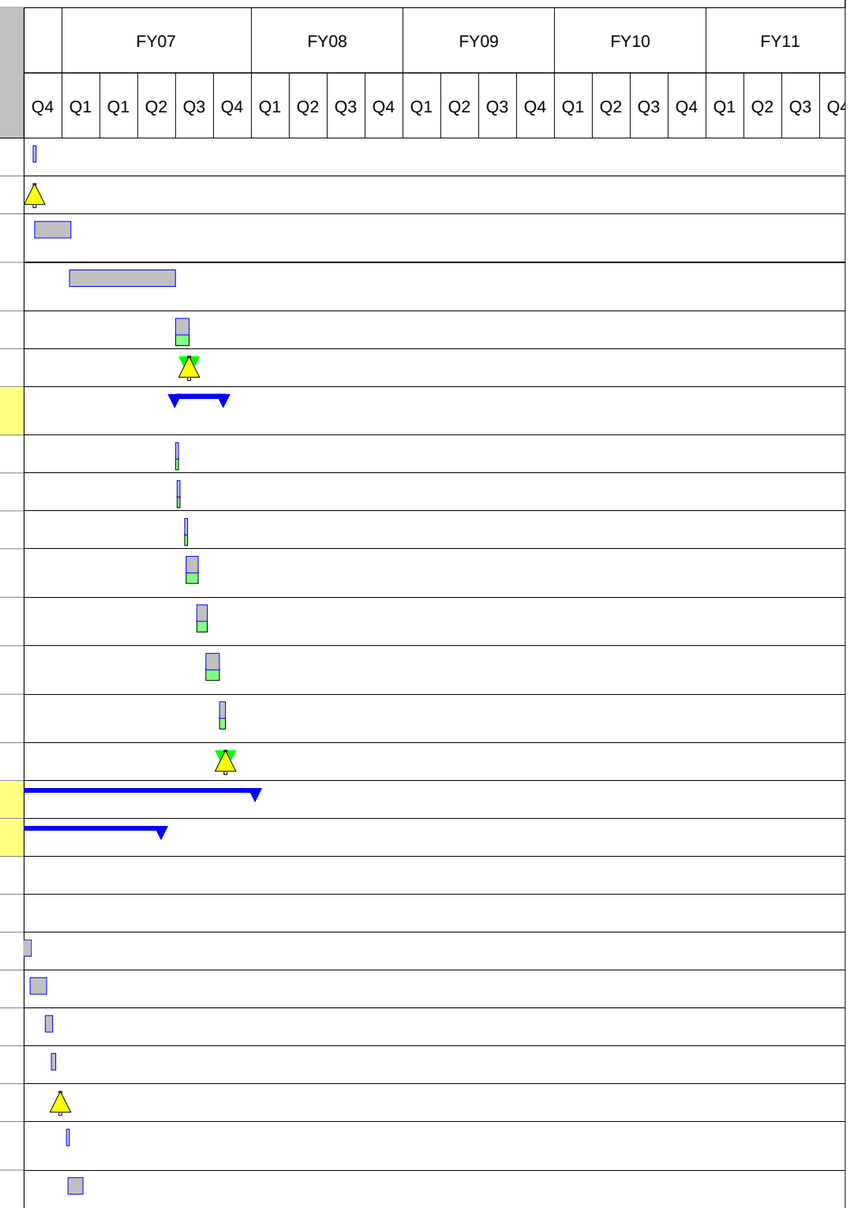
1.1.1.3.6	Revise purchase order 564502	1d	26Jul06	26Jul06	1.1.1.3.5[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.1.3.7	Purchase order released 564502	0	26Jul06	26Jul06	1.1.1.3.6[FS]	
1.1.1.3.8	Perform wetland delineation	60d	27Jul06	19Oct06	1.1.1.3.7[FS]	L.FNAL.FESS.ENG.ENG,20.00,;M.FNAL.FESS. MANDS,15000.00,
1.1.1.3.9	Prepare report	109d	20Oct06	30Mar07	1.1.1.3.8[FS]	M.FNAL.FESS.MANDS,10600.00,;L.FNAL.FESS. ENG.ENG,16.00,
1.1.1.3.10	Prepare report - 2HFY07	21d	02Apr07	30Apr07	1.1.1.3.9[FS]	L.FNAL.FESS.ENG.ENG,8.00,
1.1.1.3.11	Wetland delineation completed	0	30Apr07	30Apr07	1.1.1.3.10[FS]	
1.1.1.4	**Revise Ash River Environmental Assessment Worksheet**	**83d**	**02Apr07**	**27Jul07**		
1.1.1.4.1	Prepare request for proposal	4d	02Apr07	05Apr07	1.9.4.2[FS]	L.FNAL.FESS.ENG.ENG,24.00,
1.1.1.4.2	Issue request for proposal	1d	06Apr07	06Apr07	1.1.1.4.1[FS]	L.FNAL.FESS.ENG.ENG,8.00,
1.1.1.4.3	Review received proposals	3d	23Apr07	25Apr07	1.1.1.4.2[FS+10d]	L.FNAL.FESS.ENG.ENG,40.00,
1.1.1.4.4	Gather data	20d	26Apr07	23May07	1.1.1.1.10[FS]; 1.1.1.3.8[FS]; 1.1.1.4.3[FS]	L.FNAL.FESS.ENG.ENG,24.00,;M.FNAL.FESS. MANDS,20000.00,
1.1.1.4.5	Revise existing EAW	15d	24May07	14Jun07	1.1.1.4.4[FS]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS. ENG.ENG,8.00,
1.1.1.4.6	NOvA project review	20d	15Jun07	13Jul07	1.1.1.4.5[FS]	L.FNAL.FESS.ENG.ENG,40.00,;M.FNAL.FESS. MANDS,0.00,
1.1.1.4.7	Finalize report	10d	16Jul07	27Jul07	1.1.1.4.6[FS]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS. ENG.ENG,20.00,
1.1.1.4.8	EAW revisions completed	0	27Jul07	27Jul07	1.1.1.4.7[FS]	
1.1.2	**Title 1 Preparation**	**387d**	**03Apr06**	**12Oct07**		
1.1.2.1	**Site Preparation Advanced Conceptual Design**	**227d**	**03Apr06**	**27Feb07**		
1.1.2.1.1	Prepare request for proposal	51d	03Apr06	13Jun06	1.9.4.1[FS]	L.FNAL.FESS.ENG.ENG,19.00,
1.1.2.1.2	Issue RFP	1d	15Jun06	15Jun06	1.1.2.1.1[FS+1d]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.2.1.3	Review received proposal	21d	16Jun06	17Jul06	1.1.2.1.2[FS]	L.FNAL.FESS.ENG.ENG,19.00,
1.1.2.1.4	Prepare requisition 189633	25d	18Jul06	21Aug06	1.1.2.1.3[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.2.1.5	Circulate for signature	11d	22Aug06	06Sep06	1.1.2.1.4[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.2.1.6	Prepare purchase order 571506	5d	07Sep06	13Sep06	1.1.2.1.5[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.2.1.7	PO released	0	25Sep06	25Sep06	1.1.2.1.6[FS]	
1.1.2.1.8	Hold kickoff meeting	1d	13Oct06	13Oct06	1.1.2.1.7[FS+14d]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS. ENG.ENG,40.00,
1.1.2.1.9	Prepare drawings	25d	16Oct06	17Nov06	1.1.2.1.8[FS]	M.FNAL.FESS.MANDS,80000.00,;L.FNAL.FESS. ENG.ENG,200.00,



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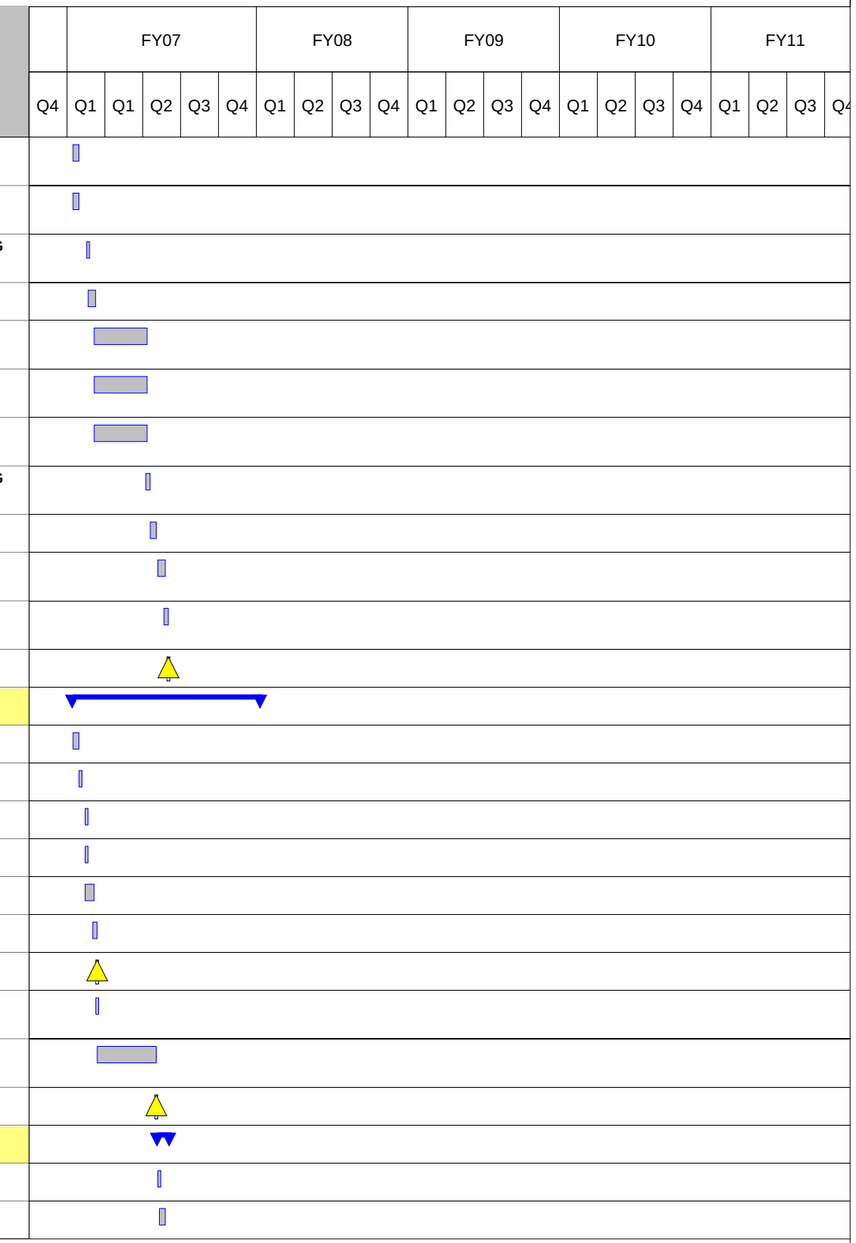
1.1.2.1.10	Prepare specifications	10d	16Oct06	27Oct06	1.1.2.1.8[FS]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS.ENG.ENG,20.00,
1.1.2.1.11	Prepare cost estimate	10d	16Oct06	27Oct06	1.1.2.1.8[FS]	L.FNAL.FESS.ENG.ENG,20.00,;M.FNAL.FESS.MANDS,10000.00,
1.1.2.1.12	Assemble, print, and distribute documents	2d	20Nov06	21Nov06	1.1.2.1.10[FS]; 1.1.2.1.9[FS]; 1.1.2.1.11[FS]	M.FNAL.FESS.MANDS,2500.00,;L.FNAL.FESS.ENG.ENG,36.00,
1.1.2.1.13	Comment and compliance review	10d	22Nov06	07Dec06	1.1.2.1.12[FS]	L.FNAL.FESS.ENG.ENG,200.00,
1.1.2.1.14	Revise drawings	20d	08Dec06	10Jan07	1.1.2.1.13[FS]	M.FNAL.FESS.MANDS,92000.00,;L.FNAL.FESS.ENG.ENG,100.00,
1.1.2.1.15	Revise specifications	20d	08Dec06	10Jan07	1.1.2.1.13[FS]	L.FNAL.FESS.ENG.ENG,20.00,;M.FNAL.FESS.MANDS,10000.00,
1.1.2.1.16	Revise cost estimate	20d	08Dec06	10Jan07	1.1.2.1.13[FS]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS.ENG.ENG,20.00,
1.1.2.1.17	Assemble, print, and distribute documents	5d	11Jan07	18Jan07	1.1.2.1.16[FS]	M.FNAL.FESS.MANDS,2200.00,;L.FNAL.FESS.ENG.ENG,24.00,
1.1.2.1.18	Quality assurance review	10d	19Jan07	01Feb07	1.1.2.1.17[FS]	L.FNAL.FESS.ENG.ENG,20.00,
1.1.2.1.19	Finalize documents	10d	09Feb07	22Feb07	1.1.2.1.18[FS+5d]	M.FNAL.FESS.MANDS,30000.00,;L.FNAL.FESS.ENG.ENG,86.00,
1.1.2.1.20	Assemble, print, and distribute documents	3d	23Feb07	27Feb07	1.1.2.1.19[FS]	L.FNAL.FESS.ENG.ENG,36.00,;M.FNAL.FESS.MANDS,2900.00,
1.1.2.1.21	Site preparation ACD completed	0	27Feb07	27Feb07	1.1.2.1.20[FS]	
1.1.2.2	**Building Design Modifications**	**250d**	**16Oct06**	**12Oct07**		
1.1.2.2.1	Prepare request for proposal	10d	16Oct06	27Oct06		L.FNAL.FESS.ENG.ENG,80.00,
1.1.2.2.2	Issue RFP	1d	30Oct06	30Oct06	1.1.2.2.1[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.2.2.3	Review received proposal	2d	14Nov06	15Nov06	1.1.2.2.2[FS+10d]	L.FNAL.FESS.ENG.ENG,40.00,
1.1.2.2.4	Prepare requisition	1d	16Nov06	16Nov06	1.1.2.2.3[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.2.2.5	Circulate for signature	10d	17Nov06	04Dec06	1.1.2.2.4[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.2.2.6	Prepare purchase order	5d	05Dec06	11Dec06	1.1.2.2.5[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.2.2.7	PO released	0	11Dec06	11Dec06	1.1.2.2.6[FS]	
1.1.2.2.8	Hold kickoff meeting	1d	12Dec06	12Dec06	1.1.2.2.7[FS]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS.ENG.ENG,40.00,
1.1.2.2.9	Review background information	30d	13Dec06	30Jan07	1.1.2.2.8[FS]	M.FNAL.FESS.MANDS,63580.00,;L.FNAL.FESS.ENG.ENG,200.00,
1.1.2.2.10	Suspend building design modifications	0	30Jan07	30Jan07	1.1.2.2.9[FS]	
1.1.2.2.11	**Value Engineering**	**21d**	**09Feb07**	**09Mar07**		
1.1.2.2.11.1	Brainstoming session	1d	09Feb07	09Feb07	1.1.2.2.10[FS+7d]	L.FNAL.FESS.ENG.ENG,32.00,
1.1.2.2.11.2	Investigate alternatives	10d	12Feb07	23Feb07	1.1.2.2.11.1[FS]	L.FNAL.FESS.ENG.ENG,120.00,



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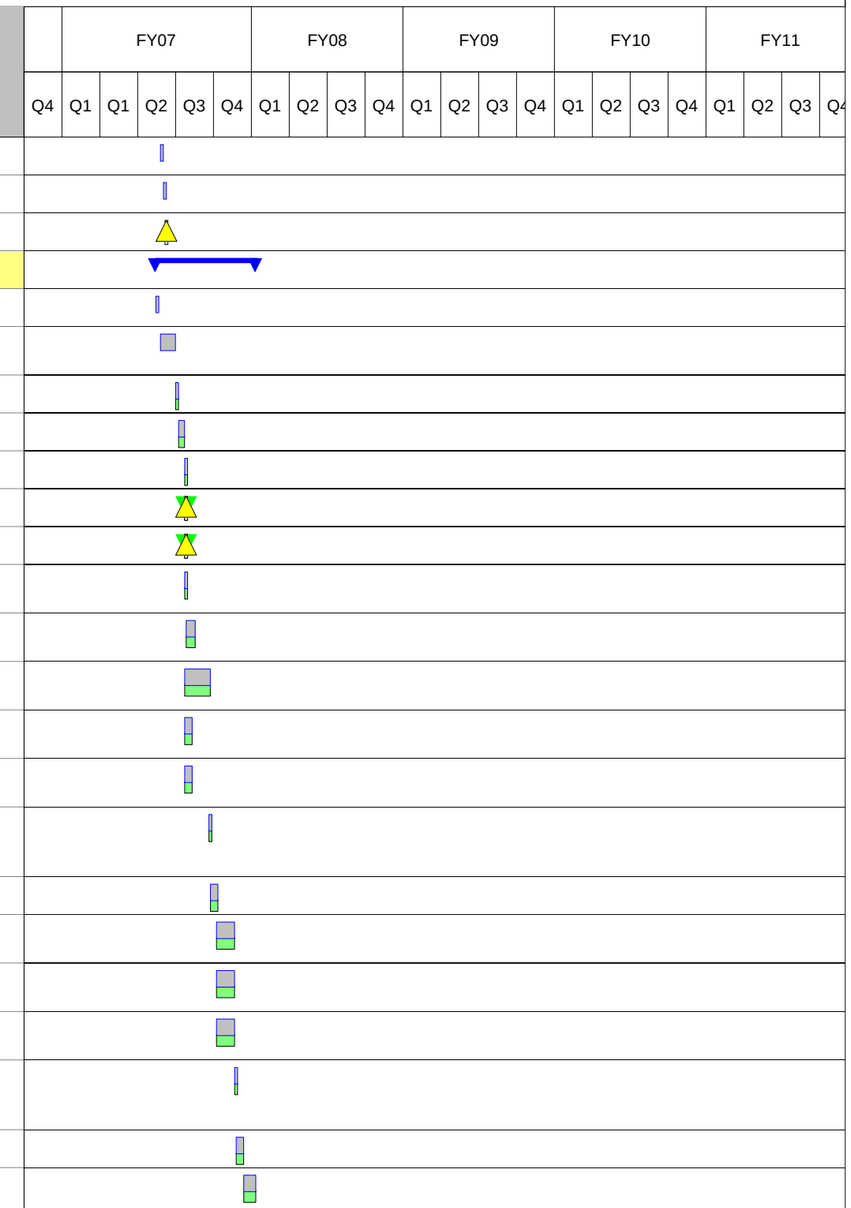
1.1.2.2.11.3	Review alternatives	5d	26Feb07	02Mar07	1.1.2.2.11.2[FS]	L.FNAL.FESS.ENG.ENG,40.00,
1.1.2.2.11.4	Document suggestions	5d	05Mar07	09Mar07	1.1.2.2.11.3[FS]	L.FNAL.FESS.ENG.ENG,40.00,
1.1.2.2.11.5	Value engineering completed	0	09Mar07	09Mar07	1.1.2.2.11.4[FS]	
1.1.2.2.12	**Document Revisions**	**168d**	**16Feb07**	**12Oct07**		
1.1.2.2.12.1	Kickoff meeting	1d	16Feb07	16Feb07	1.1.2.2.11.1[FS+4d]	L.FNAL.FESS.ENG.ENG,32.00,
1.1.2.2.12.2	Revise drawings	25d	26Feb07	30Mar07	1.1.2.2.11.2[FS]; 1.1.2.2.12.1[FS]	L.FNAL.FESS.ENG.ENG,300.00,
1.1.2.2.12.3	Project review	5d	02Apr07	06Apr07	1.1.2.2.12.2[FS]	L.FNAL.FESS.ENG.ENG,80.00,
1.1.2.2.12.4	Incorporate revisions	10d	09Apr07	20Apr07	1.1.2.2.12.3[FS]	L.FNAL.FESS.ENG.ENG,200.00,
1.1.2.2.12.5	Assemble, print, and distribute documents	2d	23Apr07	24Apr07	1.1.2.2.12.4[FS]	L.FNAL.FESS.ENG.ENG,40.00,
1.1.2.2.12.6	Document revisions completed	0	24Apr07	24Apr07	1.1.2.2.12.5[FS]	
1.1.2.2.12.7	Resume building design modifications	0	25Apr07	25Apr07	1.1.2.2.12.6[FS]	
1.1.2.2.12.8	Kickoff meeting	1d	25Apr07	25Apr07	1.1.2.2.12.7[FS]	L.FNAL.FESS.ENG.ENG,80.00,;M.FNAL.FESS. MANDS,11600.00,
1.1.2.2.12.9	Review background information	15d	26Apr07	16May07	1.1.2.2.12.8[FS]	L.FNAL.FESS.ENG.ENG,120.00,;M.FNAL.FESS. MANDS,40000.00,
1.1.2.2.12.10	Prepare drawings	40d	25Apr07	20Jun07	1.1.2.2.12.7[FS]	M.FNAL.FESS.MANDS,250000.00,;L.FNAL.FESS. ENG.ENG,200.00,
1.1.2.2.12.11	Prepare specifications	10d	25Apr07	08May07	1.1.2.2.12.7[FS]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS. ENG.ENG,20.00,
1.1.2.2.12.12	Prepare cost estimate	10d	25Apr07	08May07	1.1.2.2.12.7[FS]	L.FNAL.FESS.ENG.ENG,20.00,;M.FNAL.FESS. MANDS,10000.00,
1.1.2.2.12.13	Assemble, print, and distribute documents	2d	21Jun07	22Jun07	1.1.2.2.12.12[FS]; 1.1.2.2.12.11[FS]; 1.1.2.2.12.10[FS]	M.FNAL.FESS.MANDS,2500.00,;L.FNAL.FESS.ENG .ENG,36.00,
1.1.2.2.12.14	Comment and compliance review	10d	25Jun07	09Jul07	1.1.2.2.12.13[FS]	L.FNAL.FESS.ENG.ENG,200.00,
1.1.2.2.12.15	Revise drawings	30d	10Jul07	20Aug07	1.1.1.2.10[FS]; 1.1.2.2.12.14[FS]	M.FNAL.FESS.MANDS,197000.00,;L.FNAL.FESS. ENG.ENG,100.00,
1.1.2.2.12.16	Revise specifications	30d	10Jul07	20Aug07	1.1.2.2.12.14[FS]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS. ENG.ENG,20.00,
1.1.2.2.12.17	Revise cost estimate	30d	10Jul07	20Aug07	1.1.2.2.12.14[FS]	M.FNAL.FESS.MANDS,10000.00,;L.FNAL.FESS. ENG.ENG,20.00,
1.1.2.2.12.18	Assemble, print and distribute documents	5d	21Aug07	27Aug07	1.1.2.2.12.16[FS]; 1.1.2.2.12.15[FS]; 1.1.2.2.12.17[FS]	M.FNAL.FESS.MANDS,2500.00,;L.FNAL.FESS.ENG .ENG,24.00,
1.1.2.2.12.19	Quality assurance review	10d	28Aug07	11Sep07	1.1.2.2.12.18[FS]	L.FNAL.FESS.ENG.ENG,20.00,
1.1.2.2.12.20	Finalize documents	20d	12Sep07	09Oct07	1.1.2.2.12.19[FS]	L.FNAL.FESS.ENG.ENG,86.00,;M.FNAL.FESS. MANDS,121316.00,



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Nova Project
WBS 1.x - R & D
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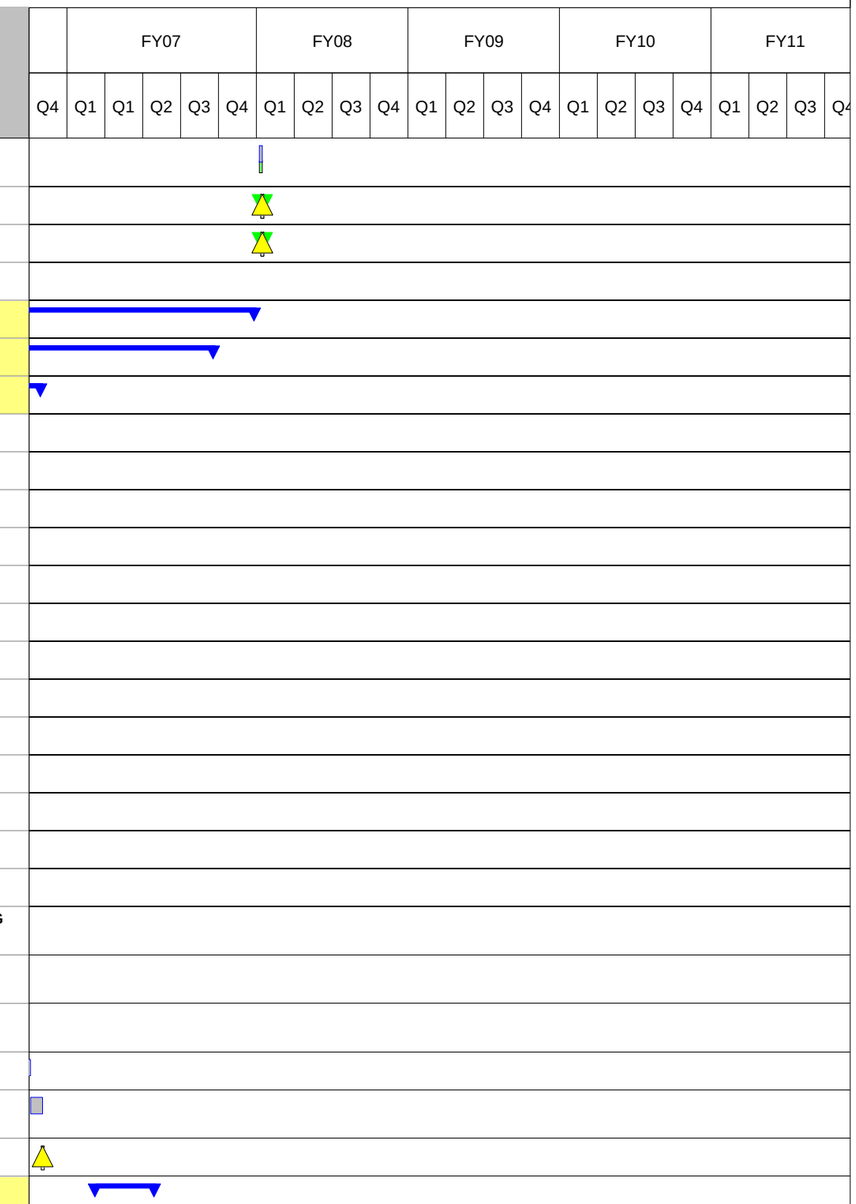
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.1.2.2.12.21	Assemble, print and distribute documents	3d	10Oct07	12Oct07	1.1.2.2.12.20[FS]	L.FNAL.FESS.ENG.ENG,36.00,;M.FNAL.FESS.MANDS,2900.00,
1.1.2.2.13	Building design modifications completed	0	12Oct07	12Oct07	1.1.2.2.12.21[FS]	
1.1.2.3	Title 1 preparation complete	0	12Oct07	12Oct07	1.1.2.1.21[FS]; 1.1.2.2.13[FS]	
1.1.3	(Retired)	1d	03Oct05	03Oct05		
1.1.4	**Management - R&D Phase**	**501d**	**03Oct05**	**28Sep07**		
1.1.4.1	**Independent Cost Estimate Review**	**330d**	**01Mar06**	**20Jun07**		
1.1.4.1.1	**Initial Cost Estimate Review**	**107d**	**01Mar06**	**31Jul06**		
1.1.4.1.1.1	Prepare request for proposals	5d	01Mar06	07Mar06		L.FNAL.FESS.ENG.ENG,24.00,
1.1.4.1.1.2	Issue RFP	2d	08Mar06	09Mar06	1.1.4.1.1.1[FS]	L.FNAL.FESS.ENG.ENG,8.00,
1.1.4.1.1.3	Review proposals	2d	21Mar06	22Mar06	1.1.4.1.1.2[FS+7d]	L.FNAL.FESS.ENG.ENG,40.00,
1.1.4.1.1.4	Write requsition	13d	23Mar06	10Apr06	1.1.4.1.1.3[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.4.1.1.5	Circulate requisition for signatures 186695	10d	11Apr06	24Apr06	1.1.4.1.1.4[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.4.1.1.6	Prepare purchase order	4d	25Apr06	28Apr06	1.1.4.1.1.5[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.4.1.1.7	Purchase order issued 568988	0	28Apr06	28Apr06	1.1.4.1.1.6[FS]	
1.1.4.1.1.8	Prepare request for schedule review	3d	01May06	03May06	1.1.4.1.1.7[FS]	L.FNAL.FESS.ENG.ENG,24.00,
1.1.4.1.1.9	Issue RFP	1d	04May06	04May06	1.1.4.1.1.8[FS]	L.FNAL.FESS.ENG.ENG,8.00,
1.1.4.1.1.10	Review proposal	6d	05May06	12May06	1.1.4.1.1.9[FS]	L.FNAL.FESS.ENG.ENG,40.00,
1.1.4.1.1.11	Write requistion 187494	1d	15May06	15May06	1.1.4.1.1.10[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.4.1.1.12	Circulate requisition for signatures	1d	16May06	16May06	1.1.4.1.1.11[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.4.1.1.13	Modify purchase order 568988	6d	17May06	24May06	1.1.4.1.1.12[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.4.1.1.14	Hold kickoff meeting	1d	25May06	25May06	1.1.4.1.1.13[FS]; 1.1.4.1.1.7[FS]	M.FNAL.FESS.MANDS,2000.00,;L.FNAL.FESS.ENG.ENG,16.00,
1.1.4.1.1.15	Review background information	16d	26May06	19Jun06	1.1.4.1.1.14[FS]	L.FNAL.FESS.ENG.ENG,16.00,;M.FNAL.FESS.MANDS,4000.00,
1.1.4.1.1.16	Develop draft report	5d	20Jun06	26Jun06	1.1.4.1.1.15[FS]	M.FNAL.FESS.MANDS,30000.00,;L.FNAL.FESS.ENG.ENG,16.00,
1.1.4.1.1.17	Project review of draft report	5d	27Jun06	03Jul06	1.1.4.1.1.16[FS]	L.FNAL.FESS.ENG.ENG,24.00,
1.1.4.1.1.18	Finalize report	19d	05Jul06	31Jul06	1.1.4.1.1.17[FS]	L.FNAL.FESS.ENG.ENG,8.00,;M.FNAL.FESS.MANDS,8000.00,
1.1.4.1.1.19	ICE review completed	0	31Jul06	31Jul06	1.1.4.1.1.18[FS]	
1.1.4.1.2	**Update Cost Estimate**	**31d**	**12Dec06**	**30Jan07**		



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Nova Project
WBS 1.x - R & D
Gantt Chart

CD-2/3a Director's Review
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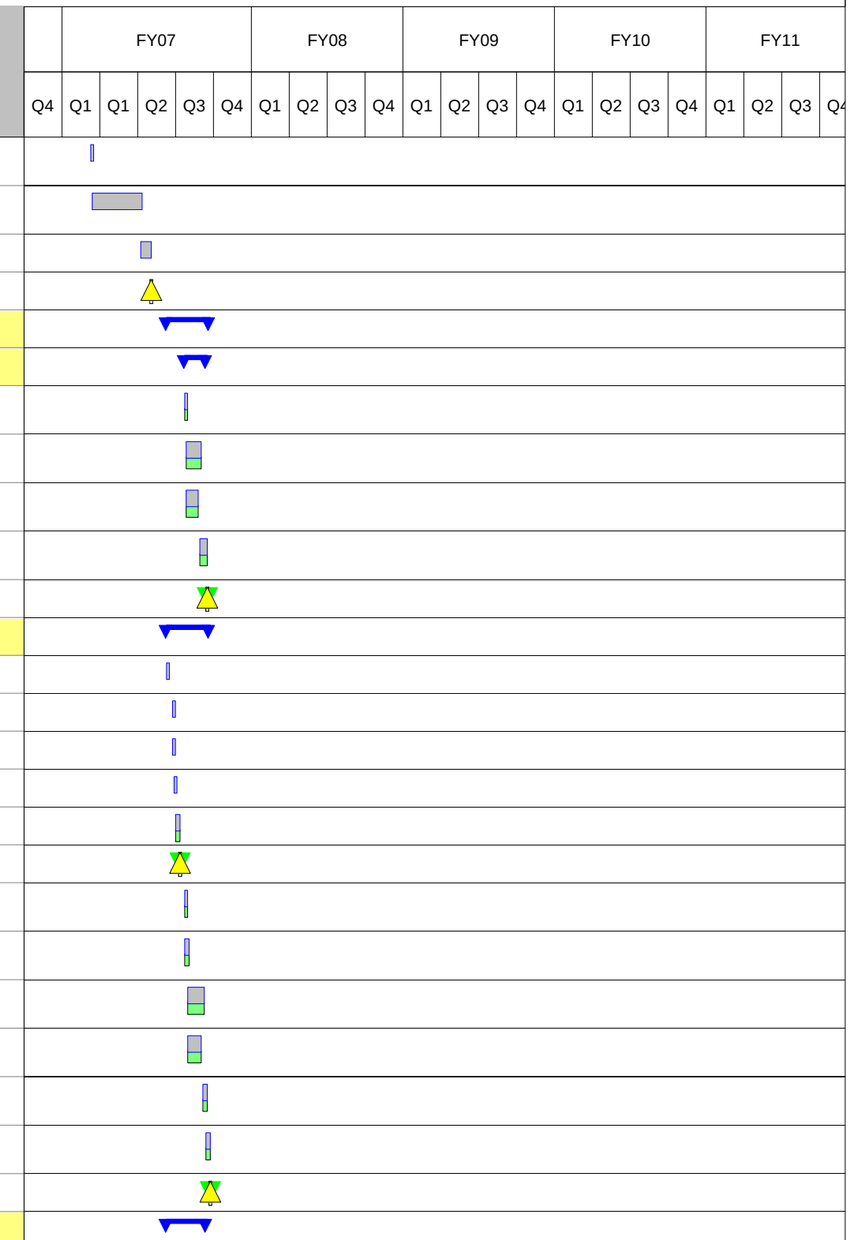
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.1.4.1.2.1	Kickoff meeting	1d	12Dec06	12Dec06	1.1.2.2.7[FS]	M.FNAL.FESS.MANDS,1000.00,;L.FNAL.FESS.ENG .ENG,5.00,
1.1.4.1.2.2	Revise cost estimate	15d	13Dec06	08Jan07	1.1.4.1.2.1[FS]	M.FNAL.FESS.MANDS,7000.00,;L.FNAL.FESS.ENG .ENG,20.00,
1.1.4.1.2.3	Internal project review	15d	09Jan07	30Jan07	1.1.4.1.2.2[FS]	L.FNAL.FESS.ENG.ENG,60.00,
1.1.4.1.2.4	Cost estimate update completed	0	30Jan07	30Jan07	1.1.4.1.2.3[FS]	
1.1.4.1.3	**Cost Estimate and Schedule Revisions**	**72d**	**12Mar07**	**20Jun07**		
1.1.4.1.3.1	**Burns and McDonnell**	**36d**	**25Apr07**	**14Jun07**		
1.1.4.1.3.1.1	Kickoff meeting	1d	25Apr07	25Apr07	1.1.2.2.12.6[FS]	M.FNAL.FESS.MANDS,2500.00,;L.FNAL.FESS.ENG .ENG,10.00,
1.1.4.1.3.1.2	Revise cost estimate	25d	26Apr07	31May07	1.1.4.1.3.1.1[FS]	M.FNAL.FESS.MANDS,14500.00,;L.FNAL.FESS. ENG.ENG,40.00,
1.1.4.1.3.1.3	Update schedule	20d	26Apr07	23May07	1.1.4.1.3.1.1[FS]	L.FNAL.FESS.ENG.ENG,10.00,;M.FNAL.FESS. MANDS,9000.00,
1.1.4.1.3.1.4	Internal project review	10d	01Jun07	14Jun07	1.1.4.1.3.1.2[FS]; 1.1.4.1.3.1.3[FS]	L.FNAL.FESS.ENG.ENG,100.00,
1.1.4.1.3.1.5	Revision completed	0	14Jun07	14Jun07	1.1.4.1.3.1.4[FS]	
1.1.4.1.3.2	**J.E.Dunn-North Central**	**72d**	**12Mar07**	**20Jun07**		
1.1.4.1.3.2.1	Prepare request for proposals	5d	12Mar07	16Mar07		L.FNAL.FESS.ENG.ENG,16.00,
1.1.4.1.3.2.3	Review proposals	1d	26Mar07	26Mar07	1.1.4.1.3.2.1[FS+5d]	L.FNAL.FESS.ENG.ENG,16.00,
1.1.4.1.3.2.4	Write requsition (193708)	1d	27Mar07	27Mar07	1.1.4.1.3.2.3[FS]	L.FNAL.FESS.ENG.ENG,8.00,
1.1.4.1.3.2.5	Circulate requisition for signatures	3d	28Mar07	30Mar07	1.1.4.1.3.2.4[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.4.1.3.2.6	Prepare purchase order	6d	02Apr07	09Apr07	1.1.4.1.3.2.5[FS]	L.FNAL.FESS.ENG.ENG,4.00,
1.1.4.1.3.2.7	Purchase order issued (PO 57444)	0	10Apr07	10Apr07	1.1.4.1.3.2.6[FS]	
1.1.4.1.3.2.8	Hold kickoff meeting	1d	24Apr07	24Apr07	1.1.4.1.3.2.7[FS+10d]	L.FNAL.FESS.ENG.ENG,10.00,;M.FNAL.FESS. MANDS,2900.00,
1.1.4.1.3.2.9	Review background information	5d	25Apr07	01May07	1.1.4.1.3.2.8[FS]	L.FNAL.FESS.ENG.ENG,40.00,;M.FNAL.FESS. MANDS,5800.00,
1.1.4.1.3.2.10	Develop draft estimate	25d	02May07	06Jun07	1.1.4.1.3.2.9[FS]	M.FNAL.FESS.MANDS,23392.00,;L.FNAL.FESS. ENG.ENG,40.00,
1.1.4.1.3.2.11	Develop draft schedule	20d	02May07	30May07	1.1.4.1.3.2.9[FS]	L.FNAL.FESS.ENG.ENG,40.00,;M.FNAL.FESS. MANDS,5800.00,
1.1.4.1.3.2.12	Project review of draft report	5d	07Jun07	13Jun07	1.1.4.1.3.2.11[FS]; 1.1.4.1.3.2.10[FS]	L.FNAL.FESS.ENG.ENG,100.00,
1.1.4.1.3.2.13	Finalize documents	5d	14Jun07	20Jun07	1.1.4.1.3.2.12[FS]	L.FNAL.FESS.ENG.ENG,40.00,;M.FNAL.FESS. MANDS,2500.00,
1.1.4.1.3.2.14	A/E cost estimate completed	0	20Jun07	20Jun07	1.1.4.1.3.2.13[FS]	
1.1.4.1.3.3	**Constructive Ideas**	**69d**	**12Mar07**	**15Jun07**		



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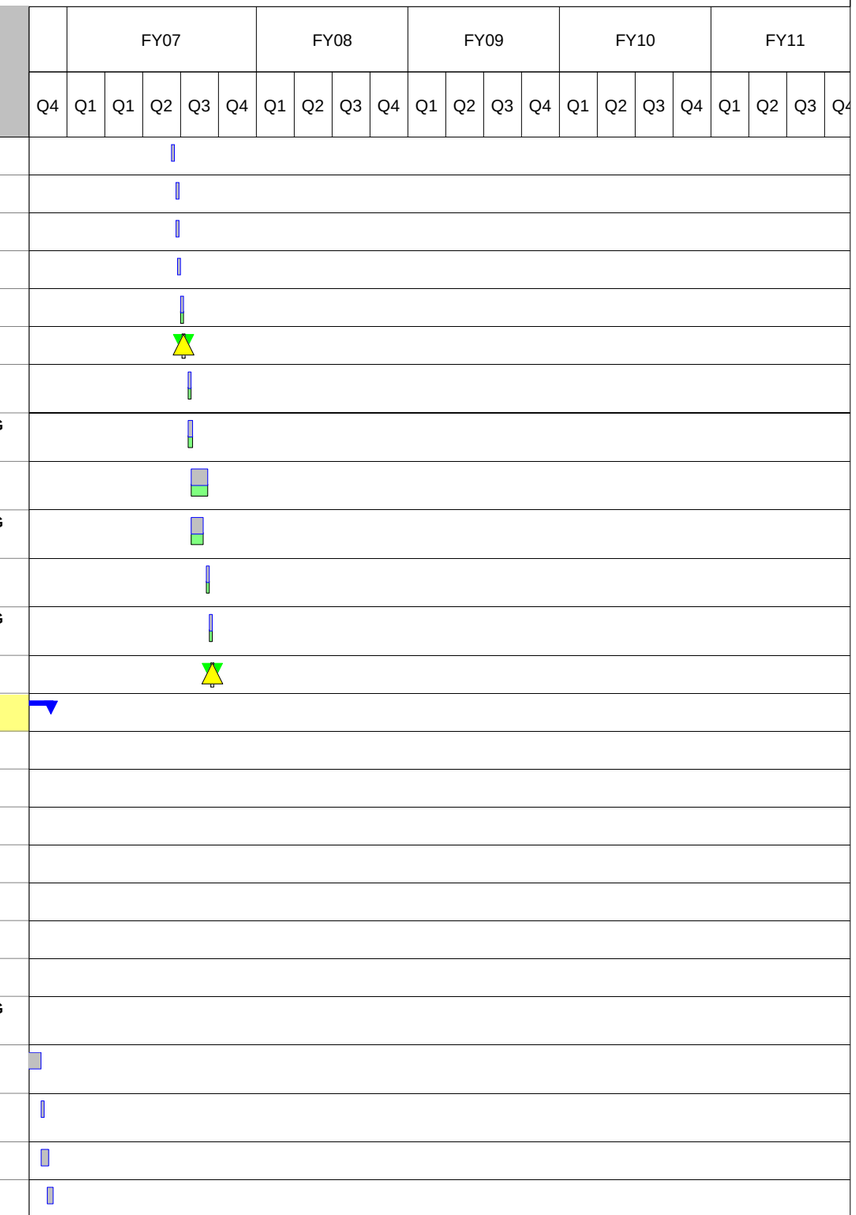
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.1.4.1.3.3.1	Prepare request for proposals	4d	**12Mar07**	**15Mar07**		**L.FNAL.FESS.ENG.ENG,16.00,**
1.1.4.1.3.3.3	Review proposals	1d	**22Mar07**	**22Mar07**	**1.1.4.1.3.3.1[FS+4d]**	**L.FNAL.FESS.ENG.ENG,16.00,**
1.1.4.1.3.3.4	Write requsition (193688)	1d	**23Mar07**	**23Mar07**	**1.1.4.1.3.3.3[FS]**	**L.FNAL.FESS.ENG.ENG,8.00,**
1.1.4.1.3.3.5	Circulate requisition for signatures	5d	**26Mar07**	**30Mar07**	**1.1.4.1.3.3.4[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.4.1.3.3.6	Prepare purchase order	3d	**02Apr07**	**04Apr07**	**1.1.4.1.3.3.5[FS]**	**L.FNAL.FESS.ENG.ENG,10.00,**
1.1.4.1.3.3.7	Purchase order issued (PO 57428)	0	**05Apr07**	**05Apr07**	**1.1.4.1.3.3.6[FS]**	
1.1.4.1.3.3.8	Hold kickoff meeting	1d	**19Apr07**	**19Apr07**	**1.1.4.1.3.3.7[FS+10d]**	**L.FNAL.FESS.ENG.ENG,10.00,;M.FNAL.FESS. MANDS,2900.00,**
1.1.4.1.3.3.9	Review background information	5d	**20Apr07**	**26Apr07**	**1.1.4.1.3.3.8[FS]**	**M.FNAL.FESS.MANDS,5800.00,;L.FNAL.FESS.ENG .ENG,40.00,**
1.1.4.1.3.3.10	Develop draft estimate	25d	**27Apr07**	**01Jun07**	**1.1.4.1.3.3.9[FS]**	**L.FNAL.FESS.ENG.ENG,40.00,;M.FNAL.FESS. MANDS,7500.00,**
1.1.4.1.3.3.11	Develop draft schedule	20d	**27Apr07**	**24May07**	**1.1.4.1.3.3.9[FS]**	**M.FNAL.FESS.MANDS,5400.00,;L.FNAL.FESS.ENG .ENG,40.00,**
1.1.4.1.3.3.12	Project review of draft report	5d	**04Jun07**	**08Jun07**	**1.1.4.1.3.3.11[FS]; 1.1.4.1.3.3.10[FS]**	**L.FNAL.FESS.ENG.ENG,100.00,**
1.1.4.1.3.3.13	Finalize documents	5d	**11Jun07**	**15Jun07**	**1.1.4.1.3.3.12[FS]**	**M.FNAL.FESS.MANDS,2500.00,;L.FNAL.FESS.ENG .ENG,40.00,**
1.1.4.1.3.3.14	A/E cost estimate completed	0	**15Jun07**	**15Jun07**	**1.1.4.1.3.3.13[FS]**	
1.1.4.2	**Secondary Containment Study**	**104d**	**03Apr06**	**28Aug06**		
1.1.4.2.1	Prepare request for proposals	6d	**03Apr06**	**10Apr06**	**1.9.4.1[FS]**	**L.FNAL.FESS.ENG.ENG,24.00,**
1.1.4.2.2	Issue RFP	1d	**11Apr06**	**11Apr06**	**1.1.4.2.1[FS]**	**L.FNAL.FESS.ENG.ENG,8.00,**
1.1.4.2.3	Review proposals	2d	**14Apr06**	**17Apr06**	**1.1.4.2.2[FS+2d]**	**L.FNAL.FESS.ENG.ENG,40.00,**
1.1.4.2.4	Write requsition	1d	**18Apr06**	**18Apr06**	**1.1.4.2.3[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.4.2.5	Circulate requsition for signatures 186834	4d	**19Apr06**	**24Apr06**	**1.1.4.2.4[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.4.2.6	Prepare purchase order	2d	**25Apr06**	**26Apr06**	**1.1.4.2.5[FS]**	**L.FNAL.FESS.ENG.ENG,4.00,**
1.1.4.2.7	Purchase order issued 568982	0	**26Apr06**	**26Apr06**	**1.1.4.2.6[FS]**	
1.1.4.2.8	Hold kickoff meeting	16d	**27Apr06**	**18May06**	**1.1.4.2.7[FS]**	**M.FNAL.FESS.MANDS,2000.00,;L.FNAL.FESS.ENG .ENG,16.00,**
1.1.4.2.9	Review background information	49d	**19May06**	**28Jul06**	**1.1.4.2.8[FS]**	**L.FNAL.FESS.ENG.ENG,16.00,;M.FNAL.FESS. MANDS,4000.00,**
1.1.4.2.10	Develop draft report	1d	**31Jul06**	**31Jul06**	**1.1.4.2.9[FS]**	**L.FNAL.FESS.ENG.ENG,16.00,;M.FNAL.FESS. MANDS,14000.00,**
1.1.4.2.11	Project review of draft report	10d	**01Aug06**	**14Aug06**	**1.1.4.2.10[FS]**	**L.FNAL.FESS.ENG.ENG,24.00,**
1.1.4.2.12	Finalize report	10d	**15Aug06**	**28Aug06**	**1.1.4.2.11[FS]**	**L.FNAL.FESS.ENG.ENG,8.00,;M.FNAL.FESS. MANDS,8000.00,**



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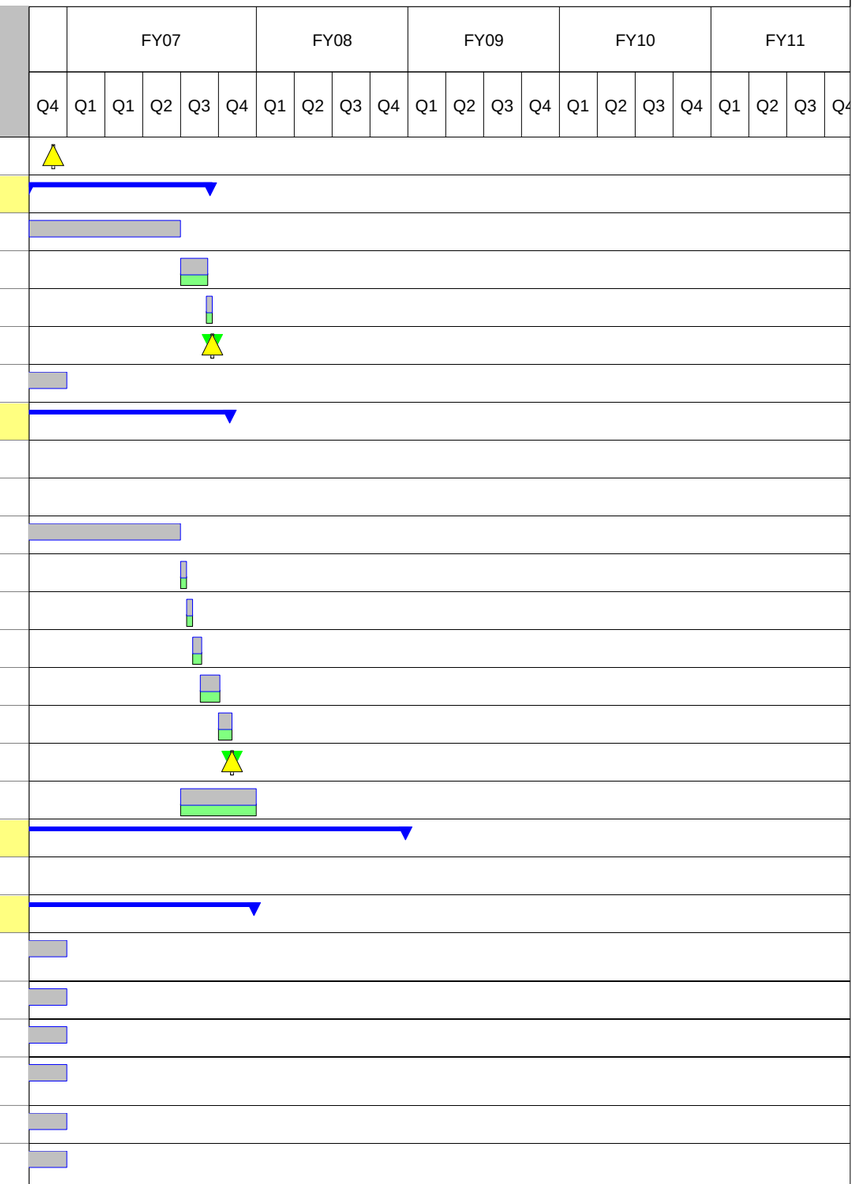
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.1.4.2.13	Secondary containment study completed	0	28Aug06	28Aug06	1.1.4.2.12[FS]	
1.1.4.3	**Overburden Study**	**240d**	**03Jul06**	**15Jun07**		
1.1.4.3.1	Perform study	186d	03Jul06	30Mar07	1.9.4.1[FS]	L.FNAL.FESS.ENG.ENG,76.00,
1.1.4.3.2	Perform study - 2HFY07	44d	02Apr07	01Jun07	1.1.4.3.1[FS]	L.FNAL.FESS.ENG.ENG,16.00,
1.1.4.3.3	Write report	10d	04Jun07	15Jun07	1.1.4.3.2[FS]	L.FNAL.FESS.ENG.ENG,55.00,
1.1.4.3.4	Overburden study completed	0	15Jun07	15Jun07	1.1.4.3.3[FS]	
1.1.4.4	FY06 Site and Building R&D	250d	03Oct05	28Sep06		M.FNAL.FESS.MANDS,200000.00,
1.1.4.5	**Risk Management Assessment**	**315d**	**01May06**	**31Jul07**		
1.1.4.5.1	Develop action plan	10d	01May06	12May06		L.FNAL.FESS.ENG.ENG,24.00,
1.1.4.5.2	Present plan at collaboration meeting	6d	15May06	22May06	1.1.4.5.1[FS]	L.FNAL.FESS.ENG.ENG,43.00,
1.1.4.5.3	Develop risks	214d	23May06	30Mar07	1.1.4.5.2[FS]	L.FNAL.FESS.ENG.ENG,146.00,
1.1.4.5.4	Risk identification activity	10d	02Apr07	13Apr07	1.1.4.5.3[FS]	L.FNAL.FESS.ENG.ENG,55.00,
1.1.4.5.5	Risk analysis activity	10d	16Apr07	27Apr07	1.1.4.5.4[FS]	L.FNAL.FESS.ENG.ENG,55.00,
1.1.4.5.6	Present preliminary results	15d	30Apr07	18May07	1.1.4.5.5[FS]	L.FNAL.FESS.ENG.ENG,9.00,
1.1.4.5.7	Finalize analysis	30d	21May07	02Jul07	1.1.4.5.6[FS]	L.FNAL.FESS.ENG.ENG,92.00,
1.1.4.5.8	Finalize risk assessment forms	20d	03Jul07	31Jul07	1.1.4.5.7[FS]	L.FNAL.FESS.ENG.ENG,92.00,
1.1.4.5.9	Risk management assessment completed	0	31Jul07	31Jul07	1.1.4.5.8[FS]	
1.1.4.6	FY07 Site and Building R&D	127d	02Apr07	28Sep07		M.FNAL.FESS.MANDS,0.00,
1.2	**Liquid Scintillator R&D**	**752d**	**03Oct05**	**29Sep08**		
1.2.1	Requirements	1d	03Oct05	03Oct05		L.IU.PD.SCI.PHY,8.00,
1.2.2	**Scintillator Composition Studies**	**501d**	**03Oct05**	**28Sep07**		
1.2.2.1	Study light yield as a function of pseudocumene content	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,
1.2.2.2	Study light yield as a function of fluor content	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,
1.2.2.3	Study light yield in an alpha-cell	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,
1.2.2.4	Study mineral oil attenuation length requirements via simulations	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,
1.2.2.5	Study mineral oil attenuation length of samples	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,
1.2.2.6	Produce scintillator for light yield studies in test extrusion cells	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,



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1.2.2.7	Continue scintillator composition studies - value engineering - 1HFY07	123d	02Oct06	30Mar07	1.2.2.5[FS]; 1.2.2.4[FS]; 1.2.2.2[FS]; 1.2.2.3[FS]; 1.2.2.1[FS]; 1.2.2.6[FS]	L.IU.PD.TECH.MT_W,125.00,;L.IU.PD.SCI.PHY,16.00,
1.2.2.8	Continue scintillator composition studies - value engineering - 2HFY07	127d	02Apr07	28Sep07	1.2.2.7[FS]	L.IU.PD.SCI.PHY,16.00,;L.IU.PD.TECH.MT_W,125.00,
1.2.3	**Accelerated Aging Studies**	**501d**	**03Oct05**	**28Sep07**		
1.2.3.1	Study effects of psuedocumene on fiber	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,
1.2.3.2	Study effects of psuedocumene on PVC	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,
1.2.3.3	Study effects of psuedocumene on glue joints	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,50.00,
1.2.3.4	Continue accelerated aging studies - value engineering - 1HFY07	123d	02Oct06	30Mar07	1.2.3.3[FS]	L.IU.PD.TECH.MT_W,125.00,;L.IU.PD.SCI.PHY,15.00,
1.2.3.5	Continue accelerated aging studies - value engineering - 2HFY07	127d	02Apr07	28Sep07	1.2.3.4[FS]	L.IU.PD.TECH.MT_W,125.00,;L.IU.PD.SCI.PHY,15.00,
1.2.4	**Scintillator Production Method Studies**	**501d**	**03Oct05**	**28Sep07**		
1.2.4.1	Study mixing methods for waveshifters and pseudocumene - FY06	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,40.00,
1.2.4.2	Study mixing methods for waveshifters and pseudocumene - 1HFY07	123d	02Oct06	30Mar07	1.2.4.1[FS]	L.IU.PD.SCI.PHY,10.00,
1.2.4.3	Study mixing methods for waveshifters and pseudocumene - 2HFY07	127d	02Apr07	28Sep07	1.2.4.2[FS]	L.IU.PD.SCI.PHY,10.00,
1.2.4.4	Study mixing methods for fluor (pre) mix with mineral oil - FY06	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,40.00,
1.2.4.5	Study mixing methods for fluor (pre) mix with mineral oil - 1HFY07	123d	02Oct06	30Mar07	1.2.4.4[FS]	L.IU.PD.SCI.PHY,10.00,
1.2.4.6	Study mixing methods for fluor (pre) mix with mineral oil - 2HFY07	127d	02Apr07	28Sep07	1.2.4.5[FS]	L.IU.PD.SCI.PHY,10.00,
1.2.5	**Development of QC Methods**	**501d**	**03Oct05**	**28Sep07**		
1.2.5.1	**Procedures**	**501d**	**03Oct05**	**28Sep07**		
1.2.5.1.1	Develop test procedures for mineral oil delivered from vendor - FY06	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,40.00,
1.2.5.1.2	Develop test procedures for psuedocumene delivered from vendor	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,40.00,
1.2.5.1.3	Develop test procedures for waveshifters delivered from vendor	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,40.00,
1.2.5.1.4	Develop test procedures for mixed scintillator at mixing facility	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,40.00,
1.2.5.1.5	Develop test procedures for mixed scintillator delivered to far detector site	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,40.00,
1.2.5.1.6	Continue QC procedure development - value engineering - 1HFY07	123d	02Oct06	30Mar07	1.2.5.1.1[FS]; 1.2.5.1.4[FS]; 1.2.5.1.3[FS]; 1.2.5.1.2[FS]; 1.2.5.1.5[FS]	L.IU.PD.SCI.PHY,20.00,;L.IU.PD.TECH.MT_W,125.00,

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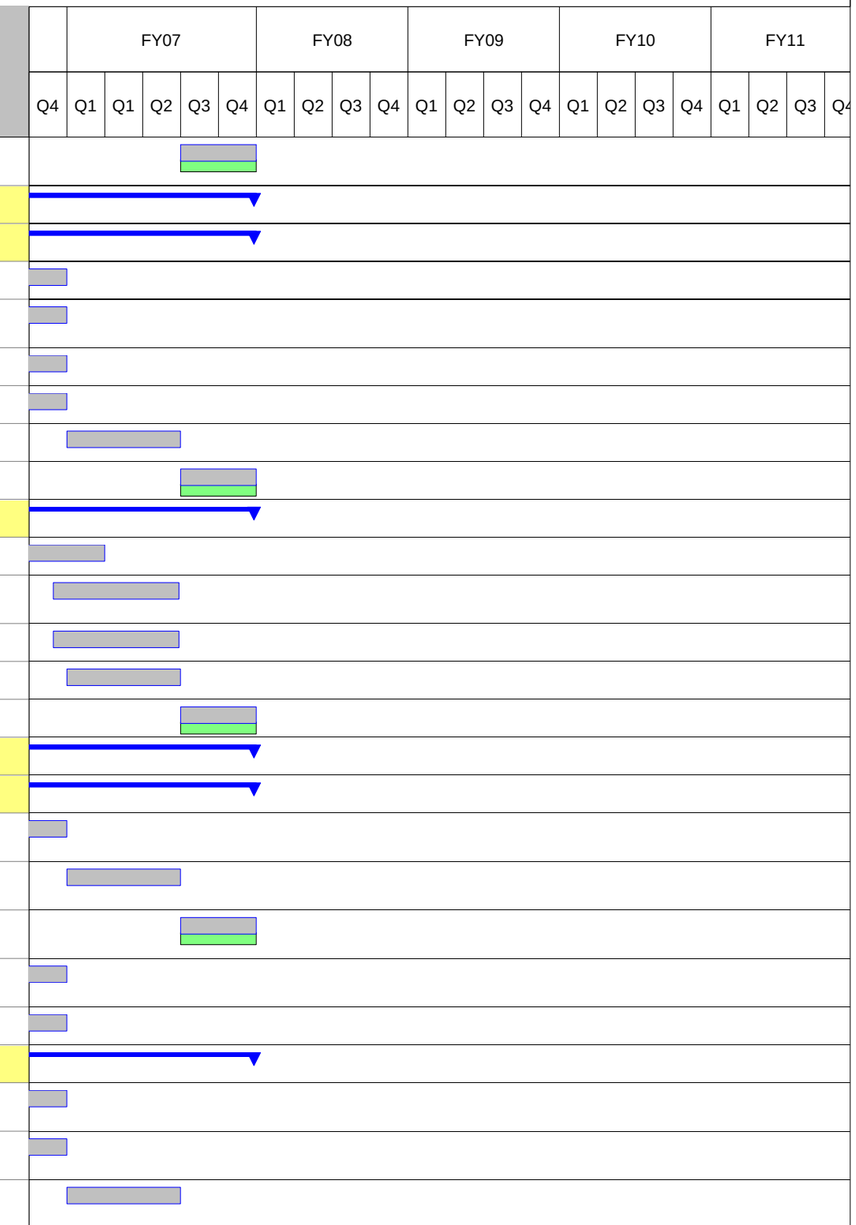
1.2.5.1.7	Continue QC procedure development - value engineering - 2HFY07	127d	02Apr07	28Sep07	1.2.5.1.6[FS]	L.IU.PD.SCI.PHY,20.00,;L.IU.PD.TECH.MT_W,125.00,
1.2.5.2	**QC Hardware Development**	**501d**	**03Oct05**	**28Sep07**		
1.2.5.2.1	**QC Hardware Development - IU**	**501d**	**03Oct05**	**28Sep07**		
1.2.5.2.1.1	Design	251d	03Oct05	29Sep06		L.IU.PD.SCI.PHY,220.00,
1.2.5.2.1.2	Procure	231d	31Oct05	29Sep06	1.2.5.2.1.1[SS+20d]	M.IU.PD.MANDSPASS,35000.00,;L.IU.PD.TECH.MT_W,132.00,
1.2.5.2.1.3	Fabricate	231d	31Oct05	29Sep06	1.2.5.2.1.2[SS]	L.IU.PD.TECH.MT_W,132.00,
1.2.5.2.1.4	Evaluate - FY06	231d	31Oct05	29Sep06	1.2.5.2.1.3[SS]	L.IU.PD.TECH.MT_W,132.00,
1.2.5.2.1.5	Evaluate - 1HFY07	123d	02Oct06	30Mar07	1.2.5.2.1.4[FS]	L.IU.PD.TECH.MT_W,64.00,
1.2.5.2.1.6	Evaluate - 2HFY08	127d	02Apr07	28Sep07	1.2.5.2.1.5[FS]	L.IU.PD.TECH.MT_W,64.00,
1.2.5.2.2	**QC Hardware Development - SMU**	**440d**	**03Jan06**	**28Sep07**		
1.2.5.2.2.1	Design	250d	03Jan06	28Dec06		L.SMU.PD.SCI.PHY,100.00,
1.2.5.2.2.2	Procure	140d	01Sep06	27Mar07	1.2.5.2.2.1[SS+20d]	L.SMU.PD.SCI.PHY,32.00,;M.SMU.PD.MANDS,13500.00,
1.2.5.2.2.3	Fabricate	140d	01Sep06	27Mar07	1.2.5.2.2.2[SS]	L.SMU.PD.SCI.PHY,100.00,
1.2.5.2.2.4	Evaluate-1HFY07	123d	02Oct06	30Mar07	1.2.5.2.2.3[SS+20d]	L.SMU.PD.SCI.PHY,100.00,
1.2.5.2.2.5	Evaluate-2HFY07	127d	02Apr07	28Sep07	1.2.5.2.2.4[FS]	L.SMU.PD.SCI.PHY,100.00,
1.2.6	**Scintillator Transportation Studies**	**501d**	**03Oct05**	**28Sep07**		
1.2.6.1	**Studies of Transport to Mixing Facility**	**501d**	**03Oct05**	**28Sep07**		
1.2.6.1.1	Study transport of mineral oil to mixing facility - FY06	251d	03Oct05	29Sep06		L.FNAL.PPD.SCI.PHY,40.00,
1.2.6.1.2	Study transport of mineral oil to mixing facility - 1HFY07	123d	02Oct06	30Mar07	1.2.6.1.1[FS]	L.FNAL.PPD.TECH.MT_M,125.00,
1.2.6.1.3	Study transport of mineral oil to mixing facility - 2HFY07	127d	02Apr07	28Sep07	1.2.6.1.2[FS]	L.FNAL.PPD.TECH.MT_M,125.00,
1.2.6.1.4	Study transport of psuedocumene to mixing facility FY06 -	251d	03Oct05	29Sep06		L.FNAL.PPD.SCI.PHY,40.00,
1.2.6.1.5	Study transport of fluors to mixing facility - FY06	251d	03Oct05	29Sep06		L.FNAL.PPD.SCI.PHY,40.00,
1.2.6.2	**Studies of Transport to Detector Sites**	**501d**	**03Oct05**	**28Sep07**		
1.2.6.2.1	Study transport methods to near detector site - FY06	251d	03Oct05	29Sep06		L.FNAL.PPD.SCI.PHY,40.00,
1.2.6.2.3	Study transport methods to far detector site - FY06	251d	03Oct05	29Sep06		L.FNAL.PPD.SCI.PHY,40.00,
1.2.6.2.4	Study transport methods to far detector site - 1HFY07	123d	02Oct06	30Mar07	1.2.6.2.3[FS]	L.FNAL.PPD.TECH.MT_M,125.00,



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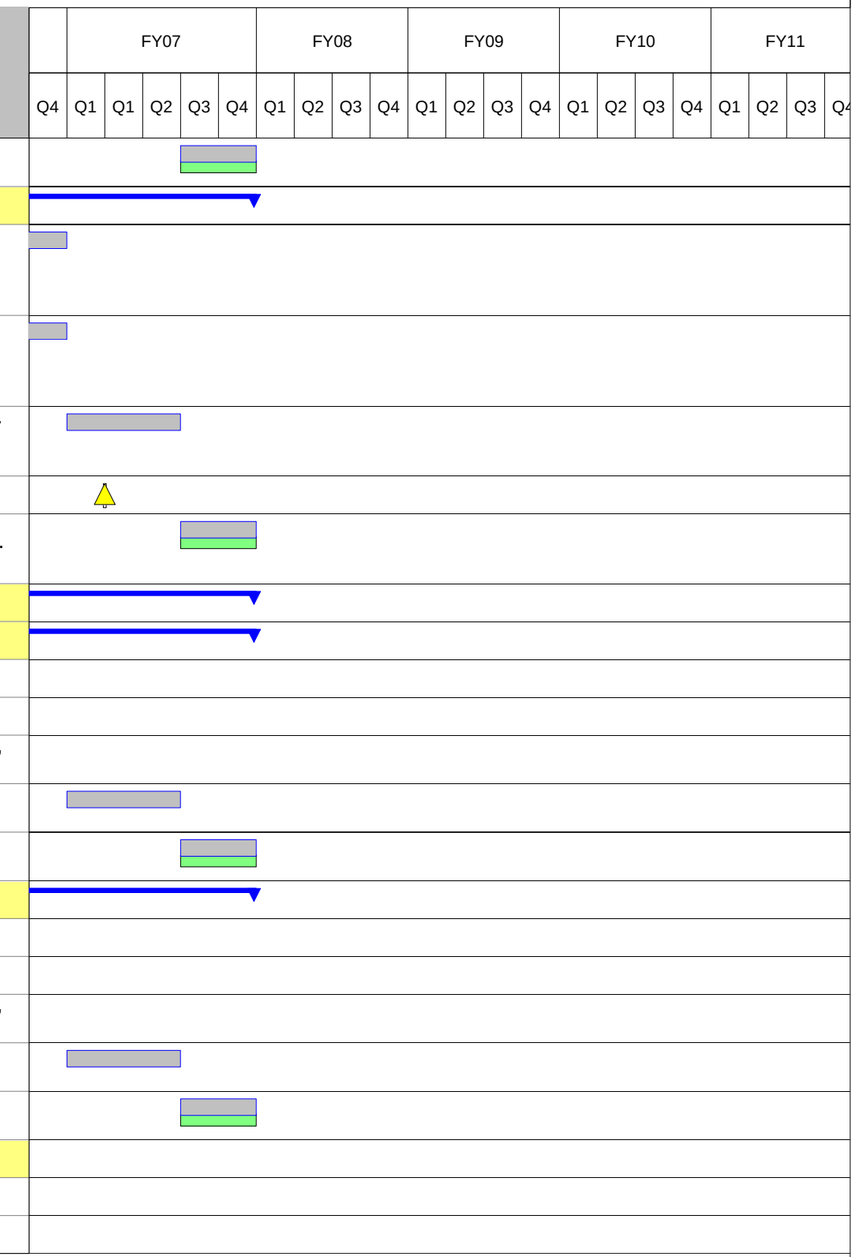
1.2.6.2.5	Study transport methods to far detector site - 2HFY07	127d	02Apr07	28Sep07	1.2.6.2.4[FS]	L.FNAL.PPD.TECH.MT_M,125.00,
1.2.7	**Blending Investigations**	**501d**	**03Oct05**	**28Sep07**		
1.2.7.1	Investigate toll blenders - FY06	251d	03Oct05	29Sep06		M.FNAL.PPD.MANDS,10000.00,;L.FNAL.PPD.MNG.PE,40.00,;L.FNAL.PPD.MNG.PM,40.00,;L.IU.PD.SCI.PHY,120.00,;L.FNAL.PPD.MNG.DPM,40.00,;L.FNAL.PPD.MNG.PC,40.00,
1.2.7.2	Investigate in-house blending option - FY06	251d	03Oct05	29Sep06		L.FNAL.PPD.MNG.DPM,80.00,;M.FNAL.PPD.MANDS,2000.00,;L.FNAL.PPD.MNG.PM,40.00,;L.FNAL.PPD.MNG.PC,40.00,;L.IU.PD.SCI.PHY,40.00,;L.FNAL.PPD.MNG.PE,40.00,
1.2.7.3	Continue blending option investigations - 1HFY07	123d	02Oct06	30Mar07	1.2.7.2[FS]; 1.2.7.1[FS]	L.IU.PD.SCI.PHY,20.00,;L.FNAL.PPD.MNG.DPM,20.00,;L.FNAL.PPD.MNG.PM,20.00,;L.FNAL.PPD.MNG.PE,20.00,;L.FNAL.PPD.MNG.PC,20.00,
1.2.7.4	Baseline blending option selected	0	28Dec06	28Dec06	1.2.7.3[SS+60d]	
1.2.7.5	Continue blending option investigations - 2HFY07	127d	02Apr07	28Sep07	1.2.7.4[FS]; 1.2.7.3[FS]	L.FNAL.PPD.MNG.PC,20.00,;L.IU.PD.SCI.PHY,20.00,;L.FNAL.PPD.MNG.PE,20.00,;L.FNAL.PPD.MNG.PM,20.00,;L.FNAL.PPD.MNG.DPM,20.00,
1.2.8	**Component Aquisition Investigations**	**501d**	**03Oct05**	**28Sep07**		
1.2.8.1	**Mineral Oil Vendors**	**501d**	**03Oct05**	**28Sep07**		
1.2.8.1.1	Investigate mineral oil vendors	26d	03Oct05	07Nov05		L.IU.PD.SCI.PHY,24.00,
1.2.8.1.2	Prepare and issue RFP for mineral oil	20d	08Nov05	07Dec05	1.2.8.1.1[FS]	L.IU.PD.SCI.PHY,24.00,
1.2.8.1.3	Evaluate vendor proposals for mineral oil	10d	10Jan06	24Jan06	1.2.8.1.2[FS+20d]	L.FNAL.PPD.SCI.PHY,16.00,;L.IU.PD.SCI.PHY,8.00,
1.2.8.1.4	Continue investigation of mineral oil vendors for production - 1HFY07	123d	02Oct06	30Mar07	1.2.8.1.3[FS]	L.IU.PD.SCI.PHY,48.00,
1.2.8.1.5	Continue investigation of mineral oil vendors for production - 2HFY07	127d	02Apr07	28Sep07	1.2.8.1.4[FS]	L.IU.PD.SCI.PHY,48.00,
1.2.8.2	**Pseudocumene Vendors**	**501d**	**03Oct05**	**28Sep07**		
1.2.8.2.1	Investigate pseudocumene vendors	26d	03Oct05	07Nov05		L.IU.PD.SCI.PHY,24.00,
1.2.8.2.2	Prepare and issue RFP for pseudocumene	20d	08Nov05	07Dec05	1.2.8.2.1[FS]	L.IU.PD.SCI.PHY,24.00,
1.2.8.2.3	Evaluate vendor proposals for pseudocumene	10d	10Jan06	24Jan06	1.2.8.2.2[FS+20d]	L.FNAL.PPD.SCI.PHY,16.00,;L.IU.PD.SCI.PHY,8.00,
1.2.8.2.4	Continue investigation of pseudocumene vendors for production - 1HFY07	123d	02Oct06	30Mar07	1.2.8.2.3[FS]	L.IU.PD.SCI.PHY,16.00,
1.2.8.2.5	Continue investigation of pseudocumene vendors for production - 2HFY07	127d	02Apr07	28Sep07	1.2.8.2.4[FS]	L.IU.PD.SCI.PHY,16.00,
1.2.8.3	**Waveshifter Vendors**	**76d**	**03Oct05**	**24Jan06**		
1.2.8.3.1	Investigate waveshifter vendors	26d	03Oct05	07Nov05		L.IU.PD.SCI.PHY,24.00,
1.2.8.3.2	Prepare and issue RFP for waveshifters	20d	08Nov05	07Dec05	1.2.8.3.1[FS]	L.IU.PD.SCI.PHY,24.00,



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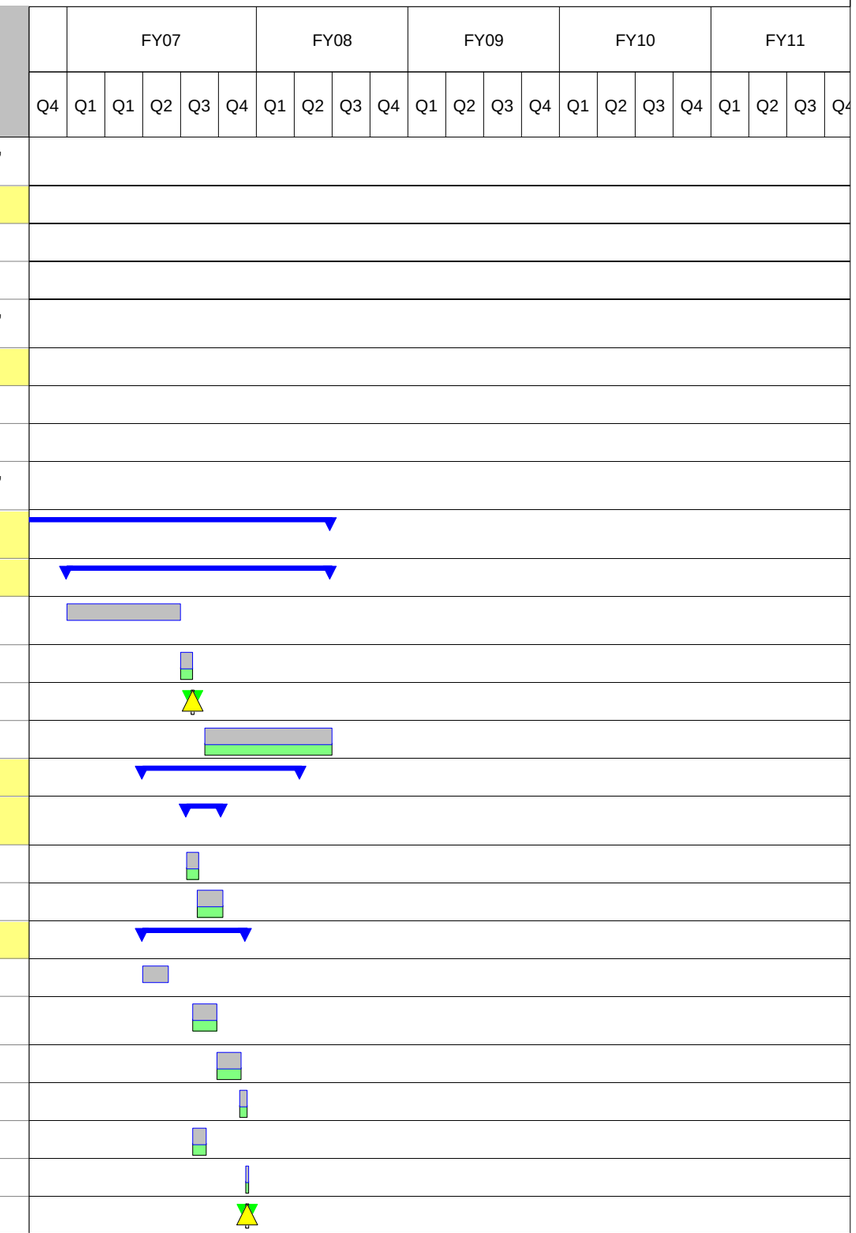
1.2.8.3.3	Evaluate vendor proposals for waveshifters	10d	10Jan06	24Jan06	1.2.8.3.2[FS+20d]	L.IU.PD.SCI.PHY,8.00,;L.FNAL.PPD.SCI.PHY,16.00,
1.2.8.4	**Premix Vendors**	**76d**	**03Oct05**	**24Jan06**		
1.2.8.4.1	Investigate premixed fluor vendors	26d	03Oct05	07Nov05		L.IU.PD.SCI.PHY,24.00,
1.2.8.4.2	Prepare and issue RFP for premixed fluors	20d	08Nov05	07Dec05	1.2.8.4.1[FS]	L.IU.PD.SCI.PHY,24.00,
1.2.8.4.3	Evaluate vendor proposals for premixed fluors	10d	10Jan06	24Jan06	1.2.8.4.2[FS+20d]	L.FNAL.PPD.SCI.PHY,16.00,;L.IU.PD.SCI.PHY,8.00,
1.2.8.5	**Complete Scintillator Vendors**	**76d**	**03Oct05**	**24Jan06**		
1.2.8.5.1	Investigate scintillator vendors	26d	03Oct05	07Nov05		L.IU.PD.SCI.PHY,24.00,
1.2.8.5.3	Prepare and issue RFP for scintillator	20d	08Nov05	07Dec05	1.2.8.5.1[FS]	L.IU.PD.SCI.PHY,24.00,
1.2.8.5.4	Evaluate vendor proposals for scintillator	10d	10Jan06	24Jan06	1.2.8.5.3[FS+20d]	L.IU.PD.SCI.PHY,8.00,;L.FNAL.PPD.SCI.PHY,16.00,
1.2.9	**Integration Prototype Detector Scintillator Production**	**548d**	**25Jan06**	**28Mar08**		
1.2.9.1	**ISO Tanks**	**373d**	**02Oct06**	**28Mar08**		
1.2.9.1.1	Investigate tank vendors	123d	02Oct06	30Mar07		L.IU.PD.SCI.PHY,8.00,;L.FNAL.PPD.TECH.MT_M,8.00,
1.2.9.1.2	Prepare purchase req and PO	20d	02Apr07	27Apr07	1.2.9.1.1[FS]	L.FNAL.PPD.TECH.MT_M,8.00,
1.2.9.1.3	PO issued for ISO tanks	0	27Apr07	27Apr07	1.2.9.1.2[FS]	
1.2.9.1.4	ISO tanks delivery and leasing	210d	29May07	28Mar08	1.2.9.1.3[FS+20d]	M.FNAL.PPD.MANDS,34280.00,
1.2.9.2	**Infrastructure**	**262d**	**02Jan07**	**16Jan08**		
1.2.9.2.1	**Secondary Containment For Blending Facility**	**60d**	**16Apr07**	**10Jul07**		
1.2.9.2.1.1	Purchase secondary containment	20d	16Apr07	11May07	1.2.9.1.4[SS-30d]	M.FNAL.PPD.MANDS,28000.00,
1.2.9.2.1.2	Set up and install secondary containment	40d	14May07	10Jul07	1.2.9.2.1.1[FS]	L.FNAL.PPD.TECH.MT_W,80.00,
1.2.9.2.2	**Blending System**	**174d**	**02Jan07**	**06Sep07**		
1.2.9.2.2.1	Design IPND blending system	40d	02Jan07	27Feb07		M.FNAL.PPD.MANDS,15000.00,
1.2.9.2.2.2	Procure blending system parts (pumps, hoses, instrumentation, scales)	40d	01May07	26Jun07	1.2.9.2.2.1[FS]	M.FNAL.PPD.MANDS,40000.00,
1.2.9.2.2.3	Assemble blending system	40d	27Jun07	22Aug07	1.2.9.2.2.2[FS]	L.FNAL.PPD.TECH.MT_W,48.00,
1.2.9.2.2.4	Electrical hook-up of blending system	10d	23Aug07	06Sep07	1.2.9.2.2.3[FS]	M.FNAL.PPD.MANDS,800.00,
1.2.9.2.3	Procure fire protection equipment	20d	01May07	29May07	1.2.9.2.2.2[SS]	M.FNAL.PPD.MANDS,500.00,
1.2.9.2.5	Commission blending system	1d	07Sep07	07Sep07	1.2.9.2.2.4[FS]; 1.2.9.2.3[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.2.6	Prototype blending system facility completed	0	07Sep07	07Sep07	1.2.9.2.5[FS]	



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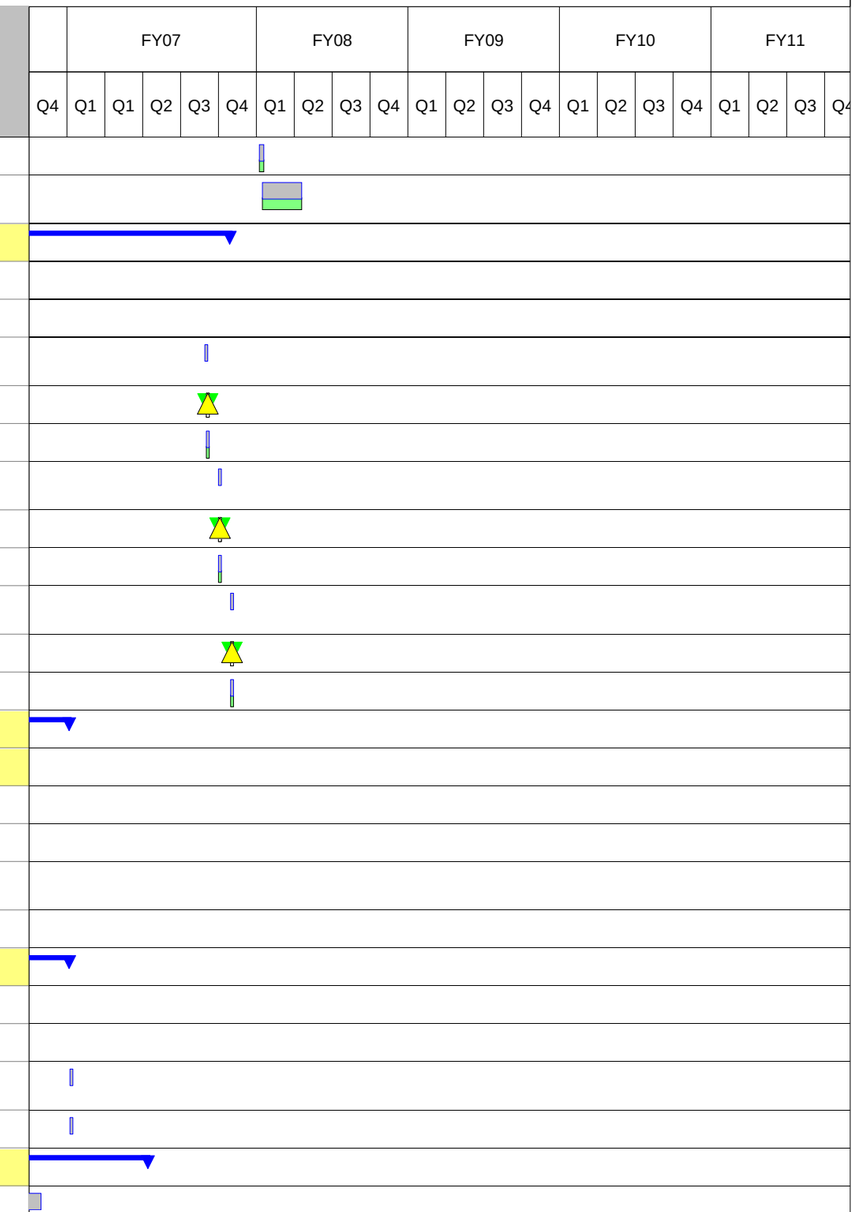
1.2.9.2.7	Decommission prototype blending infrastructure	5d	10Oct07	16Oct07	1.2.9.6.11[FS]	L.FNAL.PPD.TECH.MT_W,16.00,
1.2.9.2.8	Prepare specifications for production blending facility	60d	17Oct07	16Jan08	1.2.9.2.7[FS]; 1.2.9.2.2.1[FS]	
1.2.9.3	**Mineral Oil**	**385d**	**25Jan06**	**02Aug07**		
1.2.9.3.3	Prepare purchase req and PO	40d	25Jan06	21Mar06	1.2.8.1.3[FS]	
1.2.9.3.4	Mineral oil PO issued	0	21Mar06	21Mar06	1.2.9.3.3[FS]	
1.2.9.3.5	Deliver batch 1	1d	01Jun07	01Jun07	1.2.9.3.4[FS]	L.FNAL.PPD.TECH.MT_W,8.00,;M.FNAL.PPD.MANDS,31640.00,
1.2.9.3.6	Mineral oil batch 1 for IPND delivered	0	01Jun07	01Jun07	1.2.9.3.5[FS]	
1.2.9.3.7	QC batch 1	1d	04Jun07	04Jun07	1.2.9.3.6[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.3.8	Deliver batch 2	1d	02Jul07	02Jul07	1.2.9.3.5[FS+20d]	M.FNAL.PPD.MANDS,31640.00,;L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.3.9	Mineral oil batch 2 for IPND delivered	0	02Jul07	02Jul07	1.2.9.3.8[FS]	
1.2.9.3.10	QC batch 2	1d	03Jul07	03Jul07	1.2.9.3.7[FS]; 1.2.9.3.9[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.3.11	Deliver batch 3	1d	01Aug07	01Aug07	1.2.9.3.8[FS+20d]	L.FNAL.PPD.TECH.MT_W,8.00,;M.FNAL.PPD.MANDS,12747.00,
1.2.9.3.12	Mineral oil batch 3 for IPND delivered	0	01Aug07	01Aug07	1.2.9.3.11[FS]	
1.2.9.3.13	QC batch 3	1d	02Aug07	02Aug07	1.2.9.3.10[FS]; 1.2.9.3.12[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.4	**Pseudocumene**	**182d**	**25Jan06**	**10Oct06**		
1.2.9.4.1	**Pseudocumene- vendor 1**	**77d**	**25Jan06**	**11May06**		
1.2.9.4.1.1	Prepare purchase req and PO	70d	25Jan06	02May06	1.2.8.2.3[FS]	L.IU.PD.SCI.PHY,8.00,;L.FNAL.PPD.MNG.PC,8.00,
1.2.9.4.1.2	Pseudocumene PO issued	0	02May06	02May06	1.2.9.4.1.1[FS]	
1.2.9.4.1.3	Deliver pseudocumene	1d	10May06	10May06	1.2.9.4.1.2[FS+5d]	L.FNAL.PPD.TECH.MT_W,16.00,;M.FNAL.PPD.MANDS,10224.00,
1.2.9.4.1.4	QC pseudocumene	1d	11May06	11May06	1.2.9.4.1.3[FS]	L.FNAL.PPD.TECH.MT_W,1.00,
1.2.9.4.2	**Pseudocumene- vendor 2**	**182d**	**25Jan06**	**10Oct06**		
1.2.9.4.2.1	Prepare purchase req and PO	100d	25Jan06	14Jun06	1.2.8.2.3[FS]	L.FNAL.PPD.MNG.PC,8.00,;L.IU.PD.SCI.PHY,8.00,
1.2.9.4.2.2	Pseudocumene PO issued	0	14Jun06	14Jun06	1.2.9.4.2.1[FS]	
1.2.9.4.2.3	Deliver pseudocumene	1d	09Oct06	09Oct06	1.2.9.4.2.2[FS+80d]	M.FNAL.PPD.MANDS,10224.00,;L.FNAL.PPD.TECH.MT_W,16.00,
1.2.9.4.2.4	QC pseudocumene	1d	10Oct06	10Oct06	1.2.9.4.2.3[FS]	L.FNAL.PPD.TECH.MT_W,1.00,
1.2.9.5	**Waveshifters**	**246d**	**25Jan06**	**17Jan07**		
1.2.9.5.1	Prepare purchase req and PO	130d	25Jan06	27Jul06	1.2.8.3.3[FS]	L.IU.PD.SCI.PHY,8.00,;L.FNAL.PPD.MNG.PC,8.00,



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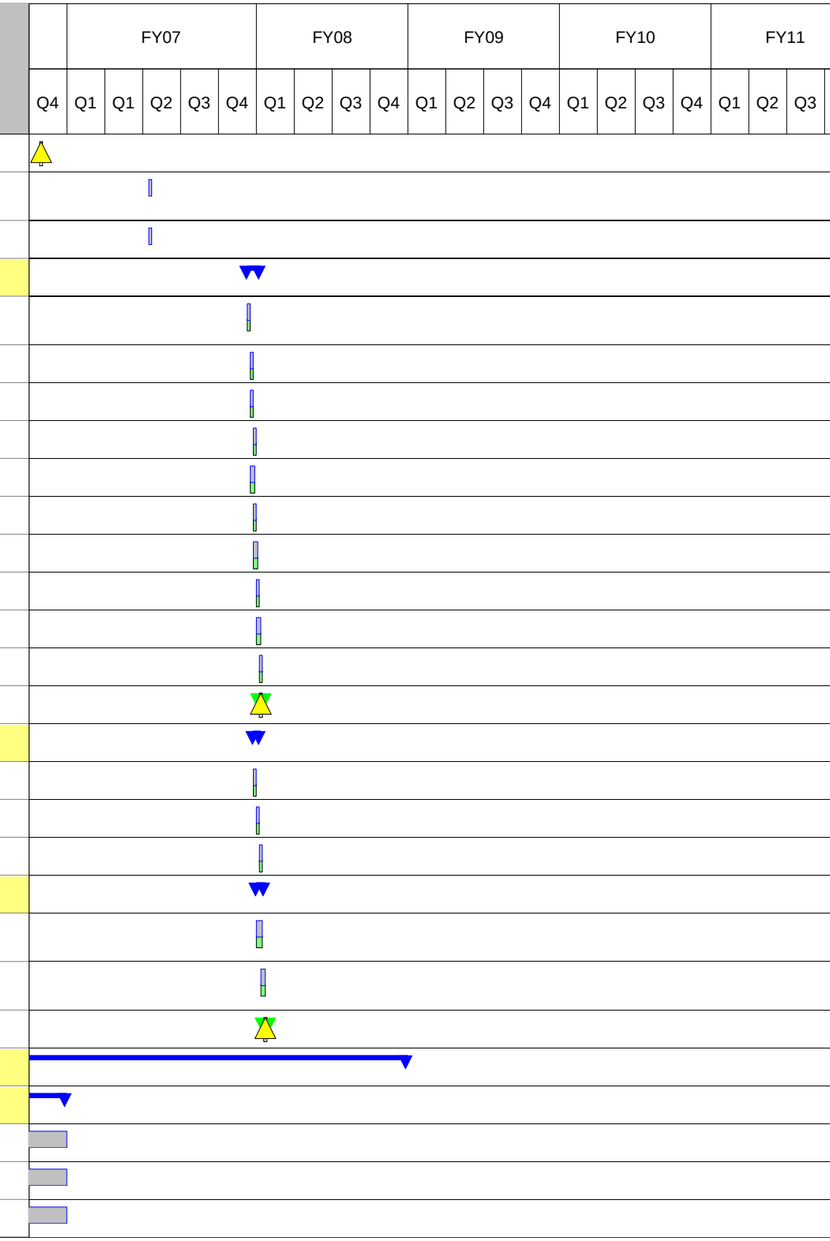
1.2.9.5.2	Waveshifter PO issued	0	27Jul06	27Jul06	1.2.9.5.1[FS]	
1.2.9.5.3	Deliver waveshifters	1d	16Jan07	16Jan07	1.2.9.5.2[FS]	L.FNAL.PPD.TECH.MT_W,4.00,;M.FNAL.PPD.MANDS,14200.00,
1.2.9.5.4	QC waveshifters	1d	17Jan07	17Jan07	1.2.9.5.3[FS]	L.FNAL.PPD.TECH.MT_W,4.00,
1.2.9.6	**Blending**	**22d**	**10Sep07**	**09Oct07**		
1.2.9.6.1	Blend psuedocumene and waveshifters-batch 1	5d	10Sep07	14Sep07	1.2.9.5.4[FS]; 1.2.9.4.1.4[FS]; 1.2.9.2.6[FS]	L.FNAL.PPD.TECH.MT_W,16.00,
1.2.9.6.2	QC fluor blend-batch 1	1d	17Sep07	17Sep07	1.2.9.6.1[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.6.3	Blend psuedocumene and waveshifters-batch 2	5d	17Sep07	21Sep07	1.2.9.6.1[FS]; 1.2.9.4.1.4[FS]	L.FNAL.PPD.TECH.MT_W,16.00,
1.2.9.6.4	QC fluor blend-batch 2	1d	24Sep07	24Sep07	1.2.9.6.2[FS]; 1.2.9.6.3[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.6.5	Blend mineral oil with fluor blend-batch 1	5d	18Sep07	24Sep07	1.2.9.6.2[FS]; 1.2.9.3.7[FS]	L.FNAL.PPD.TECH.MT_W,16.00,
1.2.9.6.6	QC scintillator blend-batch 1	1d	25Sep07	25Sep07	1.2.9.6.5[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.6.7	Blend mineral oil with fluor blend-batch 2	5d	25Sep07	01Oct07	1.2.9.3.10[FS]; 1.2.9.6.4[FS]	L.FNAL.PPD.TECH.MT_W,16.00,
1.2.9.6.8	QC scintillator blend-batch 2	1d	02Oct07	02Oct07	1.2.9.6.6[FS]; 1.2.9.6.7[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.6.9	Blend mineral oil with fluor blend-batch 3	5d	02Oct07	08Oct07	1.2.9.6.7[FS]; 1.2.9.3.13[FS]	L.FNAL.PPD.TECH.MT_W,16.00,
1.2.9.6.10	QC scintillator blend-batch 3	1d	09Oct07	09Oct07	1.2.9.6.8[FS]; 1.2.9.6.9[FS]	L.FNAL.PPD.TECH.MT_W,8.00,
1.2.9.6.11	Prototype scintillator production completed	0	09Oct07	09Oct07	1.2.9.6.10[FS]	
1.2.9.7	**Transport**	**11d**	**26Sep07**	**10Oct07**		
1.2.9.7.1	Batch 1 to integration prototype site	1d	26Sep07	26Sep07	1.2.9.6.6[FS]	L.FNAL.PPD.TECH.MT_W,4.00,
1.2.9.7.2	Batch 2 to integration prototype site	1d	03Oct07	03Oct07	1.2.9.6.8[FS]; 1.2.9.7.1[FS]	L.FNAL.PPD.TECH.MT_W,4.00,
1.2.9.7.3	Batch 3 to integration prototype site	1d	10Oct07	10Oct07	1.2.9.6.10[FS]; 1.2.9.7.2[FS]	L.FNAL.PPD.TECH.MT_W,2.00,
1.2.10	**Production Scintillator Specifications**	**15d**	**01Oct07**	**19Oct07**		
1.2.10.1	Evaluate R&D results	10d	01Oct07	12Oct07	1.2.3[FS]; 1.2.2[FS]; 1.2.7[FS]; 1.2.5[FS]; 1.2.6[FS]; 1.2.4[FS]	
1.2.10.2	Prepare final specifications document for production scintillator	5d	15Oct07	19Oct07	1.2.10.1[FS]	
1.2.10.3	Liquid scintillator final specifications completed	0	19Oct07	19Oct07	1.2.10.2[FS]	
1.2.11	**Management - R&D Phase**	**752d**	**03Oct05**	**29Sep08**		
1.2.11.1	**FY06**	**250d**	**03Oct05**	**28Sep06**		
1.2.11.1.1	Labor	250d	03Oct05	28Sep06		L.IU.PD.SCI.PHY,200.00,
1.2.11.1.2	Travel	250d	03Oct05	28Sep06		
1.2.11.1.3	Equipment	250d	03Oct05	28Sep06		



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1.2.11.1.4	Materials and supplies	250d	03Oct05	28Sep06		
1.2.11.2	**FY07**	**250d**	**02Oct06**	**28Sep07**		
1.2.11.2.1	**1HFY07**	**123d**	**02Oct06**	**30Mar07**		
1.2.11.2.1.1	Labor	123d	02Oct06	30Mar07		L.IU.PD.SCI.PHY,100.00,
1.2.11.2.1.2	Travel	123d	02Oct06	30Mar07		
1.2.11.2.1.3	Equipment	123d	02Oct06	30Mar07		
1.2.11.2.1.4	Materials and supplies	123d	02Oct06	30Mar07		
1.2.11.2.2	**2HFY07**	**127d**	**02Apr07**	**28Sep07**		
1.2.11.2.2.1	Labor	127d	02Apr07	28Sep07		L.IU.PD.SCI.PHY,100.00,
1.2.11.2.2.2	Travel	127d	02Apr07	28Sep07		
1.2.11.2.2.3	Equipment	127d	02Apr07	28Sep07		
1.2.11.2.2.4	Materials and supplies	127d	02Apr07	28Sep07		
1.2.11.3	**FY08**	**251d**	**01Oct07**	**29Sep08**		
1.2.11.3.1	Labor	251d	01Oct07	29Sep08		
1.2.11.3.2	Travel	251d	01Oct07	29Sep08		
1.2.11.3.3	Equipment	251d	01Oct07	29Sep08		
1.2.11.3.4	Materials and supplies	251d	01Oct07	29Sep08		
1.2.11.4	FY06 Liquid Scintillator R&D	250d	03Oct05	28Sep06		
1.2.11.5	FY07 Liquid Scintillator R&D	127d	02Apr07	28Sep07		
1.3	**Wave-Length-Shifting Fiber R&D**	**752d**	**03Oct05**	**29Sep08**		
1.3.1	Requirements	1d	03Oct05	03Oct05		
1.3.2	**Vendor Investigations**	**581d**	**03Oct05**	**29Jan08**		
1.3.2.1	Identify possible production vendors and establish corporate contacts	40d	03Oct05	29Nov05		L.MSU.PD.SCI.PHY,40.00,;L.FNAL.PPD.SCI.PHY,40.00,
1.3.2.2	Determine vendor qualifications and capabilities	150d	30Nov05	05Jul06	1.3.2.1[FS]	L.FNAL.PPD.SCI.PHY,40.00,;L.MSU.PD.SCI.PHY,40.00,
1.3.2.3	Work with vendors to achieve requirements - FY06	150d	01Mar06	29Sep06		L.FNAL.PPD.SCI.PHY,40.00,;L.MSU.PD.SCI.PHY,40.00,
1.3.2.4	Work with vendors to achieve requirements - 1HFY07	123d	02Oct06	30Mar07	1.3.2.3[FS]	L.MSU.PD.SCI.PHY,20.00,;L.FNAL.PPD.SCI.PHY,20.00,
1.3.2.5	Work with vendors to achieve requirements - 2HFY07	127d	02Apr07	28Sep07	1.3.2.4[FS]	L.FNAL.PPD.SCI.PHY,20.00,;L.MSU.PD.SCI.PHY,20.00,

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1.3.2.6	Work with vendors to achieve requirements - FY08	60d	01Oct07	27Dec07	1.3.2.5[FS]	L.FNAL.PPD.SCI.PHY,10.00,;L.MSU.PD.SCI.PHY,10.00,
1.3.2.7	Coordinate sample fiber procurements - FY06	140d	15Mar06	29Sep06	1.3.2.3[SS+10d]	L.FNAL.PPD.TECH.MT_W,80.00,;L.MSU.PD.TECH.MT_W,80.00,
1.3.2.8	Coordinate sample fiber procurements - 1HFY07	123d	02Oct06	30Mar07	1.3.2.7[FS]	L.FNAL.PPD.TECH.MT_W,40.00,;L.MSU.PD.TECH.MT_W,40.00,
1.3.2.9	Coordinate sample fiber procurements - 2HFY07	127d	02Apr07	28Sep07	1.3.2.8[FS]	L.FNAL.PPD.TECH.MT_W,40.00,;L.MSU.PD.TECH.MT_W,40.00,
1.3.2.10	Document vendor interactions and performance	20d	28Dec07	29Jan08	1.3.2.6[FS]; 1.3.2.9[FS]	L.MSU.PD.SCI.PHY,40.00,
1.3.3	**WLS Fiber Optimization Studies**	**416d**	**15Mar06**	**05Nov07**		
1.3.3.1	**R&D Fiber Procurement**	**390d**	**15Mar06**	**28Sep07**		
1.3.3.1.1	Procure fiber for R&D - FY06	140d	15Mar06	29Sep06	1.3.2.7[SS]	M.FNAL.PPD.MANDS,10000.00,;L.FNAL.PPD.SCI.PHY,40.00,
1.3.3.1.2	Procure fiber for R&D - 1HFY07	123d	02Oct06	30Mar07	1.3.3.1.1[FS]	M.FNAL.PPD.MANDS,15000.00,;L.FNAL.PPD.SCI.PHY,40.00,
1.3.3.1.3	Procure fiber for R&D - 2HFY07	127d	02Apr07	28Sep07	1.3.3.1.2[FS]	L.FNAL.PPD.SCI.PHY,40.00,;M.FNAL.PPD.MANDS,5000.00,
1.3.3.2	**Diameter Constraints**	**308d**	**15Mar06**	**04Jun07**		
1.3.3.2.1	Define fiber samples needed (coordinate with vendor manager)	5d	15Mar06	21Mar06	1.3.3.1.1[SS]	L.UCLA.PD.SCI.PHY,20.00,
1.3.3.2.2	Define tests and equipment	5d	15Mar06	21Mar06	1.3.3.2.1[SS]	L.UCLA.PD.SCI.PHY,20.00,
1.3.3.2.3	Procure test equipment	195d	22Mar06	28Dec06	1.3.3.2.2[FS]	M.UCLA.PD.MANDSPASS,10000.00,;L.UCLA.PD.SCI.PHY,16.00,
1.3.3.2.4	Setup test equipment	178d	14Jul06	30Mar07	1.3.3.2.3[SS+80d]	L.UCLA.PD.TECH.MT_M,160.00,;L.UCLA.PD.TECH.UGRAD,160.00,
1.3.3.2.5	Determine allowable bend radius of fiber samples	40d	02Apr07	25May07	1.3.3.2.1[FS]; 1.3.3.1.1[SS+80d]; 1.3.3.2.4[FS]	L.UCLA.PD.TECH.UGRAD,80.00,;L.UCLA.PD.TECH.MT_M,80.00,
1.3.3.2.6	Investigate mitigation methods	10d	02Apr07	13Apr07	1.3.3.2.5[SS]	L.UCLA.PD.TECH.UGRAD,80.00,;L.UCLA.PD.TECH.MT_M,80.00,
1.3.3.2.7	Document test results	5d	29May07	04Jun07	1.3.3.2.5[FS]; 1.3.3.2.6[FS]	L.UCLA.PD.SCI.PHY,20.00,
1.3.3.3	**Fluorescent Dye and Concentration Studies**	**416d**	**15Mar06**	**05Nov07**		
1.3.3.3.1	**Fluorescent Dye and Concentration Studies - MSU**	**416d**	**15Mar06**	**05Nov07**		
1.3.3.3.1.1	Define WLS dye type, concentration tests, and equipment	5d	15Mar06	21Mar06	1.3.3.1.1[SS]	L.MSU.PD.SCI.PHY,20.00,
1.3.3.3.1.2	Define fiber samples needed (coordinate with vendor manager)	5d	15Mar06	21Mar06	1.3.3.1.1[SS]	L.MSU.PD.SCI.PHY,20.00,
1.3.3.3.1.3	**Phase 1 - MSU**	**198d**	**22Mar06**	**04Jan07**		
1.3.3.3.1.3.1	Procure test equipment	90d	22Mar06	27Jul06	1.3.3.3.1.1[FS]	M.MSU.PD.MANDSPASS,5000.00,;L.MSU.PD.SCI.PHY,16.00,

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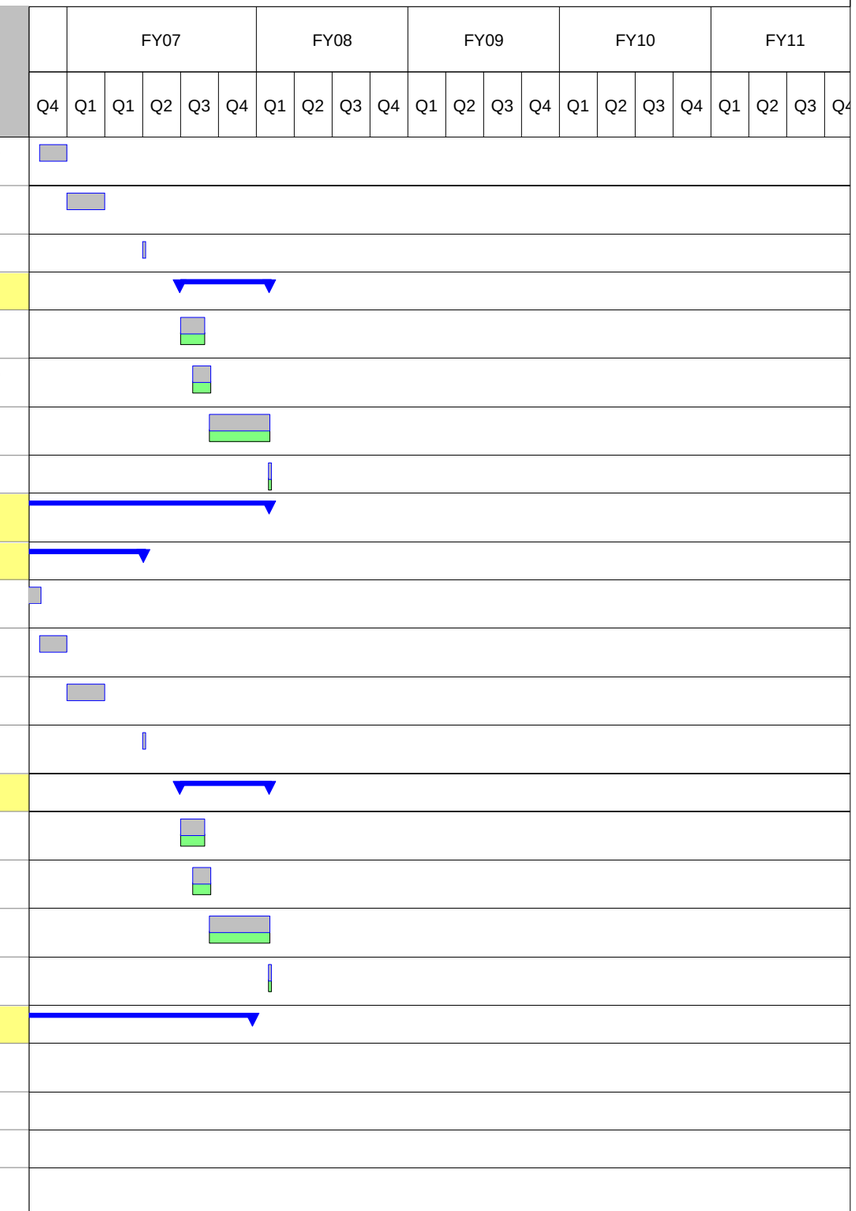
1.3.3.3.1.3.2	Setup test equipment	45d	28Jul06	29Sep06	1.3.3.3.1.3.1[FS]	L.MSU.PD.TECH.UGRAD,160.00,;L.MSU.PD.TECH.MT_M,160.00,
1.3.3.3.1.3.3	Perform spectral analyses @ 15 m length	60d	02Oct06	28Dec06	1.3.3.3.1.3.2[FS]	L.MSU.PD.TECH.MT_M,80.00,;L.MSU.PD.TECH.UGRAD,80.00,
1.3.3.3.1.3.4	Document results	3d	02Jan07	04Jan07	1.3.3.3.1.3.3[FS]	L.MSU.PD.SCI.PHY,20.00,
1.3.3.3.1.4	**Phase 2 - MSU**	**153d**	**02Apr07**	**05Nov07**		
1.3.3.3.1.4.1	Procure test equipment	40d	02Apr07	25May07		M.MSU.PD.MANDSPASS,5000.00,;L.MSU.PD.SCI.PHY,16.00,
1.3.3.3.1.4.2	Setup test equipment	30d	30Apr07	11Jun07	1.3.3.3.1.4.1[SS+20d]	L.MSU.PD.TECH.UGRAD,160.00,;L.MSU.PD.TECH.MT_M,160.00,
1.3.3.3.1.4.3	Perform spectral analyses @ 15 m length	100d	12Jun07	31Oct07	1.3.3.3.1.4.2[FS]	L.MSU.PD.TECH.MT_M,80.00,;L.MSU.PD.TECH.UGRAD,80.00,
1.3.3.3.1.4.4	Document results	3d	01Nov07	05Nov07	1.3.3.3.1.4.3[FS]	L.MSU.PD.SCI.PHY,20.00,
1.3.3.3.2	**Fluorescent Dye and Concentration Studies - UT Dallas**	**411d**	**22Mar06**	**05Nov07**		
1.3.3.3.2.1	**Phase 1 - UT Dallas**	**198d**	**22Mar06**	**04Jan07**		
1.3.3.3.2.1.1	Procure test equipment	90d	22Mar06	27Jul06	1.3.3.3.1.3.1[SS]; 1.3.3.3.1.1[FS]	M.UTD.PD.MANDSPASS,5000.00,;L.UTD.PD.SCI.PHY,16.00,
1.3.3.3.2.1.2	Setup test equipment	45d	28Jul06	29Sep06	1.3.3.3.2.1.1[FS]; 1.3.3.3.1.3.2[SS]	L.UTD.PD.TECH.UGRAD,160.00,;L.UTD.PD.TECH.MT_M,160.00,
1.3.3.3.2.1.3	Perform spectral analyses @ 15 m length	60d	02Oct06	28Dec06	1.3.3.3.1.3.3[SS]; 1.3.3.3.2.1.2[FS]	L.UTD.PD.TECH.MT_M,80.00,;L.UTD.PD.TECH.UGRAD,80.00,
1.3.3.3.2.1.4	Document results	3d	02Jan07	04Jan07	1.3.3.3.1.3.4[SS]; 1.3.3.3.2.1.3[FS]	L.UTD.PD.SCI.PHY,20.00,
1.3.3.3.2.2	**Phase 2- UT Dallas**	**153d**	**02Apr07**	**05Nov07**		
1.3.3.3.2.2.1	Procure test equipment	40d	02Apr07	25May07	1.3.3.3.1.4.1[SS]	L.UTD.PD.SCI.PHY,16.00,;M.UTD.PD.MANDSPASS,5000.00,
1.3.3.3.2.2.2	Setup test equipment	30d	30Apr07	11Jun07	1.3.3.3.1.4.2[SS]; 1.3.3.3.2.2.1[SS+20d]	L.UTD.PD.TECH.UGRAD,160.00,;L.UTD.PD.TECH.MT_M,160.00,
1.3.3.3.2.2.3	Perform spectral analyses @ 15 m length	100d	12Jun07	31Oct07	1.3.3.3.2.2.2[FS]; 1.3.3.3.1.4.3[SS]	L.UTD.PD.TECH.UGRAD,80.00,;L.UTD.PD.TECH.MT_M,80.00,
1.3.3.3.2.2.4	Document results	3d	01Nov07	05Nov07	1.3.3.3.2.2.3[FS]; 1.3.3.3.1.4.4[SS]	L.UTD.PD.SCI.PHY,20.00,
1.3.3.4	**Chemical and Environmental Stability Testing**	**388d**	**15Mar06**	**26Sep07**		
1.3.3.4.1	Define fiber samples needed (coordinate with vendor manager)	5d	15Mar06	21Mar06	1.3.3.1.1[SS]	L.UCLA.PD.SCI.PHY,20.00,
1.3.3.4.2	Define and obtain liquid scintillator samples	40d	15Mar06	09May06	1.3.3.1.1[SS]	L.UCLA.PD.SCI.PHY,8.00,
1.3.3.4.3	Define tests and equipment	5d	15Mar06	21Mar06	1.3.3.1.1[SS]	L.UCLA.PD.SCI.PHY,20.00,
1.3.3.4.4	Procure test equipment	15d	22Mar06	11Apr06	1.3.3.4.3[FS]	M.UCLA.PD.MANDSPASS,10000.00,;L.UCLA.PD.SCI.PHY,16.00,



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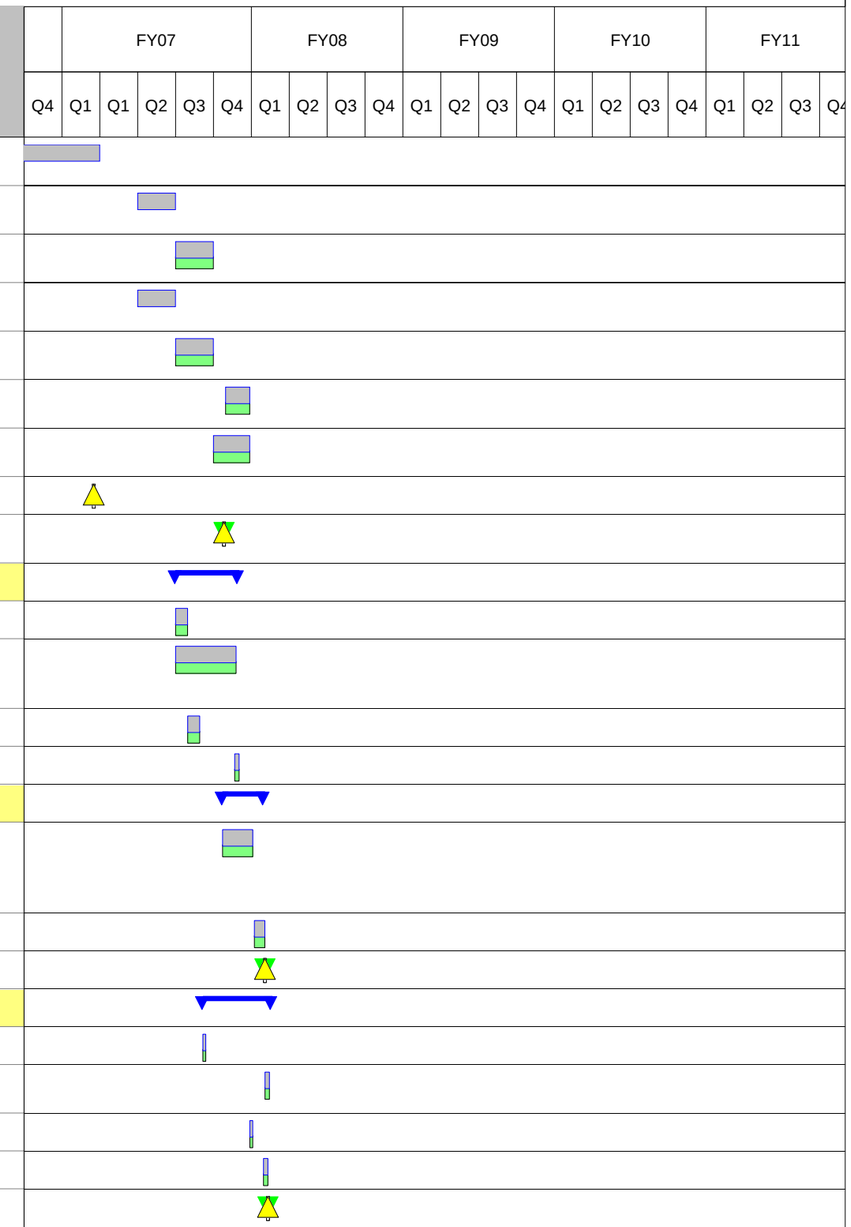
1.3.3.4.5	Setup test equipment	180d	12Apr06	28Dec06	1.3.3.4.4[FS]	L.UCLA.PD.TECH.UGRAD,160.00,;L.UCLA.PD. TECH.MT_M,160.00,
1.3.3.4.6	Perform bending tests in liquid scintillator - 1HFY07	63d	02Jan07	30Mar07	1.3.3.4.5[FS]; 1.3.3.4.2[FS]; 1.3.3.4.1[FS]	L.UCLA.PD.TECH.UGRAD,40.00,;L.UCLA.PD.TECH .MT_M,40.00,
1.3.3.4.7	Perform bending tests in liquid scintillator - 2HFY07	64d	02Apr07	29Jun07	1.3.3.4.6[FS]	L.UCLA.PD.TECH.MT_M,40.00,;L.UCLA.PD.TECH. UGRAD,40.00,
1.3.3.4.8	Perform accelerated aging tests in liquid scintillator - 1H FY07	63d	02Jan07	30Mar07	1.3.3.4.5[FS]; 1.3.3.1.1[FS]; 1.3.3.4.2[FS]; 1.3.3.4.1[FS]	L.UCLA.PD.TECH.MT_M,16.00,;L.UCLA.PD.TECH. UGRAD,16.00,
1.3.3.4.9	Perform accelerated aging tests in liquid scintillator - 2H FY07	64d	02Apr07	29Jun07	1.3.3.4.8[FS]	L.UCLA.PD.TECH.MT_M,16.00,;L.UCLA.PD.TECH. UGRAD,16.00,
1.3.3.4.10	Determine survival limits during shipping and handling	40d	01Aug07	26Sep07	1.3.3.1.1[FS]; 1.3.3.4.5[FS]	L.UCLA.PD.TECH.MT_M,16.00,;L.UCLA.PD.TECH. UGRAD,16.00,
1.3.3.4.11	Document results	60d	03Jul07	26Sep07	1.3.3.4.7[FS]; 1.3.3.4.9[FS]; 1.3.3.4.10[FF]	L.UCLA.PD.SCI.PHY,20.00,
1.3.3.5	Baseline (IPND) WLS fiber diameter chosen	0	15Dec06	15Dec06		
1.3.3.6	Baseline (IPND) WLS fiber composition chosen	0	24Jul07	24Jul07	1.3.3.3.1.4.3[SS+30d]; 1.3.3.5[FS]	
1.3.4	**Development of QA Methods**	**105d**	**02Apr07**	**28Aug07**		
1.3.4.1	Develop QA procedures	20d	02Apr07	27Apr07	1.3.3.1.1[FS]; 1.3.3.3.1.3.3[FS]	L.MSU.PD.SCI.PHY,40.00,
1.3.4.2	Develop QA test equipment for fiber acceptance	100d	02Apr07	21Aug07	1.3.3.1.1[FS]; 1.3.3.3.1.3.3[FS]	L.MSU.PD.SCI.PHY,40.00,;L.MSU.PD.ENG. EE_SR,50.00,;L.MSU.PD.ENG.ME_SR,100.00,;M. MSU.PD.MANDSPASS,10000.00,
1.3.4.3	Develop QA documentation tool	20d	30Apr07	25May07	1.3.4.1[FS]	L.MSU.PD.CP.SD,80.00,
1.3.4.4	Document results	5d	22Aug07	28Aug07	1.3.4.2[FS]	L.MSU.PD.SCI.PHY,20.00,
1.3.5	**Integration Prototype Detector Fiber Production**	**70d**	**25Jul07**	**31Oct07**		
1.3.5.1	Procure fiber for integration prototype	50d	25Jul07	03Oct07	1.3.3.6[FS]; 1.3.3.2.7[FS]; 1.3.3.5[FS]; 1.3.3.4.8[FS]; 1.3.3.3.2.1.3[FS]; 1.3.3.3.1.3.3[FS]; 1.3.3.4.6[FS]	M.FNAL.PPD.MANDS,56700.00,;L.FNAL.PPD.SCI. PHY,80.00,
1.3.5.2	QA fiber	15d	11Oct07	31Oct07	1.3.4.3[FS]; 1.3.5.1[FS+5d]	L.MSU.PD.TECH.MT_M,40.00,
1.3.5.3	IPND WLS fiber production completed	0	31Oct07	31Oct07	1.3.5.2[FS]	
1.3.6	**Production WLS Fiber Specifications**	**118d**	**05Jun07**	**19Nov07**		
1.3.6.1	Review results of fiber diameter studies	5d	05Jun07	11Jun07	1.3.3.2.7[FS]	L.MSU.PD.SCI.PHY,20.00,
1.3.6.2	Review results of composition studies	5d	06Nov07	12Nov07	1.3.3.3.1.4.4[FS]; 1.3.3.3.2.2.4[FS]	L.MSU.PD.SCI.PHY,20.00,
1.3.6.3	Review results of environmental tests	5d	27Sep07	03Oct07	1.3.3.4.11[FS]	L.MSU.PD.SCI.PHY,20.00,
1.3.6.4	Review results of IPND fiber QA	5d	01Nov07	07Nov07	1.3.4.4[FS]; 1.3.5.3[FS]	L.MSU.PD.SCI.PHY,20.00,
1.3.6.5	Production WLS fiber diameter confirmed	0	07Nov07	07Nov07	1.3.6.1[FS]; 1.3.5.2[FS]; 1.3.6.3[FS]; 1.3.6.4[FS]	



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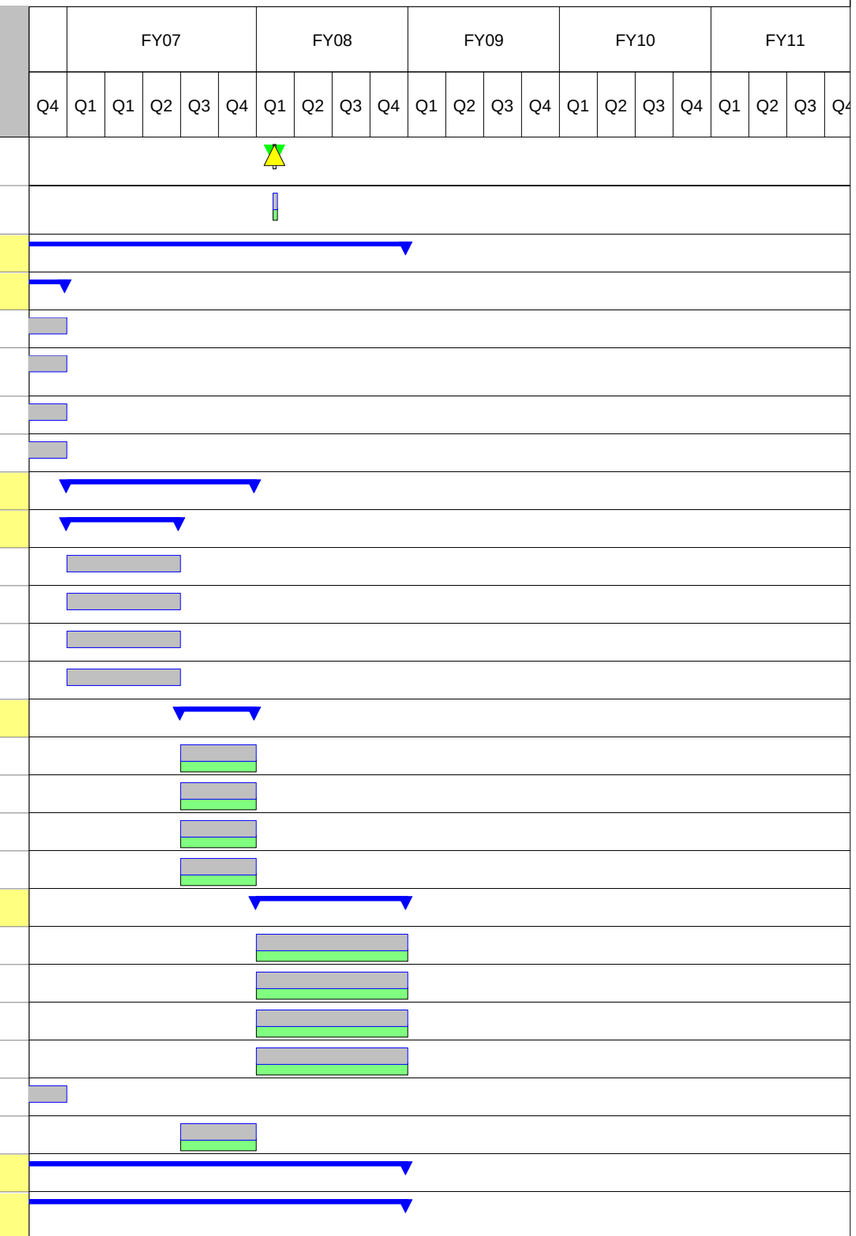
1.3.6.6	Production WLS fiber composition confirmed	0	12Nov07	12Nov07	1.3.6.3[FS]; 1.3.5.2[FS]; 1.3.6.2[FS]; 1.3.6.4[FS]	
1.3.6.7	Prepare specification document for production WLS fiber	5d	13Nov07	19Nov07	1.3.6.5[FS]; 1.3.6.6[FS]	L.MSU.PD.SCI.PHY,20.00,
1.3.7	**Management - R&D Phase**	**752d**	**03Oct05**	**29Sep08**		
1.3.7.1	**FY06**	**250d**	**03Oct05**	**28Sep06**		
1.3.7.1.1	Labor	250d	03Oct05	28Sep06		L.MSU.PD.SCI.PHY,40.00,
1.3.7.1.2	Travel	250d	03Oct05	28Sep06		M.FNAL.PPD.MANDS,5000.00,;M.MSU.PD.MANDS,5000.00,
1.3.7.1.3	Equipment	250d	03Oct05	28Sep06		M.MSU.PD.MANDSPASS,2000.00,
1.3.7.1.4	Materials and supplies	250d	03Oct05	28Sep06		M.MSU.PD.MANDSPASS,1000.00,
1.3.7.2	**FY07**	**250d**	**02Oct06**	**28Sep07**		
1.3.7.2.1	**1HFY07**	**123d**	**02Oct06**	**30Mar07**		
1.3.7.2.1.1	Labor	123d	02Oct06	30Mar07		L.MSU.PD.SCI.PHY,20.00,
1.3.7.2.1.2	Travel	123d	02Oct06	30Mar07		M.MSU.PD.MANDSPASS,2500.00,
1.3.7.2.1.3	Equipment	123d	02Oct06	30Mar07		
1.3.7.2.1.4	Materials and supplies	123d	02Oct06	30Mar07		M.MSU.PD.MANDSPASS,500.00,
1.3.7.2.2	**2HFY07**	**127d**	**02Apr07**	**28Sep07**		
1.3.7.2.2.1	Labor	127d	02Apr07	28Sep07		L.MSU.PD.SCI.PHY,20.00,
1.3.7.2.2.2	Travel	127d	02Apr07	28Sep07		M.MSU.PD.MANDSPASS,2500.00,
1.3.7.2.2.3	Equipment	127d	02Apr07	28Sep07		
1.3.7.2.2.4	Materials and supplies	127d	02Apr07	28Sep07		M.MSU.PD.MANDSPASS,500.00,
1.3.7.3	**FY08**	**251d**	**01Oct07**	**29Sep08**		
1.3.7.3.1	Labor	251d	01Oct07	29Sep08		L.MSU.PD.SCI.PHY,40.00,
1.3.7.3.2	Travel	251d	01Oct07	29Sep08		
1.3.7.3.3	Equipment	251d	01Oct07	29Sep08		
1.3.7.3.4	Materials and supplies	251d	01Oct07	29Sep08		
1.3.7.4	FY06 WLS Fiber R&D	250d	03Oct05	28Sep06		
1.3.7.5	FY07 WLS Fiber R&D	127d	02Apr07	28Sep07		
1.4	**PVC Extrusion R&D**	**752d**	**03Oct05**	**29Sep08**		
1.4.1	**Physical Properties Determination and Test Method Development**	**752d**	**03Oct05**	**29Sep08**		



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1.4.1.1	**Extrusion Optical Properties**	**521d**	**03Oct05**	**26Oct07**		
1.4.1.1.1	**General Consulting on PVC Reflectivity Issues**	**501d**	**03Oct05**	**28Sep07**		
1.4.1.1.1.1	Consulting on PVC reflectivity issues - FY06	250d	**03Oct05**	**28Sep06**		**L.FNAL.PPD.MNG.PC,200.00,**
1.4.1.1.1.2	Consulting on PVC reflectivity issues - 1HFY07	123d	**02Oct06**	**30Mar07**	**1.4.1.1.1.1[FS]**	**L.FNAL.PPD.MNG.PC,100.00,**
1.4.1.1.1.3	Consulting on PVC reflectivity issues - H2FY07	127d	**02Apr07**	**28Sep07**	**1.4.1.1.1.2[FS]**	**L.FNAL.PPD.MNG.PC,100.00,**
1.4.1.1.2	**Reflectivity Test Methods - FNAL**	**501d**	**03Oct05**	**28Sep07**		
1.4.1.1.2.1	Investigate methods of measuring reflectivity	210d	**03Oct05**	**02Aug06**		**L.FNAL.PPD.TECH.MT_W,80.00,**
1.4.1.1.2.2	Develop/purchase equipment needed for reflectivity tests	5d	**01Nov05**	**07Nov05**	**1.4.1.1.2.1[SS+20d]**	**L.FNAL.PPD.MNG.PC,48.00,;M.FNAL.PPD. MANDS,10000.00,**
1.4.1.1.2.3	Investigate extruding process properties and surface effects on reflectivity of new	123d	**02Oct06**	**30Mar07**	**1.4.1.1.2.2[FS]; 1.4.3.4.5.4[SS+10d]**	**L.FNAL.PPD.MNG.PC,48.00,;L.FNAL.PPD.TECH. MT_W,80.00,**
1.4.1.1.2.4	Investigate extruding process properties and surface effects on reflectivity of new	127d	**02Apr07**	**28Sep07**	**1.4.1.1.2.3[FS]**	**L.FNAL.PPD.TECH.MT_W,80.00,;L.FNAL.PPD. MNG.PC,48.00,**
1.4.1.1.2.5	**Reflectivity Tests on New Materials**	**451d**	**14Dec05**	**28Sep07**		
1.4.1.1.2.5.1	Perform reflectivity tests on new materials - FY06	200d	**14Dec05**	**28Sep06**	**1.4.1.1.2.2[FS]; 1.4.3.3.2[SS]**	**L.FNAL.PPD.TECH.MT_W,480.00,**
1.4.1.1.2.5.2	Perform reflectivity tests on new materials - 1H FY07	123d	**02Oct06**	**30Mar07**	**1.4.1.1.2.5.1[FS]**	**L.FNAL.PPD.TECH.MT_W,320.00,**
1.4.1.1.2.5.3	Perform reflectivity tests on new materials - 2HFY07	127d	**02Apr07**	**28Sep07**	**1.4.1.1.2.5.2[FS]**	**L.FNAL.PPD.TECH.MT_W,320.00,**
1.4.1.1.3	**Reflectivity Measurements - CT**	**440d**	**03Jan06**	**28Sep07**		
1.4.1.1.3.1	Develop light output tests to correlate/confirm reflectivity measurements	60d	**03Jan06**	**28Mar06**		**M.CT.PD.MANDS,2000.00,;L.CT.PD.TECH. MT_W,80.00,**
1.4.1.1.3.2	**Light Output Tests on New Materials**	**380d**	**29Mar06**	**28Sep07**		
1.4.1.1.3.2.1	Perform light output tests on new materials - FY06	130d	**29Mar06**	**29Sep06**	**1.4.1.1.3.1[FS]**	**L.CT.PD.TECH.MT_W,170.00,**
1.4.1.1.3.2.2	Perform light output tests on new materials - 1HFY07	123d	**02Oct06**	**30Mar07**	**1.4.1.1.3.2.1[FS]**	**L.CT.PD.TECH.MT_W,170.00,**
1.4.1.1.3.2.3	Perform light output tests on new materials - 2HFY07	127d	**02Apr07**	**28Sep07**	**1.4.1.1.3.2.2[FS]**	**L.CT.PD.TECH.MT_W,120.00,;L.CT.PD.TECH. UGRAD,250.00,**
1.4.1.1.4	Document extrusion optical properties	20d	**01Oct07**	**26Oct07**	**1.4.1.1.3.2.3[FS]; 1.4.1.1.2.5.3[FS]**	**L.ANL.PD2.SCI.PHY,80.00,;L.FNAL.PPD.MNG. PC,80.00,**
1.4.1.2	**Extrusion Mechanical Properties**	**722d**	**14Nov05**	**29Sep08**		
1.4.1.2.1	**Tensile Properties**	**316d**	**28Jun06**	**28Sep07**		
1.4.1.2.1.1	Perform tensile tests - FY06	65d	**28Jun06**	**28Sep06**	**1.4.3.3.2[FS]**	**M.ANL.PD.MANDS,2000.00,;L.FNAL.PPD.TECH. MT_W,120.00,;L.ANL.PD2.ENG.ME,40.00,;L.ANL. PD2.TECH.MT_W,40.00,**

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1.4.1.2.1.2	Perform tensile tests - 1HFY07	123d	02Oct06	30Mar07	1.4.1.2.1.1[FS]	L.ANL.PD2.TECH.MT_W,20.00,;L.ANL.PD2.ENG.ME,20.00,;M.ANL.PD.MANDS,1000.00,
1.4.1.2.1.3	Perform tensile tests - 2HFY07	127d	02Apr07	28Sep07	1.4.1.2.1.2[FS]	M.ANL.PD.MANDS,1000.00,;L.ANL.PD2.ENG.ME,20.00,;L.ANL.PD2.TECH.MT_W,20.00,
1.4.1.2.2	**Creep Tests**	**722d**	**14Nov05**	**29Sep08**		
1.4.1.2.2.1	**Creep Tests-FNAL**	**398d**	**03Mar06**	**28Sep07**		
1.4.1.2.2.1.1	Construct stands for long-term creep tests	59d	10Jul06	29Sep06		M.FNAL.PPD.MANDS,2000.00,;L.FNAL.PPD.TECH.UGRAD,250.00,
1.4.1.2.2.1.2	Construct stands for accelerated temperature creep tests	205d	03Mar06	21Dec06		L.FNAL.PPD.TECH.UGRAD,200.00,;M.FNAL.PPD.MANDS,1000.00,
1.4.1.2.2.1.3	Perform long-term creep tests - 1HFY07	123d	02Oct06	30Mar07	1.4.1.2.2.1.1[FS]	L.FNAL.PPD.TECH.MT_W,40.00,;L.FNAL.PPD.SCI.PHY,80.00,
1.4.1.2.2.1.4	Perform long-term creep tests - 2HFY07	127d	02Apr07	28Sep07	1.4.1.2.2.1.3[FS]	L.FNAL.PPD.TECH.MT_W,40.00,;L.FNAL.PPD.SCI.PHY,80.00,
1.4.1.2.2.2	**Creep Tests-ANL**	**722d**	**14Nov05**	**29Sep08**		
1.4.1.2.2.2.1	Investigate methods for accelerated creep tests	221d	14Nov05	29Sep06		L.ANL.PD2.TECH.MT_W,144.00,;L.ANL.PD2.ENG.ME,280.00,;M.ANL.PD.MANDS,5000.00,
1.4.1.2.2.2.2	Perform long-term creep tests - 1HFY07	123d	02Oct06	30Mar07	1.4.1.2.2.1.1[FS]; 1.4.1.2.2.2.1[FS]	L.ANL.PD2.TECH.MT_W,40.00,;M.ANL.PD.MANDSPASS,1000.00,;L.ANL.PD2.ENG.ME,40.00,
1.4.1.2.2.2.3	Perform long-term creep tests - 2HFY07	127d	02Apr07	28Sep07	1.4.1.2.2.2.2[FS]	M.ANL.PD.MANDSPASS,1000.00,;L.ANL.PD2.TECH.MT_W,40.00,;L.ANL.PD2.ENG.ME,40.00,
1.4.1.2.2.2.4	Perform long-term creep tests - FY08	251d	01Oct07	29Sep08	1.4.1.2.2.2.3[FS]	M.ANL.PD.MANDS,1000.00,;L.ANL.PD2.ENG.ME,40.00,;L.ANL.PD2.TECH.MT_W,40.00,
1.4.1.2.2.2.5	Perform accelerated creep tests - 1HFY07	115d	11Oct06	29Mar07	1.4.1.2.2.1.2[SS+155d]; 1.4.1.2.2.2.1[FS]	M.ANL.PD.MANDSPASS,2500.00,;L.ANL.PD2.ENG.ME,20.00,;L.ANL.PD2.TECH.MT_W,40.00,
1.4.1.2.2.2.6	Perform accelerated creep tests - 2HFY07	127d	02Apr07	28Sep07	1.4.1.2.2.2.5[FS]	M.ANL.PD.MANDSPASS,2500.00,;L.ANL.PD2.TECH.MT_W,40.00,;L.ANL.PD2.ENG.ME,20.00,
1.4.1.2.2.2.7	Analyze creep test data - 1HFY07	123d	02Oct06	30Mar07	1.4.1.2.2.2.2[SS]	L.ANL.PD2.ENG.ME,100.00,
1.4.1.2.2.2.8	Analyze creep test data - 2HFY07	127d	02Apr07	28Sep07	1.4.1.2.2.2.7[FS]	L.ANL.PD2.ENG.ME,100.00,
1.4.1.2.2.2.9	Analyze creep test data - FY08	251d	01Oct07	29Sep08	1.4.1.2.2.2.4[SS]; 1.4.1.2.2.2.8[FS]	L.ANL.PD2.ENG.ME,100.00,
1.4.1.2.3	**Impact/ Fracture Toughness Properties**	**377d**	**03Apr06**	**28Sep07**		
1.4.1.2.3.1	Develop methods for measuring impact strength	15d	03Apr06	21Apr06		L.ANL.PD2.TECH.MT_W,160.00,;L.ANL.PD2.ENG.ME,80.00,
1.4.1.2.3.2	Develop/purchase equipment for measuring impact	20d	24Apr06	19May06	1.4.1.2.3.1[FS]	L.ANL.PD2.ENG.ME,40.00,;M.ANL.PD.MANDS,5000.00,;L.ANL.PD2.TECH.MT_W,16.00,
1.4.1.2.3.3	Characterize impact properties of PVC compounds - 1HFY07	123d	02Oct06	30Mar07	1.4.1.2.3.2[FS]; 1.4.3.4.5.4[SS+10d]; 1.4.1.2.3.1[FS]	L.ANL.PD2.TECH.MT_W,40.00,;M.FNAL.PPD.MANDS,3000.00,;L.ANL.PD2.ENG.ME,24.00,
1.4.1.2.3.4	Characterize impact properties of PVC compounds - 2HFY07	127d	02Apr07	28Sep07	1.4.1.2.3.3[FS]	L.ANL.PD2.TECH.MT_W,40.00,;L.ANL.PD2.ENG.ME,24.00,
1.4.1.2.4	**Scintillator Exposure Tests**	**711d**	**01Dec05**	**29Sep08**		

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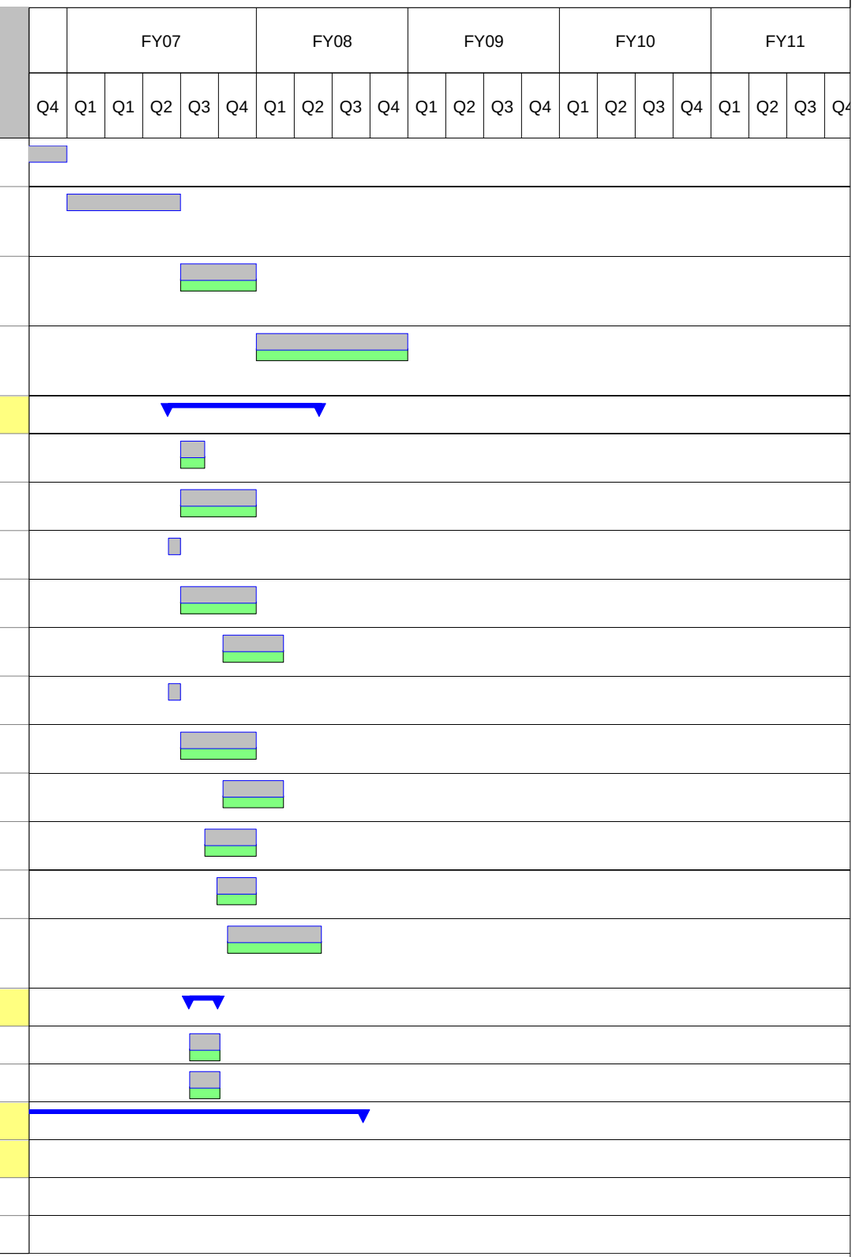
1.4.1.2.4.1	Define methods of testing for effects of liquid scintillator	210d	01Dec05	29Sep06		L.ANL.PD2.ENG.ME,20.00,
1.4.1.2.4.2	Investigate environmental effects on PVC compounds - 1HFY07	123d	02Oct06	30Mar07	1.4.1.2.4.1[FS]	L.ANL.PD2.ENG.ME,20.00,;L.ANL.PD2.TECH.MT_W,20.00,;L.FNAL.PPD.TECH.MT_W,20.00,;M.ANL.PD.MANDS,3000.00,
1.4.1.2.4.3	Investigate environmental effects on PVC compounds - 2HFY07	127d	02Apr07	28Sep07	1.4.1.2.4.2[FS]	M.ANL.PD.MANDS,3000.00,;L.ANL.PD2.TECH.MT_W,20.00,;L.ANL.PD2.ENG.ME,20.00,;L.FNAL.PPD.TECH.MT_W,20.00,
1.4.1.2.4.4	Investigate environmental effects on PVC compounds - 1HFY08	251d	01Oct07	29Sep08	1.4.1.2.4.3[FS]	L.ANL.PD2.TECH.MT_W,20.00,;M.ANL.PD.MANDS,3000.00,;L.FNAL.PPD.TECH.MT_W,20.00,;L.ANL.PD2.ENG.ME,20.00,
1.4.1.3	**Quality Control and Assurance**	**251d**	**05Mar07**	**03Mar08**		
1.4.1.3.1	Determine frequency and type of mechanical tests done at extruder for QC	40d	02Apr07	25May07	1.4.3.4.5.4[FS]	L.ANL.PD2.ENG.ME,40.00,
1.4.1.3.2	Develop/purchase equipment for QC tests at extruder	127d	02Apr07	28Sep07	1.4.1.3.1[SS]	L.ANL.PD2.ENG.ME,72.00,;M.ANL.PD.MANDS,35000.00,
1.4.1.3.3	Perform mechanical tests for quality assurance - horizontal extrusions - 1HFY07	20d	05Mar07	30Mar07	1.4.3.4.5.4[FS-20d]	L.ANL.PD2.ENG.ME,8.00,;L.ANL.PD2.TECH.MT_W,32.00,
1.4.1.3.4	Perform mechanical tests for quality assurance - horizontal extrusions - 2HFY07	127d	02Apr07	28Sep07	1.4.1.3.3[FS]	L.ANL.PD2.TECH.MT_W,128.00,;L.ANL.PD2.ENG.ME,32.00,
1.4.1.3.40	Perform mechanical tests for quality assurance - vertical extrusions	100d	12Jul07	03Dec07	1.4.3.5.7[SS]	L.ANL.PD2.ENG.ME,40.00,;L.ANL.PD2.TECH.MT_W,160.00,
1.4.1.3.50	Perform reflectivity tests for quality assurance - horizontal extrusions -1HFY07	20d	05Mar07	30Mar07	1.4.3.4.5.4[FS-20d]	L.FNAL.PPD.MNG.PC,40.00,;L.FNAL.PPD.TECH.MT_W,320.00,
1.4.1.3.60	Perform reflectivity tests for quality assurance - horizontal extrusions-2HFY07	127d	02Apr07	28Sep07	1.4.1.3.50[FS]	L.FNAL.PPD.MNG.PC,40.00,;L.FNAL.PPD.TECH.MT_W,320.00,
1.4.1.3.70	Perform reflectivity tests for quality assurance - vertical extrusions	100d	12Jul07	03Dec07	1.4.3.5.7[SS]	L.FNAL.PPD.MNG.PC,40.00,;L.FNAL.PPD.TECH.MT_W,320.00,
1.4.1.3.80	Investigate additional QA equipment	85d	30May07	27Sep07	1.4.3.4.5.10[SS]	L.ANL.PD2.ENG.ME,40.00,;L.FNAL.PPD.MNG.PC,40.00,;L.ANL.PD2.SCI.PHY,40.00,
1.4.1.3.90	Purchase additional QA equipment	65d	27Jun07	27Sep07	1.4.1.3.80[SS+20d]	M.FNAL.PPD.MANDS,60000.00,;L.ANL.PD2.ENG.ME,8.00,;L.FNAL.PPD.MNG.PC,8.00,
1.4.1.3.100	Perform QA on prototype extrusions	150d	26Jul07	03Mar08	1.4.1.3.90[SS+20d]; 1.4.3.4.5.10[SS]	L.ANL.PD2.TECH.MT_W,80.00,;L.ANL.PD2.ENG.ME,40.00,;L.FNAL.PPD.TECH.MT_W,80.00,;L.FNAL.PPD.MNG.PC,40.00,
1.4.1.4	**PVC Resin Tests**	**50d**	**23Apr07**	**02Jul07**		
1.4.1.4.1	Define raw material tests for acceptance	50d	23Apr07	02Jul07		L.FNAL.PPD.MNG.PC,40.00,
1.4.1.4.2	Perform tests to characterize raw material	50d	23Apr07	02Jul07	1.4.2.2.2.1.3[SS]; 1.4.1.4.1[SS]	M.ANL.PD.MANDS,15000.00,
1.4.2	**Raw Materials**	**680d**	**03Oct05**	**17Jun08**		
1.4.2.1	**Requirements**	**1d**	**27Jan06**	**27Jan06**		
1.4.2.1.1	Draft requirements document for raw materials	1d	27Jan06	27Jan06		L.ANL.PD2.ENG.ME,8.00,
1.4.2.1.2	Raw materials requirements document released	0	27Jan06	27Jan06	1.4.2.1.1[FS]	



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1.4.2.2	**PVC Material Development**	**501d**	**03Oct05**	**28Sep07**		
1.4.2.2.1	**Baseline PVC Material**	**74d**	**03Oct05**	**20Jan06**		
1.4.2.2.1.1	Identify, contact, and meet with prospective vendors	60d	**03Oct05**	**28Dec05**		**L.ANL.PD2.SCI.PHY,96.00,;L.ANL.PD2.ENG.ME,96.00,**
1.4.2.2.1.2	Draft RFI for baseline material (PET B)	2d	**20Dec05**	**21Dec05**	**1.4.2.2.1.1[SS+30d]**	**L.ANL.PD2.ENG.ME,16.00,**
1.4.2.2.1.3	Review and release RFI for baseline material	1d	**22Dec05**	**22Dec05**	**1.4.2.2.1.2[FS]**	
1.4.2.2.1.4	Evaluate vendor information	2d	**19Jan06**	**20Jan06**	**1.4.2.2.1.3[FS+15d]**	**L.ANL.PD2.ENG.ME,4.00,**
1.4.2.2.2	**Custom PVC Development**	**453d**	**12Dec05**	**28Sep07**		
1.4.2.2.2.1	**Custom PVC Development - ANL**	**453d**	**12Dec05**	**28Sep07**		
1.4.2.2.2.1.1	Identify specific vendors for developing custom PVC compounds	15d	**12Dec05**	**04Jan06**		**L.ANL.PD2.ENG.ME,120.00,**
1.4.2.2.2.1.2	Solicit proposals for PVC resin development work	10d	**05Jan06**	**19Jan06**	**1.4.2.2.2.1.1[FS]**	**L.ANL.PD2.ENG.ME,80.00,**
1.4.2.2.2.1.3	Work with vendors to develop custom PVC compounds - FY06	178d	**20Jan06**	**29Sep06**	**1.4.2.2.2.1.2[FS]**	**L.ANL.PD2.ENG.ME,80.00,**
1.4.2.2.2.1.4	Work with vendors to develop custom PVC compounds - 1HFY07	123d	**02Oct06**	**30Mar07**	**1.4.2.2.2.1.3[FS]**	**L.ANL.PD2.ENG.ME,40.00,**
1.4.2.2.2.1.5	Work with vendors to develop custom PVC compounds - 2HFY07	127d	**02Apr07**	**28Sep07**	**1.4.2.2.2.1.4[FS]**	**L.ANL.PD2.ENG.ME,40.00,**
1.4.2.2.2.1.6	Evaluate PVC compound studies - FY06	158d	**17Feb06**	**29Sep06**	**1.4.2.2.2.1.3[SS]; 1.4.2.2.2.2.1[SS]**	**L.ANL.PD2.SCI.PHY,20.00,;L.ANL.PD2.ENG.ME,20.00,**
1.4.2.2.2.1.7	Evaluate PVC compound studies - 1HFY07	123d	**02Oct06**	**30Mar07**	**1.4.2.2.2.1.6[FS]**	**L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.SCI.PHY,10.00,**
1.4.2.2.2.1.8	Evaluate PVC compound studies - 2HFY07	127d	**02Apr07**	**28Sep07**	**1.4.2.2.2.1.7[FS]**	**L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.SCI.PHY,10.00,**
1.4.2.2.2.2	**Custom PVC Development - FNAL**	**428d**	**20Jan06**	**28Sep07**		
1.4.2.2.2.2.1	Work with consultant and lab to develop custom PVC - FY06	158d	**17Feb06**	**29Sep06**		**L.FNAL.PPD.MNG.PC,8.00,;M.FNAL.PPD.MANDS,12500.00,**
1.4.2.2.2.2.2	Work with consultant and lab to develop custom PVC - 1HFY07	123d	**02Oct06**	**30Mar07**	**1.4.2.2.2.2.1[FS]**	**M.FNAL.PPD.MANDS,6250.00,;L.FNAL.PPD.MNG.PC,8.00,**
1.4.2.2.2.2.3	Work with consultant and lab to develop custom PVC - 2HFY07	127d	**02Apr07**	**28Sep07**	**1.4.2.2.2.2.2[FS]**	**L.FNAL.PPD.MNG.PC,8.00,;M.FNAL.PPD.MANDS,6250.00,**
1.4.2.2.2.2.4	Issue PO's to selected vendors - FY06	178d	**20Jan06**	**29Sep06**	**1.4.2.2.2.1.3[SS]**	**M.FNAL.PPD.MANDS,10000.00,**
1.4.2.2.2.2.5	Issue PO's to selected vendors - 1HFY07	123d	**02Oct06**	**30Mar07**	**1.4.2.2.2.2.4[FS]**	**M.FNAL.PPD.MANDS,30000.00,**
1.4.2.2.2.2.6	Issue PO's to selected vendors - 2HFY07	127d	**02Apr07**	**28Sep07**	**1.4.2.2.2.2.5[FS]**	**M.FNAL.PPD.MANDS,60000.00,**
1.4.2.2.2.2.7	Evaluate PVC compound studies - FY06	158d	**17Feb06**	**29Sep06**	**1.4.2.2.2.2.4[SS]; 1.4.2.2.2.1.6[SS]**	**L.FNAL.PPD.MNG.PC,20.00,**
1.4.2.2.2.2.8	Evaluate PVC compound studies - 1HFY07	123d	**02Oct06**	**30Mar07**	**1.4.2.2.2.2.7[FS]**	**L.FNAL.PPD.MNG.PC,10.00,**

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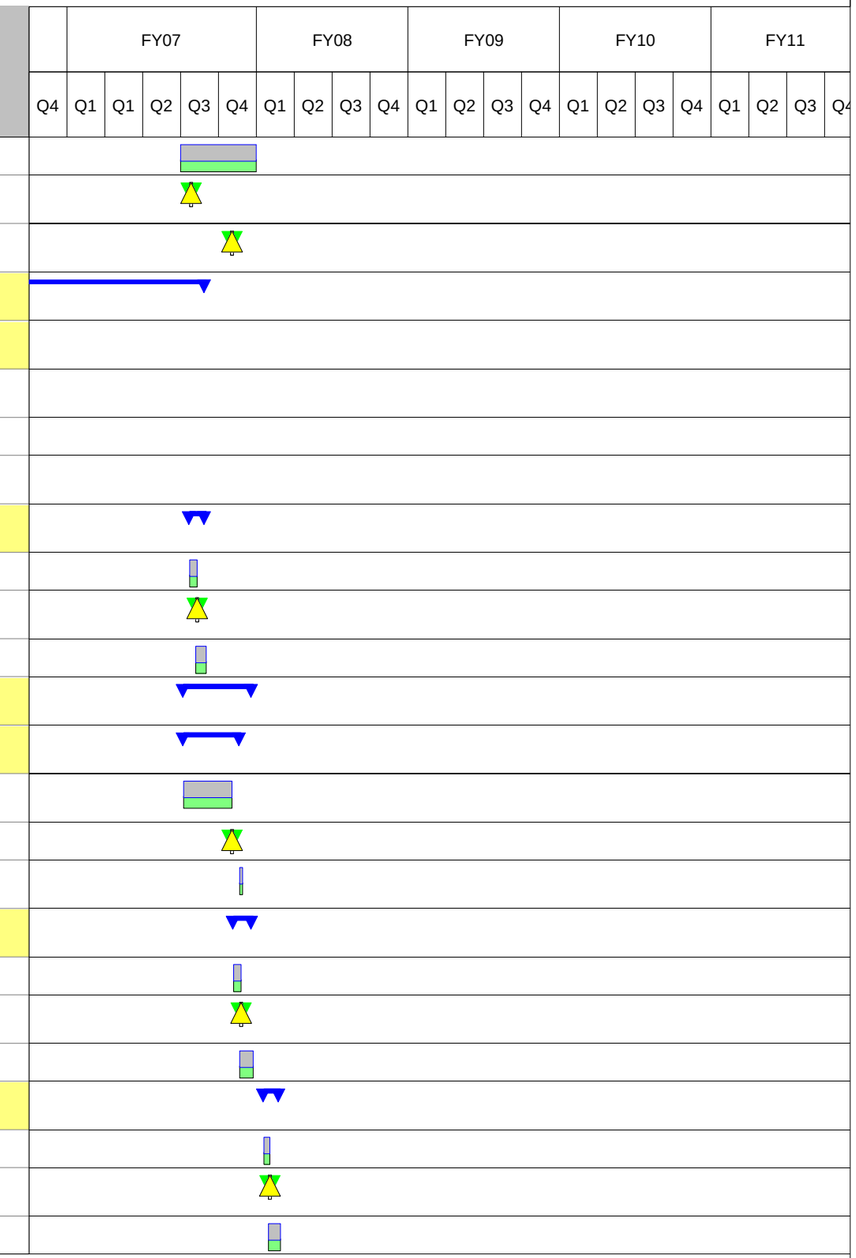
1.4.2.2.2.2.9	Evaluate PVC compound studies - 2HFY07	127d	02Apr07	28Sep07	1.4.2.2.2.2.8[FS]	L.FNAL.PPD.MNG.PC,10.00,
1.4.2.2.2.3	Prototype 16-cell PVC horizontal extrusion compound specified	0	24Apr07	24Apr07	1.4.2.2.2.1.7[SS+50%]; 1.4.2.2.2.2.8[SS+50%]	
1.4.2.2.2.4	Prototype 16-cell PVC vertical extrusion compound specified	0	01Aug07	01Aug07	1.4.2.2.2.3[FS]; 1.4.2.2.2.2.8[FS]	
1.4.2.3	**Procurement of Raw Material for Prototype 16-Cell Horizontal Extrusions**	**302d**	**17Mar06**	**29May07**		
1.4.2.3.1	**Procurement of Raw Material for Prototype 16-Cell Horizontal Extrusions - ANL**	**67d**	**17Mar06**	**20Jun06**		
1.4.2.3.1.1	Develop RFP for 16-cell horizontal extrusions	56d	17Mar06	05Jun06	1.4.2.2.2.1.3[SS+40d]; 1.4.2.1.2[FS]	L.ANL.PD2.ENG.ME,24.00,;L.ANL.PD2.SCI.PHY,8.00,
1.4.2.3.1.2	RFP issued for raw PVC resin	0	05Jun06	05Jun06	1.4.2.3.1.1[FS]	
1.4.2.3.1.3	Review proposals	1d	20Jun06	20Jun06	1.4.2.3.1.1[FS+10d]	L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,8.00,
1.4.2.3.2	**Procurement of Raw Material for Prototype 16-Cell Horizontal Extrusions - FNAL**	**25d**	**24Apr07**	**29May07**		
1.4.2.3.2.1	Prepare purchase order	10d	24Apr07	07May07	1.4.2.2.2.3[FS]; 1.4.2.3.1.3[FS]	L.FNAL.PPD.MNG.PC,8.00,
1.4.2.3.2.2	PO for raw PVC resin for 16-cell horizontal extrusions released	0	08May07	08May07	1.4.2.3.2.1[FS]	
1.4.2.3.2.3	Produce raw PVC resin	15d	08May07	29May07	1.4.2.3.2.2[FS]	M.FNAL.PPD.MANDS,100000.00,
1.4.2.4	**Procurement of Raw Material for Prototype 16-Cell Vertical Extrusions**	**116d**	**09Apr07**	**20Sep07**		
1.4.2.4.1	**Procurement of Raw Material for Prototype 16-Cell Vertical Extrusions - ANL**	**96d**	**09Apr07**	**22Aug07**		
1.4.2.4.1.1	Develop RFP for 16-cell vertical extrusions	80d	09Apr07	01Aug07	1.4.2.2.2.4[FF]; 1.4.2.3.1.1[FS]	L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,24.00,
1.4.2.4.1.2	RFP issued for raw PVC resin	0	01Aug07	01Aug07	1.4.2.4.1.1[FS]	
1.4.2.4.1.3	Review proposals	1d	22Aug07	22Aug07	1.4.2.4.1.1[FS+15d]	L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,8.00,
1.4.2.4.2	**Procurement of Raw Material for Prototype 16-Cell Vertical Extrusions - FNAL**	**30d**	**09Aug07**	**20Sep07**		
1.4.2.4.2.1	Prepare purchase order	10d	09Aug07	22Aug07	1.4.2.4.1.3[FF]	L.FNAL.PPD.MNG.PC,8.00,
1.4.2.4.2.2	PO for raw PVC resin for 16-cell vertical extrusions released	0	23Aug07	23Aug07	1.4.2.4.2.1[FS]	
1.4.2.4.2.3	Produce raw PVC resin	20d	23Aug07	20Sep07	1.4.2.4.2.2[FS]	M.FNAL.PPD.MANDS,108000.00,
1.4.2.5	**Procurement of Raw Material for Additional 16-Cell Horizontal Extrusions**	**25d**	**19Oct07**	**26Nov07**		
1.4.2.5.1	Prepare purchase order	10d	19Oct07	01Nov07	1.4.2.4.2.3[FS+20d]	L.FNAL.PPD.MNG.PC,8.00,
1.4.2.5.2	PO for raw PVC resin for 16-cell horizontal extrusions released	0	02Nov07	02Nov07	1.4.2.5.1[FS]	
1.4.2.5.3	Produce raw PVC resin	15d	02Nov07	26Nov07	1.4.2.5.2[FS]	M.FNAL.PPD.MANDS,15000.00,



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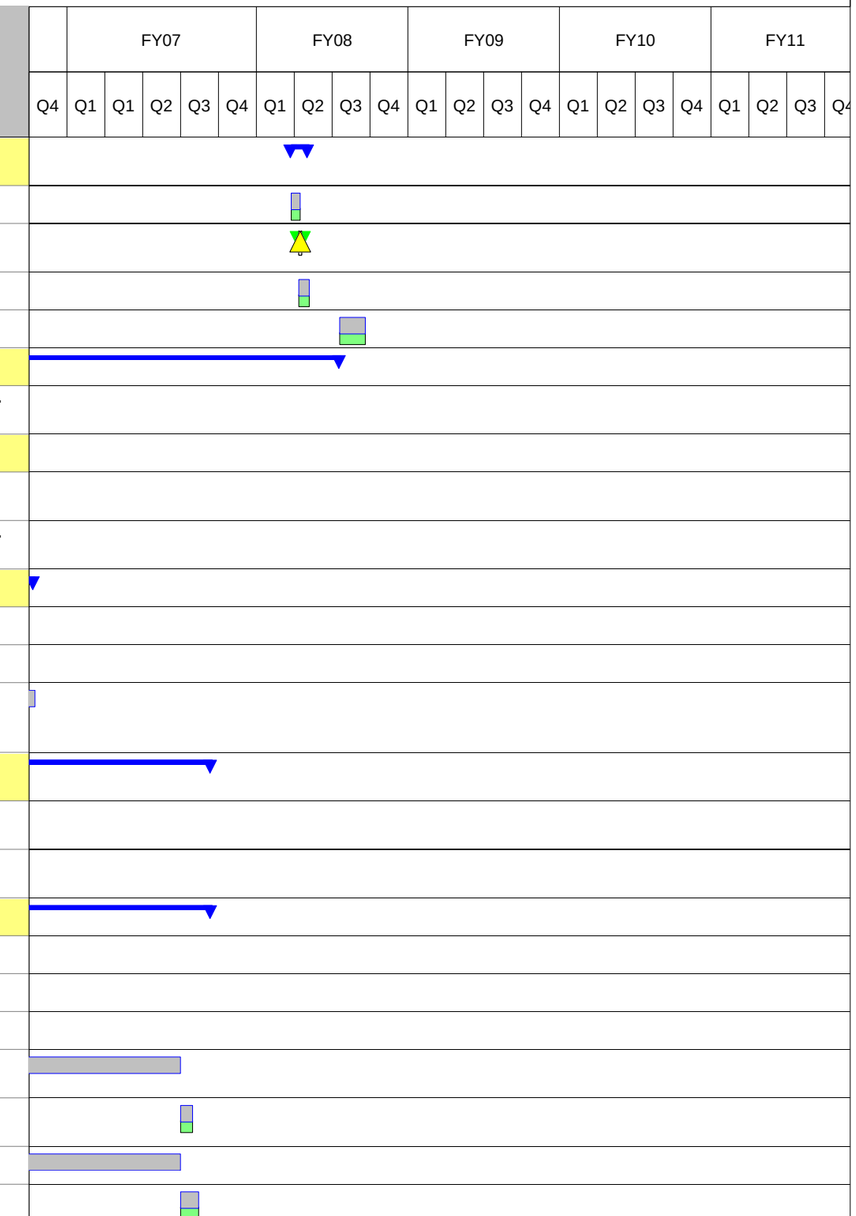
1.4.2.6	**Procurement of Raw Material for Additional 16-Cell Vertical Extrusions**	**25d**	**27Dec07**	**04Feb08**		
1.4.2.6.1	Prepare purchase order	10d	**27Dec07**	**11Jan08**	**1.4.2.5.3[FS+20d]**	**L.FNAL.PPD.MNG.PC,8.00,**
1.4.2.6.2	PO for raw PVC resin for 16-cell vertical extrusions released	0	**14Jan08**	**14Jan08**	**1.4.2.6.1[FS]**	
1.4.2.6.3	Produce raw PVC resin	15d	**14Jan08**	**04Feb08**	**1.4.2.6.2[FS]**	**M.FNAL.PPD.MANDS,15000.00,**
1.4.2.7	Final Documentation	40d	**22Apr08**	**17Jun08**	**1.4.3.7.3[FS]**	**L.FNAL.PPD.MNG.PC,8.00,**
1.4.3	**Extrusions**	**640d**	**03Oct05**	**21Apr08**		
1.4.3.1	Prepare requirements	5d	**03Oct05**	**07Oct05**		**L.ANL.PD2.ENG.ME,20.00,;L.ANL.PD2.SCI.PHY,20.00,**
1.4.3.2	**Vendor Investigations**	**40d**	**03Oct05**	**29Nov05**		
1.4.3.2.1	Investigate production vendors - FNAL	40d	**03Oct05**	**29Nov05**		**L.FNAL.PPD.MNG.PC,40.00,;L.FNAL.PPD.ENG.ME,40.00,**
1.4.3.2.2	Investigate production vendors - ANL	40d	**03Oct05**	**29Nov05**	**1.4.3.2.1[SS]**	**L.ANL.PD2.SCI.PHY,40.00,;L.ANL.PD2.ENG.ME,40.00,**
1.4.3.3	**Vendor Extrusion Tests with Existing Tooling**	**155d**	**30Nov05**	**12Jul06**		
1.4.3.3.1	Prepare purchase reqs and POs	80d	**30Nov05**	**27Mar06**	**1.4.3.2.2[FS]**	**L.FNAL.PPD.ENG.ME,40.00,**
1.4.3.3.2	Extrude raw materials	135d	**14Dec05**	**27Jun06**	**1.4.3.3.1[SS+10d]**	**M.FNAL.PPD.MANDS,20000.00,**
1.4.3.3.3	Evaluate extrusions	135d	**29Dec05**	**12Jul06**	**1.4.3.3.2[SS+10d]**	**L.ANL.PD2.ENG.ME,70.00,;L.ANL.PD2.TECH.MT_W,140.00,;L.FNAL.PPD.MNG.PC,40.00,;L.FNAL.PPD.TECH.MT_W,140.00,**
1.4.3.4	**16-cell Horizontal (thin-wall) Extrusion Prototypes**	**420d**	**10Oct05**	**12Jun07**		
1.4.3.4.1	Prepare and issue RFP	20d	**10Oct05**	**04Nov05**	**1.4.3.1[FS]**	**L.ANL.PD2.ENG.ME,8.00,;L.ANL.PD2.SCI.PHY,40.00,**
1.4.3.4.2	Evaluate proposals and select vendor	5d	**30Nov05**	**06Dec05**	**1.4.3.4.1[FS+15d]**	**L.ANL.PD2.ENG.ME,8.00,;L.ANL.PD2.SCI.PHY,8.00,**
1.4.3.4.5	**Horizontal Extrusion Fabrication**	**385d**	**30Nov05**	**12Jun07**		
1.4.3.4.5.1	Prepare purchase order	5d	**30Nov05**	**06Dec05**	**1.4.3.4.2[SS]**	**L.FNAL.PPD.ENG.ME,8.00,**
1.4.3.4.5.2	Purchase order released (16-cell horizontals)	0	**07Dec05**	**07Dec05**	**1.4.3.4.5.1[FS]; 1.4.3.4.2[FS]**	
1.4.3.4.5.3	Fabricate tooling	100d	**14Dec05**	**08May06**	**1.4.3.4.5.2[FS+5d]**	**M.FNAL.PPD.MANDS,175000.00,**
1.4.3.4.5.4	Fabricate test extrusions	224d	**09May06**	**30Mar07**	**1.4.3.4.5.3[FS]**	**L.FNAL.PPD.ENG.ME,200.00,;M.FNAL.PPD.MANDS,30000.00,**
1.4.3.4.5.5	Fabricate test extrusions - 2HFY07	20d	**02Apr07**	**27Apr07**	**1.4.3.4.5.4[FS]**	**L.FNAL.PPD.ENG.ME,40.00,;M.FNAL.PPD.MANDS,10000.00,**
1.4.3.4.5.6	Adjust die	214d	**23May06**	**30Mar07**	**1.4.3.4.5.4[SS+10d]**	**M.FNAL.PPD.MANDS,20000.00,**
1.4.3.4.5.7	Adjust die - 2HFY07	30d	**02Apr07**	**11May07**	**1.4.3.4.5.6[FS]**	**M.FNAL.PPD.MANDS,5000.00,**



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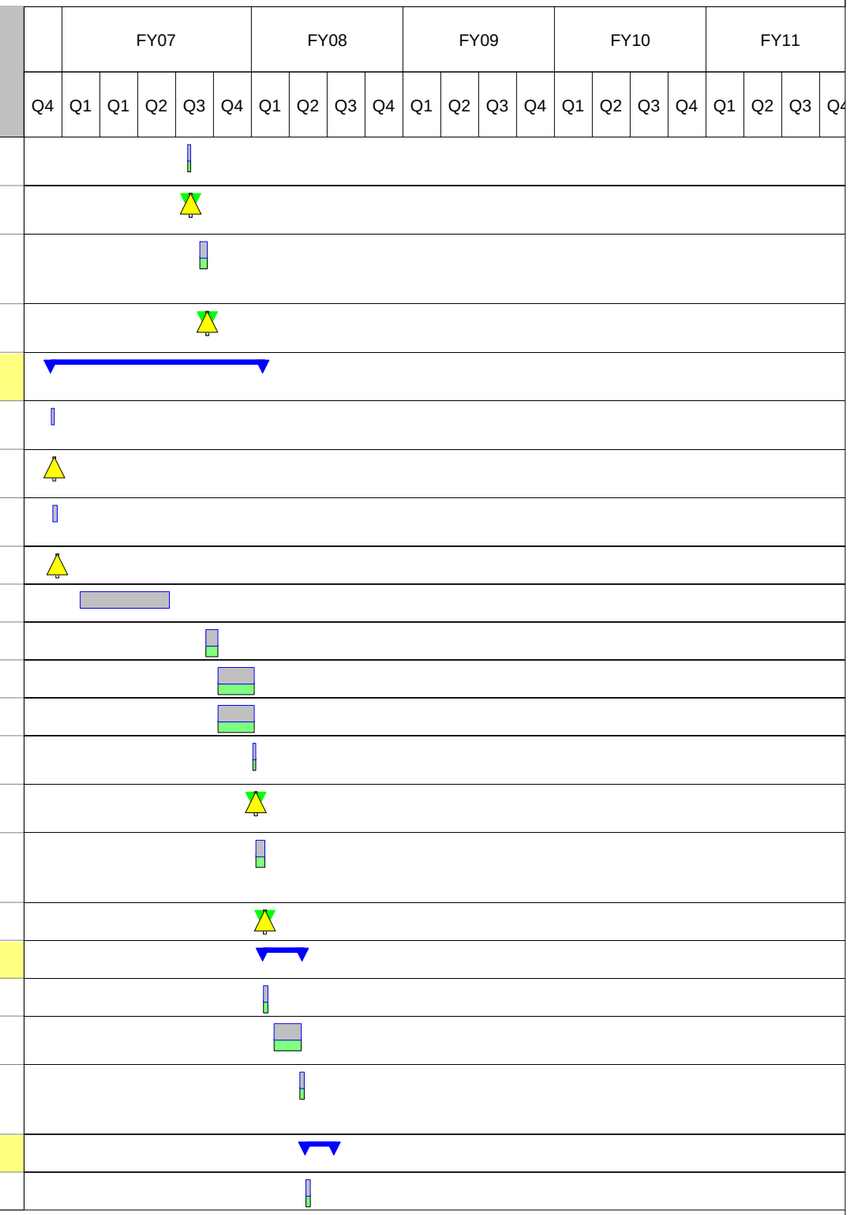
1.4.3.4.5.8	Finalize resin compound for horizontal extrusion prototypes	5d	30Apr07	04May07	1.4.3.4.5.5[FS]	L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,8.00,
1.4.3.4.5.9	16-cell horizontal extrusion prototypes specifications completed	0	04May07	04May07	1.4.3.4.5.6[FS]; 1.4.3.4.5.8[FS]	
1.4.3.4.5.10	Fabricate remaining extrusions	10d	30May07	12Jun07	1.4.3.4.5.5[FS]; 1.4.3.4.5.7[FS]; 1.4.3.4.5.9[FS]; 1.4.2.3.2.3[SS+15d]	M.FNAL.PPD.MANDS,67123.00,
1.4.3.4.5.11	16-cell horizontal extrusions for IPND completed	0	12Jun07	12Jun07	1.4.3.4.5.10[FS]	
1.4.3.5	**16-cell Vertical (thick-wall) Extrusion Prototypes**	**293d**	**05Sep06**	**01Nov07**		
1.4.3.5.1	Finalize specifications for vertical extrusion prototypes	5d	05Sep06	11Sep06		L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,8.00,
1.4.3.5.2	16-cell vertical extrusion prototype specifications completed	0	11Sep06	11Sep06	1.4.3.5.1[FS]	
1.4.3.5.3	Prepare PO for die inserts	5d	12Sep06	18Sep06	1.4.3.5.2[FS]	L.FNAL.PPD.ENG.ME,20.00,;L.ANL.PD2.SCI.PHY,20.00,
1.4.3.5.4	PO for die inserts released (16-cell verticals)	0	19Sep06	19Sep06	1.4.3.5.3[FS]	
1.4.3.5.5	Fabricate vertical die inserts	80d	14Nov06	14Mar07	1.4.3.5.4[FS+40d]	M.FNAL.PPD.MANDS,73000.00,
1.4.3.5.6	Modify die for vertical inserts	20d	13Jun07	11Jul07	1.4.3.4.5.11[FS]; 1.4.3.5.5[FS]	M.FNAL.PPD.MANDS,2000.00,
1.4.3.5.7	Fabricate test extrusions	60d	12Jul07	04Oct07	1.4.3.5.6[FS]	L.FNAL.PPD.ENG.ME,80.00,
1.4.3.5.8	Adjust die	60d	12Jul07	04Oct07	1.4.3.5.7[SS]	M.FNAL.PPD.MANDS,10000.00,
1.4.3.5.9	Finalize resin compound for vertical extrusion prototypes	5d	05Oct07	11Oct07	1.4.3.5.7[FS]	L.ANL.PD2.ENG.ME,8.00,;L.ANL.PD2.SCI.PHY,8.00,
1.4.3.5.10	16-cell vertical extrusion prototypes specifications completed	0	11Oct07	11Oct07	1.4.3.5.8[FS]; 1.4.3.5.9[FS]	
1.4.3.5.11	Fabricate remaining extrusions	15d	12Oct07	01Nov07	1.4.2.4.2.3[SS+15d]; 1.4.3.5.10[FS]	L.FNAL.PPD.ENG.ME,120.00,;M.FNAL.PPD.MANDS,100000.00,;L.FNAL.PPD.MNG.PC,24.00,;L.ANL.PD2.SCI.PHY,40.00,
1.4.3.5.12	16-cell vertical extrusions for IPND completed	0	01Nov07	01Nov07	1.4.3.5.11[FS]	
1.4.3.6	**Additional 16-cell Horizontal Extrusions**	**60d**	**02Nov07**	**04Feb08**		
1.4.3.6.1	Swap die inserts	5d	02Nov07	08Nov07	1.4.3.5.12[FS]	M.FNAL.PPD.MANDS,2000.00,
1.4.3.6.2	Fabricate test extrusions to adjust die	40d	27Nov07	28Jan08	1.4.2.5.3[SS+15d]; 1.4.3.6.1[FS]	M.FNAL.PPD.MANDS,10000.00,;L.FNAL.PPD.MNG.PC,16.00,;L.FNAL.PPD.ENG.ME,40.00,
1.4.3.6.3	Fabricate additional horizontal test extrusions	5d	29Jan08	04Feb08	1.4.3.6.2[FS]	L.ANL.PD2.SCI.PHY,24.00,;L.FNAL.PPD.MNG.PC,16.00,;M.FNAL.PPD.MANDS,10000.00,;L.FNAL.PPD.ENG.ME,40.00,
1.4.3.7	**Additional 16-cell Vertical Extrusions**	**50d**	**12Feb08**	**21Apr08**		
1.4.3.7.1	Swap die inserts	5d	12Feb08	18Feb08	1.4.3.6.3[FS+5d]	M.FNAL.PPD.MANDS,2000.00,



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WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.4.3.7.2	Fabricate test extrusions to adjust die	40d	19Feb08	14Apr08	1.4.2.6.3[SS+15d]; 1.4.3.7.1[FS]	L.ANL.PD2.SCI.PHY,16.00,;L.FNAL.PPD.MNG.PC,16.00,;L.FNAL.PPD.ENG.ME,40.00,;M.FNAL.PPD.MANDS,10000.00,
1.4.3.7.3	Fabricate additional vertical test extrusions	5d	15Apr08	21Apr08	1.4.3.7.2[FS]	M.FNAL.PPD.MANDS,10000.00,;L.FNAL.PPD.ENG.ME,40.00,;L.ANL.PD2.SCI.PHY,24.00,;L.FNAL.PPD.MNG.PC,16.00,
1.4.4	**Shipping & Handling**	**483d**	**03Jan06**	**30Nov07**		
1.4.4.1	Develop requirements	190d	03Jan06	29Sep06		L.FNAL.PPD.TECH.LDR,80.00,
1.4.4.2	Design preproduction prototype pallet system	200d	01Feb06	10Nov06	1.4.4.1[SS+20d]	L.FNAL.PPD.ENG.ME,80.00,;L.FNAL.PPD.TECH.LDR,320.00,;L.FNAL.PPD.ENG.DES,80.00,
1.4.4.3	Build preproduction prototype pallet system	233d	26Apr06	30Mar07	1.4.4.2[SS+60d]	M.FNAL.PPD.MANDS,1000.00,;L.FNAL.PPD.TECH.LDR,80.00,;L.FNAL.PPD.TECH.MT_W,160.00,
1.4.4.4	Build preproduction prototype pallet system - 2HFY07	85d	02Apr07	31Jul07	1.4.4.3[FS]	M.FNAL.PPD.MANDS,1000.00,;L.FNAL.PPD.TECH.MT_W,80.00,;L.FNAL.PPD.TECH.LDR,20.00,
1.4.4.40	Test preproduction prototype pallet system	213d	24May06	30Mar07	1.4.4.3[SS+20d]	L.FNAL.PPD.TECH.LDR,40.00,;L.FNAL.PPD.TECH.MT_W,160.00,
1.4.4.41	Test preproduction prototype pallet system - 2HFY07	95d	02Apr07	14Aug07	1.4.4.40[FS]	L.FNAL.PPD.TECH.MT_W,80.00,;L.FNAL.PPD.TECH.LDR,20.00,
1.4.4.50	Finalize preproduction prototype pallet system design	10d	15Aug07	28Aug07	1.4.4.41[FS]	L.FNAL.PPD.ENG.ME,16.00,;L.FNAL.PPD.TECH.LDR,40.00,;L.FNAL.PPD.ENG.DES,16.00,
1.4.4.60	Document shipping and handling plan	100d	09Apr07	28Aug07	1.4.4.1[FS]; 1.4.4.50[FF]	L.FNAL.PPD.TECH.LDR,120.00,
1.4.4.70	Design preproduction motion system	213d	24May06	30Mar07	1.4.4.1[SS+100d]	L.FNAL.PPD.ENG.DES,40.00,;L.FNAL.PPD.TECH.LDR,160.00,
1.4.4.71	Design preproduction motion system - 2HFY07	127d	02Apr07	28Sep07	1.4.4.70[FS]	L.FNAL.PPD.TECH.LDR,80.00,;L.FNAL.PPD.ENG.DES,40.00,
1.4.4.80	Procure preproduction motion system	63d	02Jan07	30Mar07	1.4.4.70[SS+150d]	L.FNAL.PPD.TECH.MT_W,80.00,;M.FNAL.PPD.MANDS,20000.00,;L.FNAL.PPD.TECH.LDR,40.00,
1.4.4.90	Build and test preproduction motion system	160d	02Apr07	14Nov07	1.4.4.80[FS]	M.FNAL.PPD.MANDS,5000.00,;L.ANL.PD2.TECH.MT_W,160.00,;L.FNAL.PPD.TECH.LDR,80.00,;L.FNAL.PPD.TECH.MT_W,40.00,
1.4.4.100	Finalize design of preproduction motion system	10d	15Nov07	30Nov07	1.4.4.90[FS]	L.FNAL.PPD.ENG.DES,40.00,;L.FNAL.PPD.TECH.LDR,40.00,
1.4.4.110	Document shipping and handling system design for production	20d	01Nov07	30Nov07	1.4.4.100[FF]	L.FNAL.PPD.ENG.DES,80.00,;L.FNAL.PPD.TECH.LDR,40.00,
1.4.5	**Quality Assurance Hardware Modifications**	**80d**	**04Mar08**	**24Jun08**		
1.4.5.1	Adapt prototype QA hardware to preproduction process-horizontal	80d	04Mar08	24Jun08	1.4.1.3.100[FS]	L.ANL.PD2.SCI.PHY,80.00,;L.ANL.PD2.ENG.ME,80.00,;L.ANL.PD2.TECH.ET_W,120.00,;M.ANL.PD.MANDS,20000.00,
1.4.5.2	Adapt prototype QA hardware to preproduction process-vertical	80d	04Mar08	24Jun08	1.4.5.1[SS]	L.ANL.PD2.ENG.ME,80.00,;L.ANL.PD2.SCI.PHY,80.00,;L.ANL.PD2.TECH.ET_W,120.00,;M.ANL.PD.MANDS,20000.00,
1.4.6	**Management - R&D Phase**	**752d**	**03Oct05**	**29Sep08**		
1.4.6.1	**FY06**	**250d**	**03Oct05**	**28Sep06**		

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Nova Project
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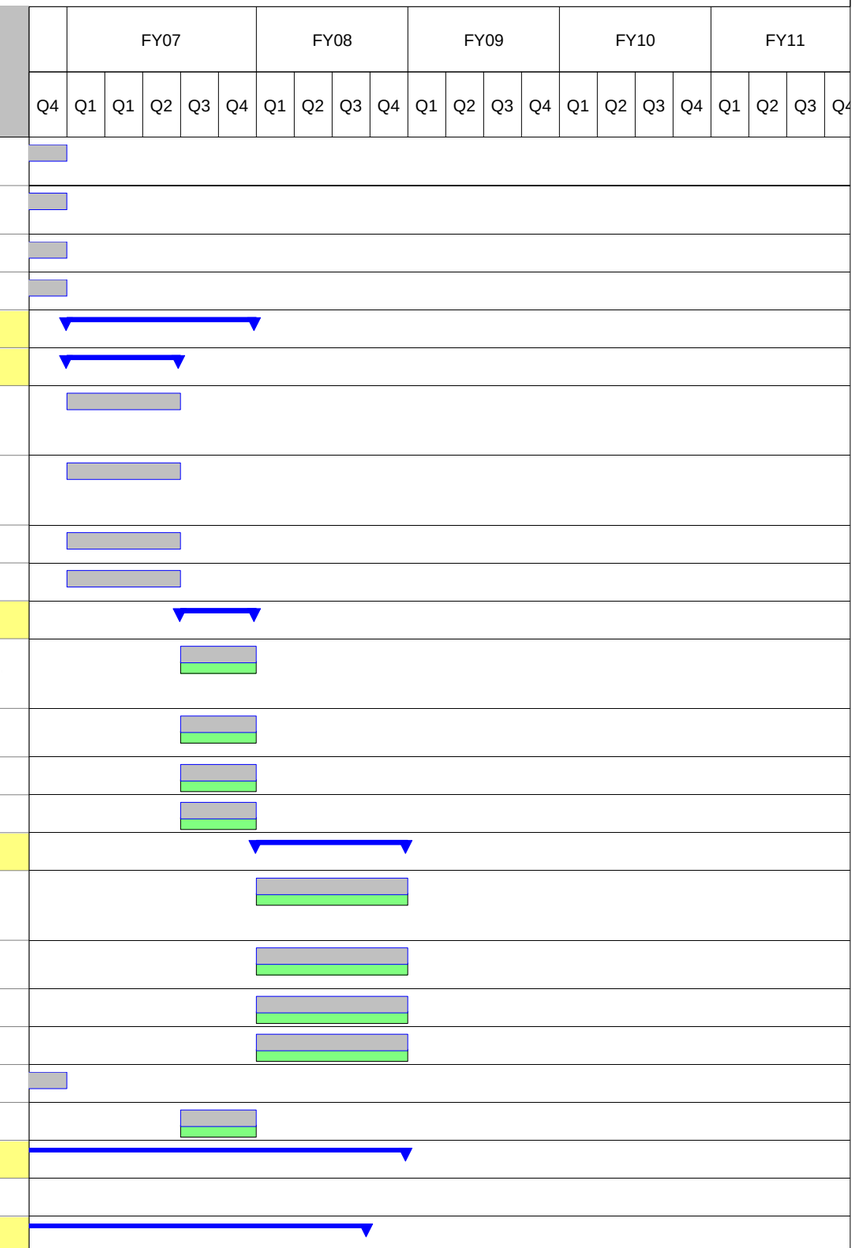
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.4.6.1.1	Labor	250d	03Oct05	28Sep06		L.ANL.PD2.SCI.PHY,750.00,;L.FNAL.PPD.ENG.ME,100.00,;L.FNAL.PPD.MNG.PC,100.00,
1.4.6.1.2	Travel	250d	03Oct05	28Sep06		M.ANL.PD.MANDS,5000.00,;M.FNAL.PPD.MANDS,5000.00,
1.4.6.1.3	Equipment	250d	03Oct05	28Sep06		
1.4.6.1.4	Materials and supplies	250d	03Oct05	28Sep06		
1.4.6.2	**FY07**	**250d**	**02Oct06**	**28Sep07**		
1.4.6.2.1	**1HFY07**	**123d**	**02Oct06**	**30Mar07**		
1.4.6.2.1.1	Labor	123d	02Oct06	30Mar07		L.FNAL.PPD.MNG.PC,50.00,;L.ANL.PD2.ENG.ME,50.00,;L.ANL.PD2.SCI.PHY,375.00,;L.FNAL.PPD.ENG.ME,50.00,
1.4.6.2.1.2	Travel	123d	02Oct06	30Mar07		M.ANL.PD.MANDS,3000.00,;M.FNAL.PPD.MANDS,10000.00,;L.CT.PD.TECH.MT_M,20.00,;M.CT.PD.MANDSPASS,2000.00,
1.4.6.2.1.3	Equipment	123d	02Oct06	30Mar07		
1.4.6.2.1.4	Materials and supplies	123d	02Oct06	30Mar07		
1.4.6.2.2	**2HFY07**	**127d**	**02Apr07**	**28Sep07**		
1.4.6.2.2.1	Labor	127d	02Apr07	28Sep07	1.4.6.2.1.1[FS]	L.FNAL.PPD.MNG.PC,50.00,;L.ANL.PD2.ENG.ME,50.00,;L.FNAL.PPD.ENG.ME,50.00,;L.ANL.PD2.SCI.PHY,375.00,
1.4.6.2.2.2	Travel	127d	02Apr07	28Sep07	1.4.6.2.1.2[FS]	M.FNAL.PPD.MANDS,10000.00,;M.ANL.PD.MANDS,3000.00,
1.4.6.2.2.3	Equipment	127d	02Apr07	28Sep07	1.4.6.2.1.3[FS]	
1.4.6.2.2.4	Materials and supplies	127d	02Apr07	28Sep07	1.4.6.2.1.4[FS]	
1.4.6.3	**FY08**	**251d**	**01Oct07**	**29Sep08**		
1.4.6.3.2	Labor	251d	01Oct07	29Sep08		L.FNAL.PPD.MNG.PC,100.00,;L.FNAL.PPD.ENG.ME,100.00,;L.ANL.PD2.SCI.PHY,750.00,;L.ANL.PD2.ENG.ME,100.00,
1.4.6.3.3	Travel	251d	01Oct07	29Sep08		M.FNAL.PPD.MANDS,10000.00,;M.ANL.PD.MANDS,3000.00,
1.4.6.3.4	Equipment	251d	01Oct07	29Sep08		
1.4.6.3.5	Materials and supplies	251d	01Oct07	29Sep08		
1.4.6.4	FY06 PVC Extrusion R&D Cost Account	250d	03Oct05	28Sep06		
1.4.6.5	FY07 PVC Extrusion R&D On-Project Cost Account	127d	02Apr07	28Sep07		
1.5	**PVC Module R&D**	**752d**	**03Oct05**	**29Sep08**		
1.5.1	Requirements	5d	03Oct05	07Oct05		
1.5.2	**End Seal R&D**	**623d**	**03Jan06**	**23Jun08**		



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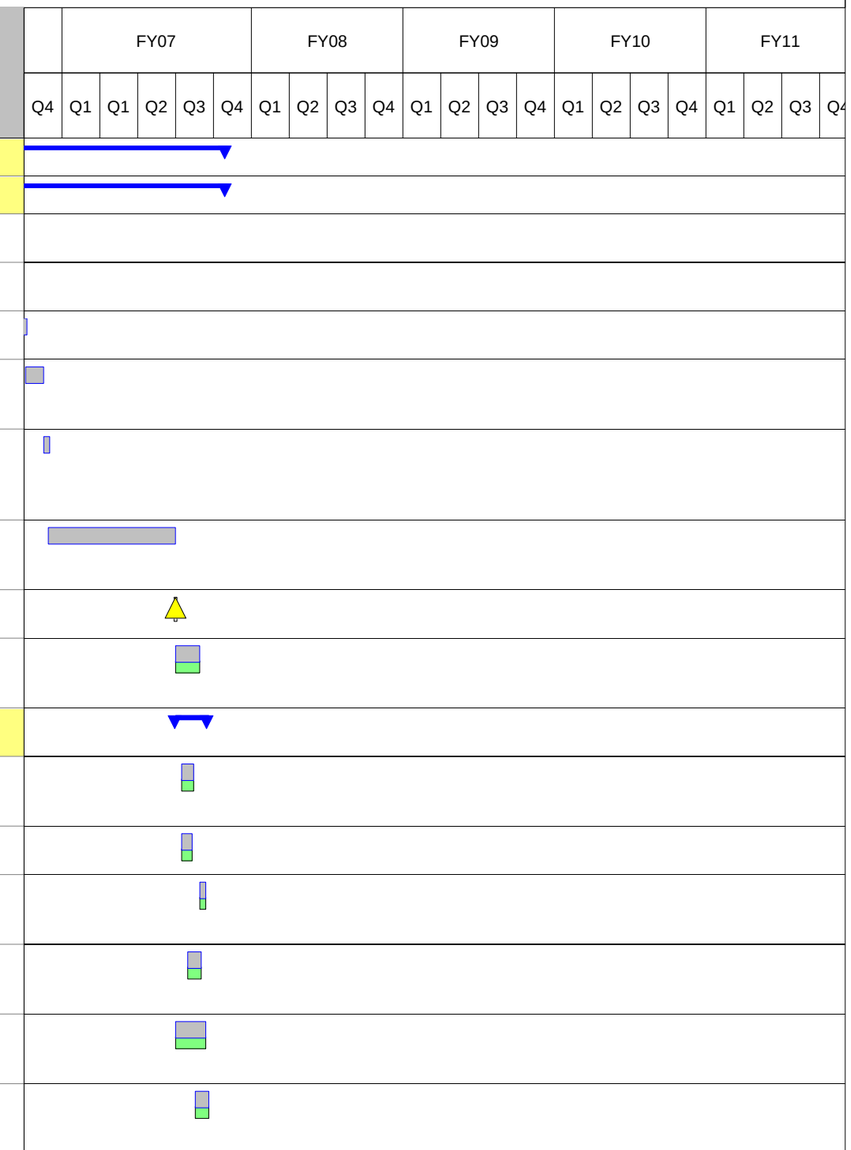
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.5.2.1	**Fiber Manifold R&D**	**398d**	**03Jan06**	**31Jul07**		
1.5.2.1.1	**Fiber Manifold Component R&D**	**398d**	**03Jan06**	**31Jul07**		
1.5.2.1.1.1	Design conceptual prototype manifolds	20d	**03Jan06**	**31Jan06**		**L.FNAL.PPD.SCI.PHY,80.00,;L.UMNTC.PD.SCI.PHY,80.00,;L.UMNTC.PD.ENG.ME,80.00,**
1.5.2.1.1.2	Manufacture conceptual prototype manifolds	20d	**01Feb06**	**28Feb06**	**1.5.2.1.1.1[FS]**	**M.UMNTC.PD.MANDSPASS,7000.00,;L.FNAL.PPD.ENG.ME,24.00,;L.UMNTC.PD.ENG.ME,24.00,**
1.5.2.1.1.3	Design functional prototype manifolds	90d	**01Mar06**	**06Jul06**	**1.5.2.1.1.2[FS]**	**L.UMNTC.PD.SCI.PHY,40.00,;L.UMNTC.PD.ENG.ME,160.00,;L.UMNTC.PD.TECH.LDR,80.00,**
1.5.2.1.1.4	Manufacture functional prototype manifolds	30d	**07Jul06**	**17Aug06**	**1.5.2.1.1.3[FS]**	**L.UMNTC.PD.ENG.ME,40.00,;M.UMNTC.PD.MANDSPASS,9000.00,;L.FNAL.PPD.TECH.MT_W,24.00,**
1.5.2.1.1.5	Test functional prototype manifolds	10d	**18Aug06**	**31Aug06**	**1.5.2.1.1.4[FS]**	**L.UMNTC.PD.SCI.PHY,10.00,;L.UMNTC.PD.TECH.UGRAD,10.00,;L.UMNTC.PD.ENG.COOP,10.00,;L.UMNTC.PD.ENG.ME,10.00,;L.UMNTC.PD.TECH.LDR,80.00,**
1.5.2.1.1.6	Design integration prototype manifold candidates	143d	**01Sep06**	**30Mar07**	**1.5.2.1.1.5[FS]**	**L.UMNTC.PD.SCI.PHY,88.00,;L.UMNTC.PD.ENG.ME,250.00,;L.UMNTC.PD.TECH.LDR,36.00,;L.UMNTC.PD.ENG.COOP,16.00,**
1.5.2.1.1.7	Integration prototype manifold concept selected	0	**30Mar07**	**30Mar07**	**1.5.2.1.1.6[FS]**	
1.5.2.1.1.8	Finalize integration prototype design	40d	**02Apr07**	**25May07**	**1.5.3.7[FF]; 1.5.2.1.1.7[FS]; 1.4.3.4.5.9[FF+10d]**	**L.UMNTC.PD.ENG.ME,16.00,;L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.ENG.COOP,40.00,;L.UMNTC.PD.SCI.PHY,40.00,**
1.5.2.1.1.9	**Integration Prototype Manifold Manufacturing**	**55d**	**02Apr07**	**18Jun07**		
1.5.2.1.1.9.1	Manufacture snout	20d	**16Apr07**	**11May07**	**1.5.2.1.1.8[SS+10d]**	**M.UMNTC.PD.MANDSPASS,8800.00,;L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.TECH.LDR,4.00,;L.UMNTC.PD.ENG.ME,8.00,**
1.5.2.1.1.9.2	Manufacture manifold covers	16d	**16Apr07**	**07May07**	**1.5.2.1.1.8[SS+10d]**	**M.UMNTC.PD.MANDSPASS,4920.00,;L.UMNTC.PD.TECH.LDR,4.00,;L.UMNTC.PD.SCI.PHY,8.00,**
1.5.2.1.1.9.3	Manufacture fill tubes	10d	**29May07**	**11Jun07**	**1.5.2.1.1.8[FS]**	**L.UMNTC.PD.ENG.ME,8.00,;M.UMNTC.PD.MANDSPASS,1000.00,;L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.TECH.LDR,4.00,**
1.5.2.1.1.9.4	Manufacture side and center seals	23d	**30Apr07**	**31May07**	**1.5.2.1.1.8[SS+20d]**	**M.UMNTC.PD.MANDSPASS,1480.00,;L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.ENG.ME,8.00,;L.UMNTC.PD.TECH.LDR,4.00,**
1.5.2.1.1.9.5	Fiber raceways	50d	**02Apr07**	**11Jun07**	**1.5.2.1.1.8[FS-40d]**	**M.UMNTC.PD.MANDSPASS,14000.00,;L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.TECH.LDR,4.00,;L.UMNTC.PD.ENG.ME,8.00,**
1.5.2.1.1.9.6	Fiber cover	20d	**21May07**	**18Jun07**	**1.5.2.1.1.8[FS-5d]**	**L.UMNTC.PD.SCI.PHY,8.00,;M.UMNTC.PD.MANDSPASS,1000.00,;L.UMNTC.PD.ENG.ME,8.00,;L.UMNTC.PD.TECH.LDR,4.00,**



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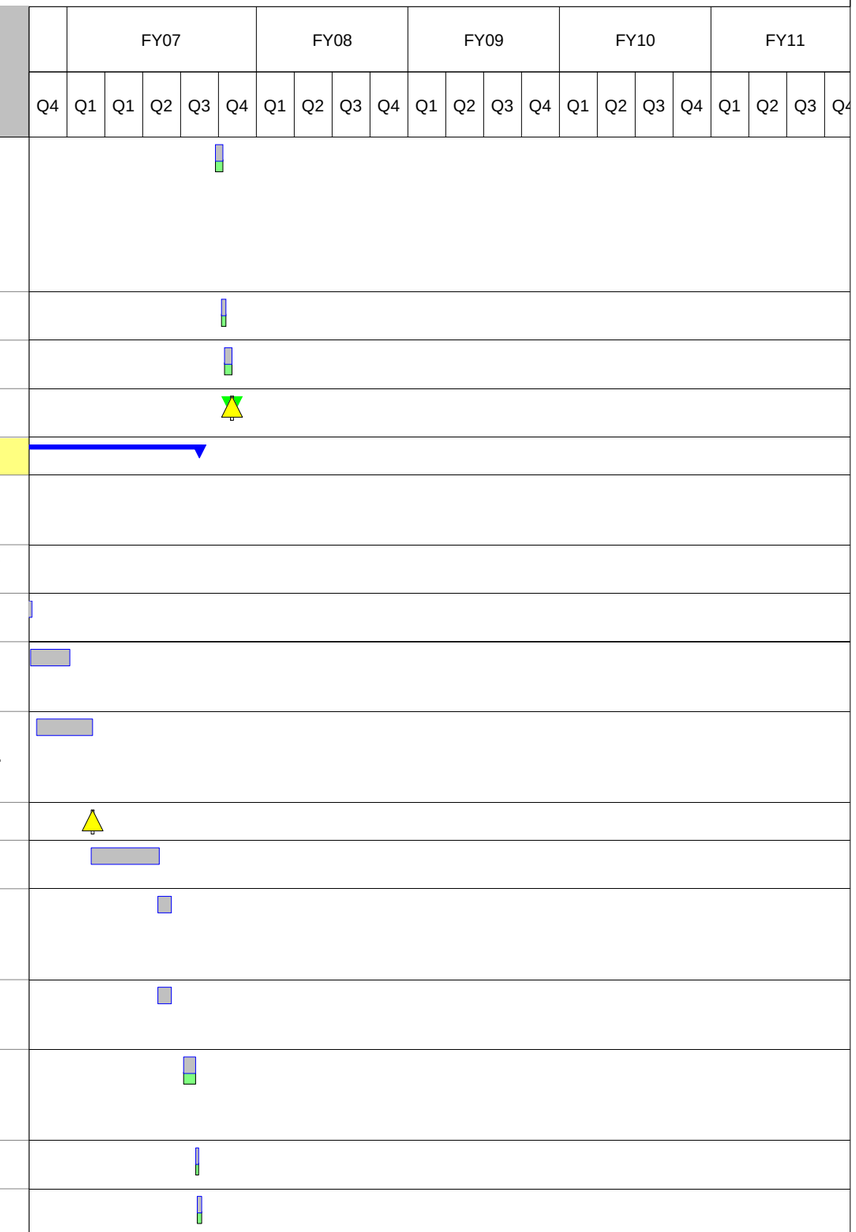
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.5.2.1.1.10	Test integration prototype manifolds	10d	26Jun07	10Jul07	1.5.2.3.2[FS]; 1.5.2.1.1.9.6[FS+5d]; 1.5.2.1.1.9.5[FS+5d]; 1.5.2.1.1.9.3[FS+5d]; 1.5.2.1.1.9.2[FS+5d]; 1.5.2.1.1.9.1[FS+5d]; 1.5.2.1.1.9.4[FS+5d]	L.UMNTC.PD.ENG.ME,20.00,;L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.ENG.COOP,20.00,;L.UMNTC.PD.SCI.PHY,20.00,
1.5.2.1.1.11	Review design	5d	11Jul07	17Jul07	1.5.2.1.1.10[FS]	L.UMNTC.PD.ENG.ME,20.00,;L.UMNTC.PD.SCI.PHY,20.00,;L.UMNTC.PD.TECH.LDR,20.00,
1.5.2.1.1.12	Finalize design of preproduction prototype (for IPND)	10d	18Jul07	31Jul07	1.5.2.1.1.11[FS]	L.UMNTC.PD.SCI.PHY,40.00,;L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.ENG.ME,80.00,
1.5.2.1.1.13	Preproduction prototype manifold design (for IPND) completed	0	31Jul07	31Jul07	1.5.2.1.1.12[FS]	
1.5.2.2	**End Plate R&D**	**348d**	**03Jan06**	**18May07**		
1.5.2.2.1	Design conceptual prototype	25d	03Jan06	07Feb06		L.UMNTC.PD.ENG.ME,40.00,;L.FNAL.PPD.ENG.ME,8.00,;L.UMNTC.PD.SCI.PHY,40.00,;L.FNAL.PPD.SCI.PHY,20.00,
1.5.2.2.2	Manufacture conceptual prototype	25d	08Feb06	14Mar06	1.5.2.2.1[FS]	M.UMNTC.PD.MANDSPASS,4000.00,;L.FNAL.PPD.TECH.MT_W,20.00,;L.UMNTC.PD.ENG.ME,8.00,
1.5.2.2.3	Design functional prototype	80d	15Mar06	06Jul06	1.5.2.2.2[FS]	L.UMNTC.PD.SCI.PHY,24.00,;L.UMNTC.PD.ENG.ME,40.00,;L.UMNTC.PD.ENG.COOP,40.00,
1.5.2.2.4	Manufacture functional prototype	65d	07Jul06	06Oct06	1.5.2.2.3[FS]	L.UMNTC.PD.ENG.ME,20.00,;M.FNAL.PPD.MANDS,5000.00,;L.FNAL.PPD.TECH.MT_W,50.00,;M.UMNTC.PD.MANDSPASS,5000.00,
1.5.2.2.5	Test functional prototype	90d	21Jul06	28Nov06	1.5.2.2.4[SS+10d]	L.UMNTC.PD.TECH.UGRAD,300.00,;L.UMNTC.PD.ENG.COOP,80.00,;L.UMNTC.PD.TECH.LDR,400.00,;L.UMNTC.PD.ENG.ME,40.00,;L.UMNTC.PD.SCI.PHY,300.00,
1.5.2.2.6	End plate integration prototype concept selected	0	28Nov06	28Nov06	1.5.2.2.5[FS]	
1.5.2.2.7	Design integration prototype	45d	29Nov06	06Feb07	1.5.2.2.6[FS]	L.UMNTC.PD.SCI.PHY,40.00,;L.UMNTC.PD.ENG.ME,24.00,;L.UMNTC.PD.TECH.LDR,24.00,
1.5.2.2.8	Manufacture end plate	20d	07Feb07	06Mar07	1.5.2.2.7[FS]	L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.ENG.ME,8.00,;L.FNAL.PPD.TECH.MT_W,50.00,;M.UMNTC.PD.MANDSPASS,5000.00,;L.UMNTC.PD.TECH.LDR,4.00,
1.5.2.2.9	Manufacture side and center seals	20d	07Feb07	06Mar07	1.5.2.2.7[FS]	L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.ENG.ME,8.00,;M.UMNTC.PD.MANDSPASS,1480.00,;L.UMNTC.PD.TECH.LDR,4.00,
1.5.2.2.10	Test integration prototype end plate	20d	09Apr07	04May07	1.5.2.3.2[FS+5d]; 1.5.2.2.8[FS]; 1.5.2.2.9[FS]	L.UMNTC.PD.SCI.PHY,80.00,;L.UMNTC.PD.TECH.LDR,80.00,;L.UMNTC.PD.ENG.COOP,40.00,;L.UMNTC.PD.TECH.UGRAD,160.00,;L.UMNTC.PD.ENG.ME,8.00,
1.5.2.2.11	Review design	5d	07May07	11May07	1.5.2.2.10[FS]	L.UMNTC.PD.SCI.PHY,16.00,;L.UMNTC.PD.ENG.ME,16.00,;L.UMNTC.PD.TECH.LDR,16.00,
1.5.2.2.12	Finalize design of preproduction prototype (for IPND)	5d	14May07	18May07	1.5.2.2.11[FS]	L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.SCI.PHY,24.00,;L.UMNTC.PD.ENG.ME,40.00,



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Nova Project
WBS 1.x - R & D
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WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.5.2.2.13	Design of preproduction prototype bottom plate (for IPND) completed	0	18May07	18May07	1.5.2.2.12[FS]	
1.5.2.3	**Joining Technology R&D**	**623d**	**03Jan06**	**23Jun08**		
1.5.2.3.1	Generate joining system concepts	40d	03Jan06	28Feb06		L.ANL.PD2.ENG.ME,40.00,;L.FNAL.PPD.SCI.PHY,80.00,;L.UMNTC.PD.ENG.COOP,40.00,;L.UMNTC.PD.SCI.PHY,80.00,;L.UMNTC.PD.ENG.ME,24.00,
1.5.2.3.2	Test adhesive joining technologies	80d	04Dec06	30Mar07	1.4.3.4.5.4[FF]; 1.5.2.3.1[FS]	L.FNAL.PPD.TECH.MT_W,200.00,;L.UMNTC.PD.TECH.UGRAD,480.00,;M.UMNTC.PD.MANDSPASS,14000.00,;L.UMNTC.PD.ENG.COOP,400.00,;L.UMNTC.PD.TECH.LDR,240.00,;L.UMNTC.PD.ENG.ME,40.00,;L.UMNTC.PD.SCI.PHY,240.00,
1.5.2.3.3	IPND adhesive selected	0	30Mar07	30Mar07	1.5.2.3.2[FS]	
1.5.2.3.4	Test RF welding technologies	100d	01Mar06	20Jul06	1.5.2.3.1[FS]	L.MSU.PD.SCI.PHY,80.00,;M.MSU.PD.MANDSPASS,40000.00,;L.UMNTC.PD.SCI.PHY,10.00,;L.UMNTC.PD.ENG.ME,10.00,
1.5.2.3.5	RF welding go/no go decision made	0	13Jul06	13Jul06	1.5.2.3.4[SS+95d]	
1.5.2.3.6	Mechanical lifetime tests of joining systems	300d	02Apr07	09Jun08	1.5.2.3.3[FS]	L.FNAL.PPD.SCI.PHY,160.00,;L.FNAL.PPD.TECH.MT_W,160.00,;L.UMNTC.PD.TECH.UGRAD,600.00,;L.UMNTC.PD.ENG.ME,80.00,;L.UMNTC.PD.ENG.COOP,300.00,;L.UMNTC.PD.SCI.PHY,160.00,;L.UMNTC.PD.TECH.LDR,160.00,
1.5.2.3.7	Chemical lifetime tests of joining systems	300d	02Apr07	09Jun08	1.5.2.3.3[FS]	L.UMNTC.PD.ENG.ME,24.00,;L.UMNTC.PD.SCI.PHY,300.00,;L.UMNTC.PD.ENG.COOP,300.00,;L.UMNTC.PD.TECH.UGRAD,300.00,;L.UMNTC.PD.TECH.LDR,160.00,
1.5.2.3.8	Document lifetime tests	10d	10Jun08	23Jun08	1.5.2.3.7[FS]; 1.5.2.3.6[FS]	L.UMNTC.PD.SCI.PHY,40.00,;L.UMNTC.PD.ENG.COOP,40.00,;L.UMNTC.PD.ENG.ME,4.00,
1.5.3	**Photo Detector Interface R&D**	**329d**	**01Feb06**	**21May07**		
1.5.3.1	Conceptual design-optical connector/manifold integration	20d	01Feb06	28Feb06	1.5.2.1.1.1[FS]	L.UMNTC.PD.ENG.COOP,10.00,;L.UMNTC.PD.SCI.PHY,40.00,;L.IU.PD.SCI.PHY,40.00,;L.IU.PD.ENG.ME,40.00,;L.UMNTC.PD.ENG.ME,40.00,
1.5.3.2	Conceptual design-optical connector/APD module integration	30d	01Feb06	14Mar06	1.5.2.1.1.1[FS]	L.IU.PD.SCI.PHY,80.00,;L.IU.PD.ENG.ME,64.00,;L.UMNTC.PD.SCI.PHY,16.00,;L.UMNTC.PD.ENG.ME,32.00,
1.5.3.3	Design functional prototype	118d	07Jul06	26Dec06	1.5.3.1[FS]; 1.5.2.1.1.3[FS]; 1.5.3.2[FS]	M.IU.PD.MANDSPASS,1500.00,;L.UMNTC.PD.ENG.ME,20.00,;L.IU.PD.ENG.ME,40.00,;M.UMNTC.PD.MANDSPASS,4000.00,;L.UMNTC.PD.SCI.PHY,16.00,;L.IU.PD.SCI.PHY,80.00,
1.5.3.4	Manufacture functional prototype	35d	12Jan07	02Mar07	1.5.3.3[FS+10d]	L.UMNTC.PD.ENG.ME,8.00,;M.UMNTC.PD.MANDSPASS,4000.00,;M.IU.PD.MANDSPASS,1500.00,;L.UMNTC.PD.SCI.PHY,8.00,;L.IU.PD.SCI.PHY,8.00,;L.UMNTC.PD.TECH.LDR,20.00,

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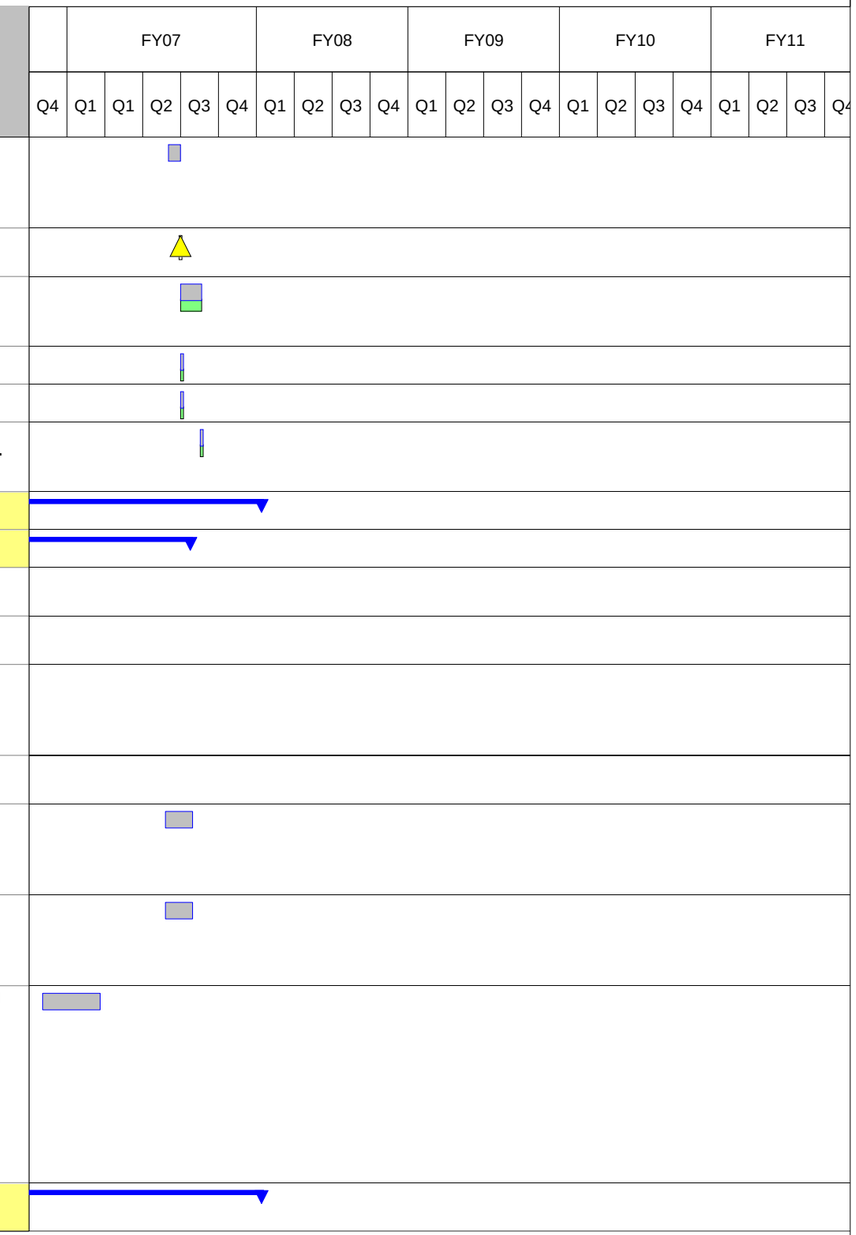
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.5.3.5	Test functional prototype	20d	05Mar07	30Mar07	1.5.3.4[FS]	L.UMNTC.PD.ENG.ME,16.00,;L.IU.PD.ENG.ME,16.00,;L.UMNTC.PD.TECH.UGRAD,40.00,;L.UMNTC.PD.TECH.LDR,20.00,;L.UMNTC.PD.SCI.PHY,40.00,;L.IU.PD.SCI.PHY,20.00,
1.5.3.6	Integration prototype optical connector design concept selected	0	30Mar07	30Mar07	1.5.3.5[FS]	
1.5.3.7	Design integration prototype	35d	02Apr07	18May07	1.5.3.6[FS]	L.UMNTC.PD.ENG.ME,40.00,;L.UMNTC.PD.SCI.PHY,16.00,;L.IU.PD.ENG.ME,40.00,;L.IU.PD.SCI.PHY,16.00,;L.UMNTC.PD.TECH.LDR,20.00,
1.5.3.8	Manufacture integration prototype (not needed)	1d	02Apr07	02Apr07	1.5.3.6[FS]	
1.5.3.9	Test integration prototype (not needed)	1d	02Apr07	02Apr07	1.5.3.6[FS]	
1.5.3.10	Review design	1d	21May07	21May07	1.5.3.7[FS]	L.UMNTC.PD.ENG.ME,8.00,;L.UMNTC.PD.TECH.LDR,8.00,;L.IU.PD.SCI.PHY,8.00,;L.UMNTC.PD.SCI.PHY,16.00,;L.IU.PD.ENG.ME,8.00,
1.5.4	**Module Factory R&D**	**454d**	**03Jan06**	**18Oct07**		
1.5.4.1	**Assembly Methods R&D**	**333d**	**03Jan06**	**27Apr07**		
1.5.4.1.1	Develop plan for unpacking extrusions from truck	45d	03Jan06	07Mar06		L.UMNTC.PD.TECH.LDR,80.00,;L.FNAL.PPD.SCI.PHY,40.00,;L.UMNTC.PD.SCI.PHY,80.00,
1.5.4.1.2	Develop plan for extrusion warehousing	45d	03Jan06	07Mar06	1.5.4.1.1[SS]	L.UMNTC.PD.TECH.LDR,20.00,;L.UMNTC.PD.SCI.PHY,80.00,;L.FNAL.PPD.SCI.PHY,40.00,
1.5.4.1.3	Investigate methods for extrusion fiber-stringing	30d	03Jan06	14Feb06		L.UMNTC.PD.TECH.UGRAD,120.00,;L.ANL.PD2.ENG.ME,20.00,;L.UMNTC.PD.ENG.DES,20.00,;L.UMNTC.PD.ENG.ME,16.00,;L.UMNTC.PD.SCI.PHY,240.00,
1.5.4.1.4	Investigate methods for manifold threading	30d	03Jan06	14Feb06		L.UMNTC.PD.TECH.UGRAD,240.00,;L.UMNTC.PD.SCI.PHY,80.00,;L.UMNTC.PD.ENG.ME,30.00,
1.5.4.1.5	Investigate methods for manifold gluing and sealing	45d	26Feb07	27Apr07	1.5.2.3.1[FS]; 1.4.3.4.5.4[FF+20d]	L.UMNTC.PD.TECH.LDR,80.00,;L.UMNTC.PD.TECH.UGRAD,240.00,;L.UMNTC.PD.ENG.ME,40.00,;L.UMNTC.PD.SCI.PHY,80.00,;M.UMNTC.PD.MANDS,5000.00,
1.5.4.1.6	Investigate methods for end plate gluing and sealing	45d	26Feb07	27Apr07	1.5.2.3.1[FS]; 1.4.3.4.5.4[FF+20d]	L.UMNTC.PD.TECH.LDR,120.00,;L.ANL.PD2.ENG.ME,40.00,;L.UMNTC.PD.SCI.PHY,80.00,;L.UMNTC.PD.TECH.UGRAD,1200.00,;L.UMNTC.PD.ENG.ME,40.00,
1.5.4.1.7	Develop methods to assemble two 16 cell extrusions into a 32 cell extrusion	95d	03Aug06	18Dec06	1.4.3.4.5.4[SS+60d]	M.FNAL.PPD.MANDS,1500.00,;L.UMNTC.PD.TECH.UGRAD,120.00,;L.ANL.PD2.SCI.PHY,10.00,;L.UMNTC.PD.TECH.LDR,120.00,;L.ANL.PD2.ENG.ME,40.00,;L.ANL.PD2.TECH.MT_W,40.00,;L.UMNTC.PD.SCI.PHY,40.00,;L.FNAL.PPD.TECH.MT_M,40.00,;L.FNAL.PPD.ENG.ME,20.00,;M.UMNTC.PD.MANDSPASS,5000.00,;L.UMNTC.PD.ENG.COOP,40.00,;L.FNAL.PPD.SCI.PHY,40.00,;M.ANL.PD.MANDSPASS,1500.00,
1.5.4.2	**Factory Material Handling, Tooling, & Fixtures R&D**	**424d**	**15Feb06**	**18Oct07**		



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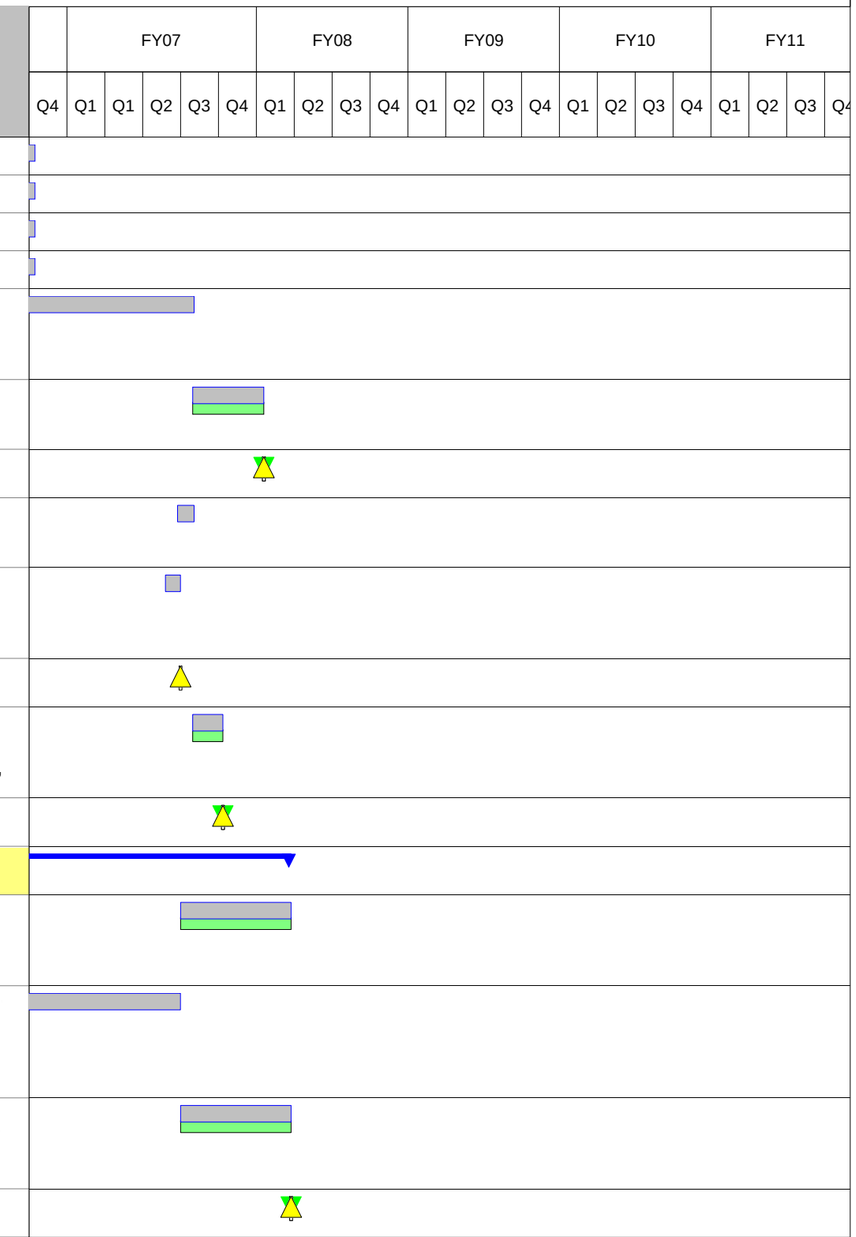
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.5.4.2.1	Investigate cart/dollies options	90d	08Mar06	13Jul06	1.5.4.1.2[FS]	L.UMNTC.PD.SCI.PHY,80.00,
1.5.4.2.2	Investigate shelving options	90d	08Mar06	13Jul06	1.5.4.1.2[FS]	L.UMNTC.PD.SCI.PHY,80.00,
1.5.4.2.3	Investigate extrusion lifter options	90d	08Mar06	13Jul06	1.5.4.1.2[FS]	L.UMNTC.PD.SCI.PHY,80.00,
1.5.4.2.4	Investigate work platform options	90d	08Mar06	13Jul06	1.5.4.1.2[FS]	L.UMNTC.PD.SCI.PHY,40.00,
1.5.4.2.5	Develop functional prototype thread spooling machine	304d	15Feb06	30Apr07	1.5.4.1.3[FS]	L.ANL.PD2.ENG.ME,80.00,;L.UMNTC.PD.ENG.ME,20.00,;M.UMNTC.PD.MANDSPASS,30000.00,;L.UMNTC.PD.ENG.DES,40.00,;L.UMNTC.PD.SCI.PHY,240.00,;L.UMNTC.PD.TECH.LDR,80.00,
1.5.4.2.6	Develop pre-production prototype extrusion fiber-stringing machine	120d	01May07	18Oct07	1.5.4.2.5[FS]	L.UMNTC.PD.ENG.DES,40.00,;L.UMNTC.PD.SCI.PHY,240.00,;M.UMNTC.PD.MANDSPASS,30000.00,;L.UMNTC.PD.TECH.LDR,80.00,
1.5.4.2.7	Prototype extrusion fiber-stringing machine for IPND ready to operate	0	18Oct07	18Oct07	1.5.4.2.6[FS]	
1.5.4.2.8	Develop extrusion puck and fiber mount	25d	27Mar07	30Apr07	1.5.4.2.5[FF]; 1.5.4.1.3[FS]	L.UMNTC.PD.ENG.DES,16.00,;L.UMNTC.PD.SCI.PHY,100.00,;L.UMNTC.PD.TECH.LDR,50.00,;M.UMNTC.PD.MANDSPASS,5000.00,
1.5.4.2.9	Develop fiber facing machine	25d	26Feb07	30Mar07	1.5.4.1.5[SS]	L.UMNTC.PD.ENG.ME,10.00,;L.UMNTC.PD.TECH.LDR,40.00,;M.UMNTC.PD.MANDSPASS,10000.00,;L.UMNTC.PD.TECH.UGRAD,50.00,;L.UMNTC.PD.SCI.PHY,40.00,
1.5.4.2.10	Prototype fiber facing machine for IPND ready to operate	0	30Mar07	30Mar07	1.5.4.2.9[FS]	
1.5.4.2.11	Develop end seal and manifold gluing machine	50d	01May07	11Jul07	1.5.4.1.6[FS]	M.UMNTC.PD.MANDSPASS,30000.00,;L.UMNTC.PD.SCI.PHY,40.00,;L.UMNTC.PD.TECH.LDR,80.00,;L.UMNTC.PD.TECH.UGRAD,80.00,;L.UMNTC.PD.ENG.ME,16.00,;L.UMNTC.PD.ENG.COOP,20.00,
1.5.4.2.12	Prototype gluing machine for IPND ready to operate	0	11Jul07	11Jul07	1.5.4.2.11[FS]	
1.5.5	**Quality Assurance and Quality Control Methods Development**	**468d**	**15Feb06**	**21Dec07**		
1.5.5.1	Develop methods for extrusion quality checkout	185d	02Apr07	21Dec07	1.4.3.4.5.4[FS]	L.UMNTC.PD.TECH.LDR,100.00,;L.UMNTC.PD.TECH.UGRAD,100.00,;M.UMNTC.PD.MANDSPASS,2000.00,;L.UMNTC.PD.SCI.PHY,50.00,
1.5.5.2	Develop methods for pressure testing	263d	15Mar06	30Mar07	1.5.2.2.2[FS]	L.UMNTC.PD.SCI.PHY,200.00,;L.UMNTC.PD.TECH.LDR,200.00,;L.UMNTC.PD.ENG.ME,36.00,;M.UMNTC.PD.MANDSPASS,20000.00,;L.UMNTC.PD.TECH.UGRAD,200.00,;L.UMNTC.PD.ENG.COOP,148.00,
1.5.5.3	Develop methods for pressure testing - 2HFY07	185d	02Apr07	21Dec07	1.5.5.2[FS]	L.UMNTC.PD.TECH.UGRAD,200.00,;L.UMNTC.PD.ENG.ME,40.00,;M.UMNTC.PD.MANDSPASS,20000.00,;L.UMNTC.PD.TECH.LDR,200.00,;L.UMNTC.PD.ENG.COOP,40.00,;L.UMNTC.PD.SCI.PHY,200.00,
1.5.5.4	Pressure-testing hardware for IPND production ready to operate	0	21Dec07	21Dec07	1.5.5.3[FS]	



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WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.5.5.5	Develop methods for verifying fiber mapping and fiber continuity	280d	15Feb06	27Mar07	1.5.4.1.3[FS]	L.UMNTC.PD.SCI.PHY,120.00,;L.UMNTC.PD.TECH.LDR,40.00,;M.UMNTC.PD.MANDSPASS,10000.00,;L.UMNTC.PD.TECH.UGRAD,200.00,
1.5.5.6	Develop methods for verifying fiber mapping and fiber continuity - 2HFY07	185d	02Apr07	21Dec07	1.5.5.5[FS]	L.UMNTC.PD.SCI.PHY,120.00,;L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.TECH.UGRAD,200.00,;M.UMNTC.PD.MANDSPASS,10000.00,
1.5.5.7	Fiber mapping and continuity hardware for IPND production ready to operate	0	21Dec07	21Dec07	1.5.5.6[FS]	
1.5.5.8	Develop methods for assuring fiber-face tolerance	185d	02Apr07	21Dec07	1.5.4.2.10[FS]	M.UMNTC.PD.MANDSPASS,2000.00,;L.UMNTC.PD.SCI.PHY,80.00,;L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.TECH.UGRAD,100.00,
1.5.6	Module shipping and storage R&D - 2HFY07	260d	03Apr07	14Apr08	1.5.7.3.9[FF]	L.UMNTC.PD.SCI.PHY,120.00,;L.UMNTC.PD.TECH.LDR,120.00,;L.UMNTC.PD.TECH.UGRAD,120.00,;L.FNAL.PPD.SCI.PHY,120.00,
1.5.7	**Integration Prototype Detector (IPND) Modules**	**529d**	**08Mar06**	**14Apr08**		
1.5.7.1	**Factory Preparation for Integration Prototype Near Detector Production**	**409d**	**08Mar06**	**18Oct07**		
1.5.7.1.1	Identify and acquire factory space	45d	08Mar06	09May06	1.5.4.1.1[FS]	L.UMNTC.PD.SCI.PHY,80.00,;L.UMNTC.PD.ENG.ME,8.00,
1.5.7.1.2	Acquire and install factory tools, fixtures, and other infrastructure	120d	02Oct06	27Mar07	1.5.7.1.1[FS+100d]	L.UMNTC.PD.TECH.UGRAD,1600.00,;L.UMNTC.PD.ENG.COOP,40.00,;L.UMNTC.PD.ENG.ME,16.00,;M.UMNTC.PD.MANDSPASS,60000.00,;L.UMNTC.PD.SCI.PHY,200.00,;L.UMNTC.PD.TECH.LDR,400.00,
1.5.7.1.3	Install and setup additional infrastructure and factory machines	100d	30May07	18Oct07	1.5.4.2.9[SS]; 1.5.4.2.8[SS]; 1.5.4.2.7[FF]; 1.5.7.1.2[FS]; 1.5.4.2.11[SS]	L.UMNTC.PD.ENG.ME,20.00,;L.UMNTC.PD.TECH.UGRAD,600.00,;M.UMNTC.PD.MANDSPASS,5000.00,;L.UMNTC.PD.TECH.LDR,200.00,;L.UMNTC.PD.SCI.PHY,160.00,
1.5.7.1.4	Develop initial versions of machine operating procedures	10d	05Oct07	18Oct07	1.5.7.1.3[FF]	L.UMNTC.PD.SCI.PHY,40.00,;L.UMNTC.PD.TECH.LDR,40.00,
1.5.7.3	**Integration Prototype Near Detector (IPND) Module Manufacturing**	**225d**	**22May07**	**14Apr08**		
1.5.7.3.1	**IPND Manifold Components**	**122d**	**22May07**	**12Nov07**		
1.5.7.3.1.1	Manufacture snout	90d	12Jun07	17Oct07	1.5.2.1.1.9.1[FS+20d]	L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.TECH.LDR,4.00,;M.UMNTC.PD.MANDSPASS,47000.00,;L.UMNTC.PD.ENG.ME,20.00,
1.5.7.3.1.2	Manufacture manifold covers	100d	22May07	11Oct07	1.5.2.1.1.9.2[FS+10d]	L.UMNTC.PD.SCI.PHY,8.00,;M.UMNTC.PD.MANDSPASS,75000.00,;L.UMNTC.PD.ENG.ME,10.00,;L.UMNTC.PD.TECH.LDR,4.00,
1.5.7.3.1.3	Manufacture fill tubes	20d	12Jun07	10Jul07	1.5.2.1.1.9.3[FS]	L.UMNTC.PD.ENG.ME,12.00,;M.UMNTC.PD.MANDSPASS,6000.00,;L.UMNTC.PD.TECH.LDR,4.00,;L.UMNTC.PD.SCI.PHY,8.00,
1.5.7.3.1.4	Manufacture side and center seals	100d	22Jun07	12Nov07	1.5.2.1.1.9.4[FS+15d]	L.UMNTC.PD.ENG.ME,20.00,;L.UMNTC.PD.SCI.PHY,8.00,;M.UMNTC.PD.MANDSPASS,32000.00,;L.UMNTC.PD.TECH.LDR,4.00,

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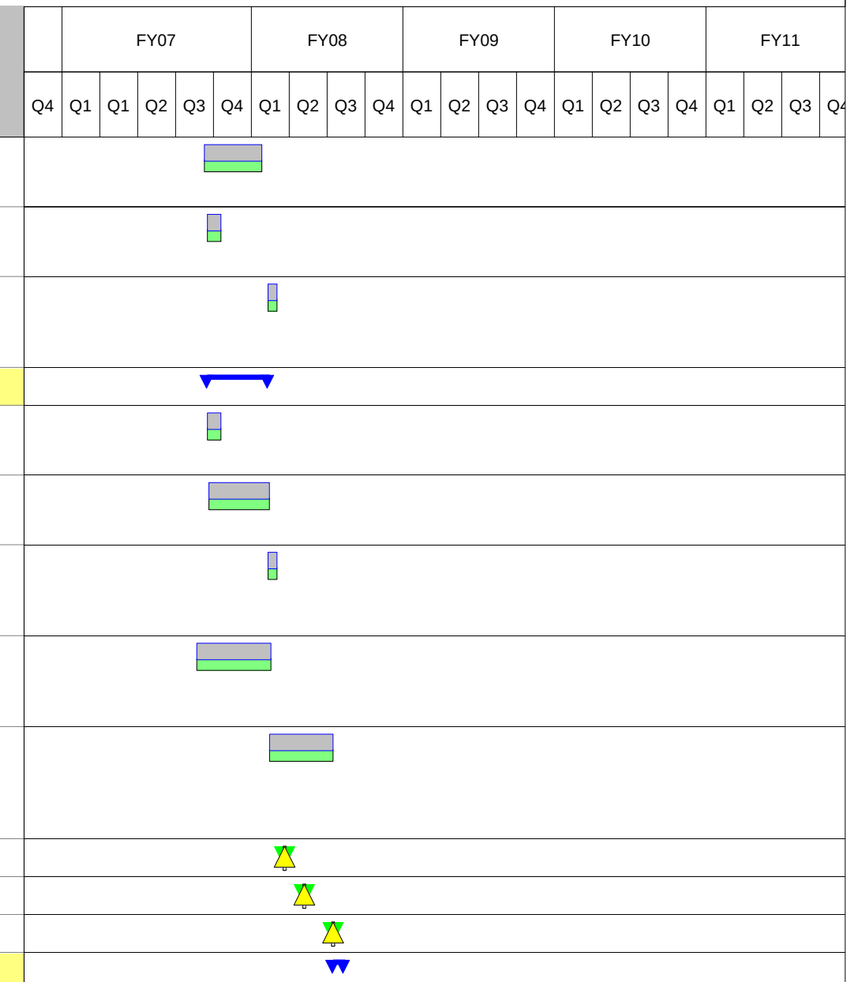
1.5.7.3.1.5	Manufacture fiber raceways	95d	12Jun07	24Oct07	1.5.2.1.1.9.5[FS]	L.UMNTC.PD.ENG.ME,40.00,;L.UMNTC.PD.SCI.PHY,8.00,;M.UMNTC.PD.MANDSPASS,160000.00,;L.UMNTC.PD.TECH.LDR,4.00,
1.5.7.3.1.6	Manufacture fiber covers	20d	19Jun07	17Jul07	1.5.2.1.1.9.6[FS]	L.UMNTC.PD.TECH.LDR,4.00,;L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.ENG.ME,8.00,;M.UMNTC.PD.MANDSPASS,15000.00,
1.5.7.3.2	Assemble and test IPND manifolds	10d	13Nov07	28Nov07	1.5.7.3.1.6[FS]; 1.5.7.3.1.4[FS]; 1.5.7.3.1.2[FS]; 1.5.7.3.1.1[FS]; 1.5.7.3.1.3[FS]; 1.5.7.3.1.5[FS]	L.UMNTC.PD.ENG.ME,10.00,;L.UMNTC.PD.TECH.UGRAD,80.00,;L.UMNTC.PD.SCI.PHY,40.00,;M.UMNTC.PD.MANDSPASS,2000.00,;L.UMNTC.PD.TECH.LDR,40.00,
1.5.7.3.3	**IPND End Plate Components**	**103d**	**19Jun07**	**12Nov07**		
1.5.7.3.3.1	Manufacture IPND end plates	20d	19Jun07	17Jul07	1.5.2.2.13[FS+20d]	M.UMNTC.PD.MANDSPASS,5000.00,;L.UMNTC.PD.SCI.PHY,8.00,;L.UMNTC.PD.ENG.ME,16.00,;L.UMNTC.PD.TECH.LDR,4.00,
1.5.7.3.3.2	Manufacture side and center seals	100d	22Jun07	12Nov07	1.5.7.3.1.4[SS]; 1.5.2.2.9[FS]	L.UMNTC.PD.TECH.LDR,4.00,;L.UMNTC.PD.ENG.ME,20.00,;M.UMNTC.PD.MANDSPASS,32000.00,;L.UMNTC.PD.SCI.PHY,8.00,
1.5.7.3.4	Assemble and test preproduction prototype (IPND) end plates and seals	10d	13Nov07	28Nov07	1.5.7.3.3.2[FS]; 1.5.7.3.3.1[FS]	L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.SCI.PHY,40.00,;L.UMNTC.PD.TECH.UGRAD,80.00,;M.UMNTC.PD.MANDSPASS,2000.00,;L.UMNTC.PD.ENG.ME,10.00,
1.5.7.3.5	Design, manufacture and document preproduction prototype (IPND) optical connectors	125d	22May07	15Nov07	1.5.3.10[FS]	M.UMNTC.PD.MANDSPASS,47000.00,;L.UMNTC.PD.SCI.PHY,20.00,;L.UMNTC.PD.TECH.LDR,8.00,;L.UMNTC.PD.ENG.ME,80.00,;L.IU.PD.SCI.PHY,40.00,;L.IU.PD.ENG.ME,24.00,
1.5.7.3.6	Produce IPND modules	100d	16Nov07	14Apr08	1.5.4.2.10[FS]; 1.5.7.1.3[FS]; 1.5.7.3.5[FS]; 1.4.3.4.5.11[FS]; 1.4.3.5.12[FF+25d]; 1.5.2.3.3[FS]; 1.5.7.3.4[SS]; 1.5.4.2.12[FS]; 1.5.7.3.2[SS]	L.UMNTC.PD.TECH.UGRAD,3200.00,;M.UMNTC.PD.MANDSPASS,6000.00,;L.UMNTC.PD.SCI.PHY,600.00,;L.UMNTC.PD.ENG.ME,40.00,;L.UMNTC.PD.TECH.LDR,600.00,
1.5.7.3.7	IPND modules for first 8-plane segment completed	0	17Dec07	17Dec07	1.5.7.3.6[SS+20d]	
1.5.7.3.8	IPND module production 50% complete	0	04Feb08	04Feb08	1.5.7.3.6[SS+50%]	
1.5.7.3.9	IPND module production completed	0	14Apr08	14Apr08	1.5.7.3.8[FS]; 1.5.7.3.6[FS]	
1.5.8	**Initial Production Module Specifications**	**20d**	**15Apr08**	**12May08**		
1.5.8.1	Document preproduction (IPND) prototype manifold	10d	15Apr08	28Apr08	1.5.7.3.2[FS]; 1.5.7.3.9[FS]	L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.ENG.COOP,80.00,;L.UMNTC.PD.SCI.PHY,40.00,;L.UMNTC.PD.ENG.ME,40.00,
1.5.8.2	Review manifold design	10d	29Apr08	12May08	1.5.8.1[FS]	L.FNAL.PPD.SCI.PHY,72.00,;L.UMNTC.PD.ENG.ME,24.00,;L.FNAL.PPD.ENG.ME,24.00,;L.UMNTC.PD.TECH.LDR,24.00,;L.UMNTC.PD.SCI.PHY,72.00,
1.5.8.3	Document preproduction (IPND) prototype bottom plate	10d	15Apr08	28Apr08	1.5.7.3.4[FS]; 1.5.7.3.9[FS]	L.UMNTC.PD.ENG.ME,16.00,;L.UMNTC.PD.TECH.LDR,40.00,;L.UMNTC.PD.SCI.PHY,16.00,;L.UMNTC.PD.ENG.COOP,40.00,



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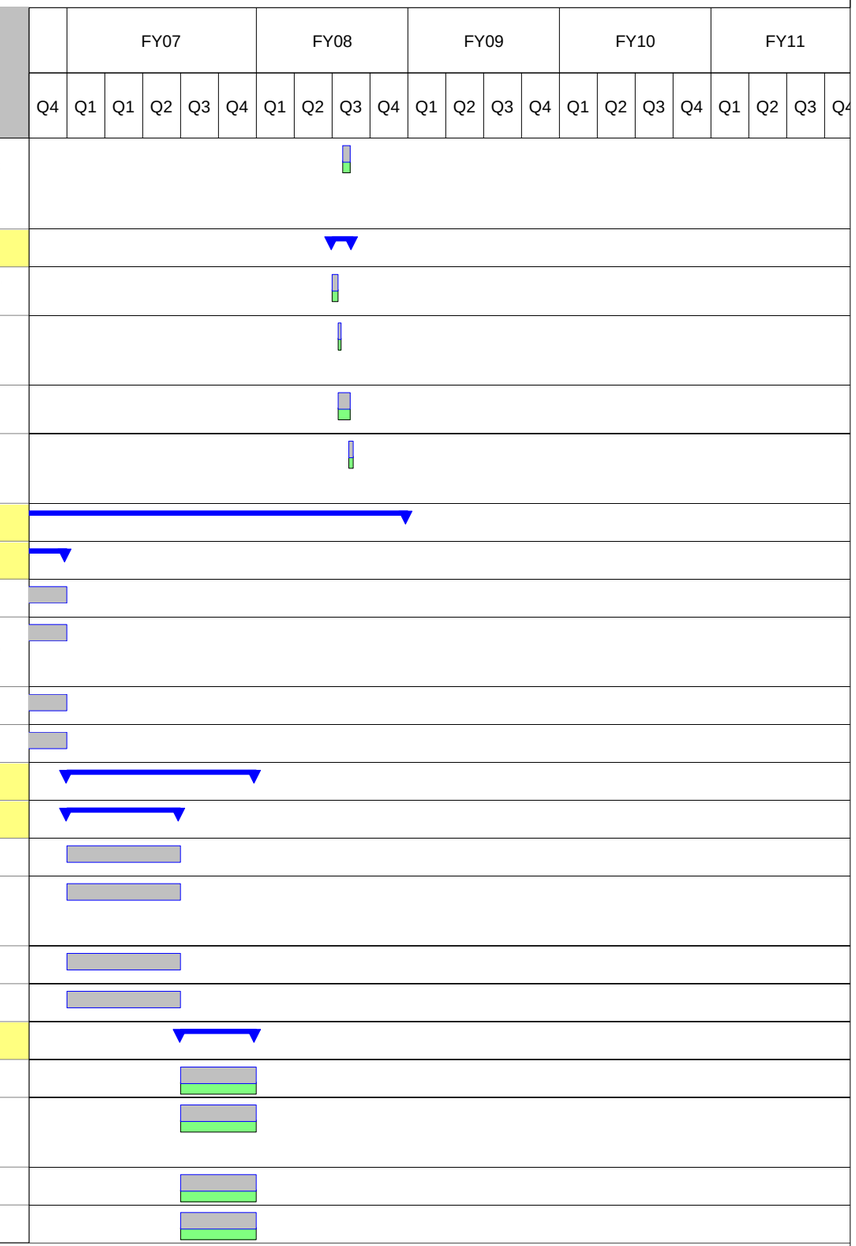
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.5.8.4	Review bottom plate design	10d	29Apr08	12May08	1.5.8.3[FS]	L.UMNTC.PD.SCI.PHY,32.00,;L.FNAL.PPD.SCI.PHY,32.00,;L.UMNTC.PD.ENG.ME,24.00,;L.UMNTC.PD.TECH.LDR,24.00,;L.FNAL.PPD.ENG.ME,24.00,
1.5.9	**Initial Factory Tooling Specifications**	**35d**	**01Apr08**	**19May08**		
1.5.9.1	Document assembly process, procedures, and training	10d	01Apr08	14Apr08	1.5.2.1.1.8[FS]; 1.8.3.4[FS]; 1.5.7.3.6[FF]	L.UMNTC.PD.TECH.LDR,80.00,;L.UMNTC.PD.ENG.ME,8.00,;L.UMNTC.PD.SCI.PHY,80.00,
1.5.9.2	Review assembly process, procedures, and training	5d	15Apr08	21Apr08	1.5.9.1[FS]	L.UMNTC.PD.SCI.PHY,20.00,;L.FNAL.PPD.ENG.ME,10.00,;L.FNAL.PPD.SCI.PHY,20.00,;L.UMNTC.PD.ENG.ME,8.00,;L.UMNTC.PD.TECH.LDR,16.00,
1.5.9.3	Document factory machines and functioning	20d	15Apr08	12May08	1.5.7.3.6[FS]	L.UMNTC.PD.ENG.ME,16.00,;L.UMNTC.PD.SCI.PHY,80.00,;L.UMNTC.PD.TECH.LDR,40.00,
1.5.9.4	Review factory machines and functioning	5d	13May08	19May08	1.5.9.3[FS]	L.UMNTC.PD.ENG.ME,8.00,;L.FNAL.PPD.ENG.ME,10.00,;L.FNAL.PPD.SCI.PHY,20.00,;L.UMNTC.PD.SCI.PHY,20.00,;L.UMNTC.PD.TECH.LDR,16.00,
1.5.10	**Management - R&D Phase**	**752d**	**03Oct05**	**29Sep08**		
1.5.10.1	**FY06**	**250d**	**03Oct05**	**28Sep06**		
1.5.10.1.1	Labor	250d	03Oct05	28Sep06		L.UMNTC.PD.SCI.PHY,200.00,
1.5.10.1.2	Travel	250d	03Oct05	28Sep06		M.ANL.PD.MANDS,1000.00,;M.UMNTC.PD.MANDSPASS,4000.00,;M.FNAL.PPD.MANDS,3000.00,
1.5.10.1.3	Equipment	250d	03Oct05	28Sep06		
1.5.10.1.4	Materials and supplies	250d	03Oct05	28Sep06		
1.5.10.2	**FY07**	**250d**	**02Oct06**	**28Sep07**		
1.5.10.2.6	**H1FY07**	**123d**	**02Oct06**	**30Mar07**		
1.5.10.2.6.1	Labor	123d	02Oct06	30Mar07		L.UMNTC.PD.SCI.PHY,100.00,
1.5.10.2.6.2	Travel	123d	02Oct06	30Mar07		M.ANL.PD.MANDS,1000.00,;M.FNAL.PPD.MANDS,2000.00,;M.UMNTC.PD.MANDSPASS,3000.00,
1.5.10.2.6.3	Equipment	123d	02Oct06	30Mar07		
1.5.10.2.6.4	Materials and supplies	123d	02Oct06	30Mar07		
1.5.10.2.8	**H2FY07**	**127d**	**02Apr07**	**28Sep07**		
1.5.10.2.8.1	Labor	127d	02Apr07	28Sep07		L.UMNTC.PD.SCI.PHY,100.00,
1.5.10.2.8.2	Travel	127d	02Apr07	28Sep07		M.FNAL.PPD.MANDS,12000.00,;M.ANL.PD.MANDS,1000.00,;M.UMNTC.PD.MANDSPASS,3000.00,
1.5.10.2.8.3	Equipment	127d	02Apr07	28Sep07		
1.5.10.2.8.4	Materials and supplies	127d	02Apr07	28Sep07		



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Nova Project
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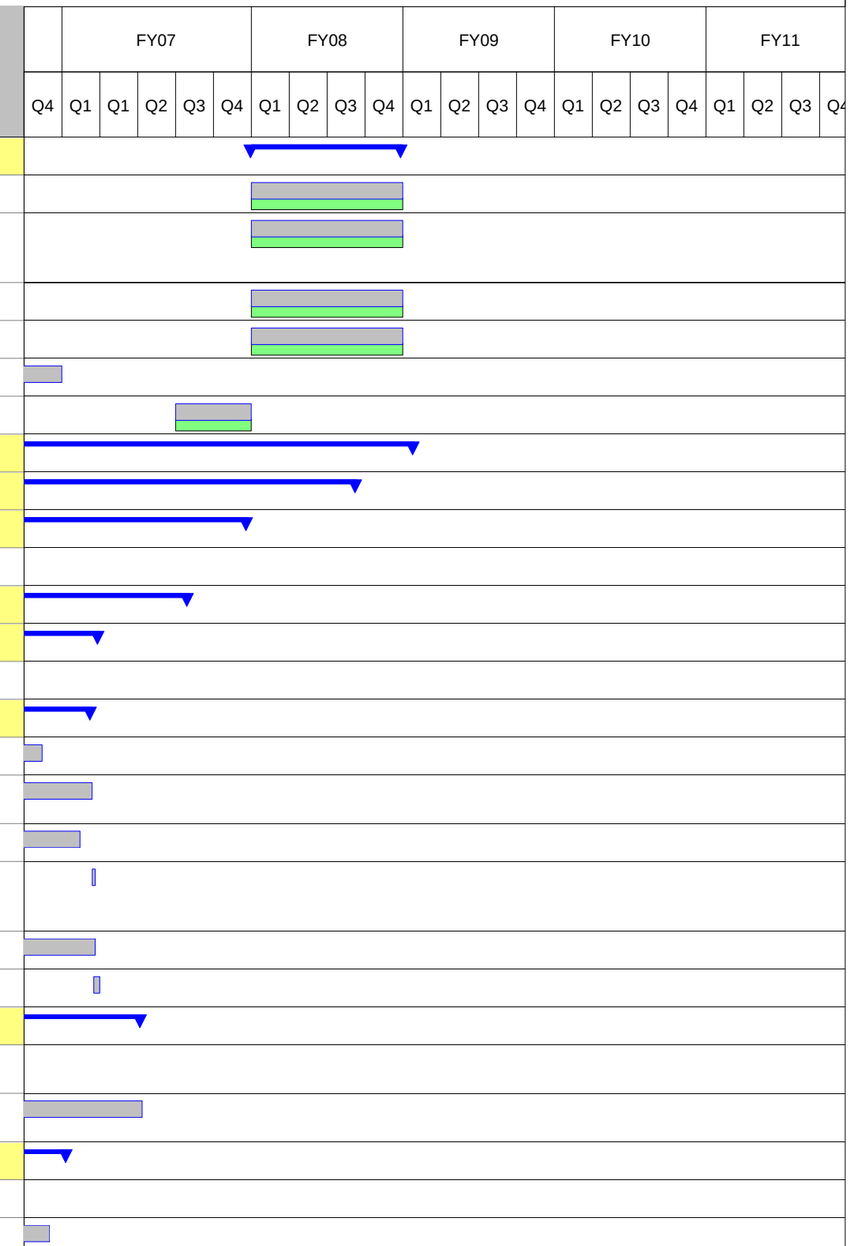
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.5.10.3	**FY08**	**251d**	**01Oct07**	**29Sep08**		
1.5.10.3.1	Labor	251d	**01Oct07**	**29Sep08**		**L.UMNTC.PD.SCI.PHY,200.00,**
1.5.10.3.2	Travel	251d	**01Oct07**	**29Sep08**		**M.FNAL.PPD.MANDS,4000.00,;M.ANL.PD. MANDS,2000.00,;M.UMNTC.PD. MANDSPASS,10000.00,**
1.5.10.3.3	Equipment	251d	**01Oct07**	**29Sep08**		
1.5.10.3.4	Materials and supplies	251d	**01Oct07**	**29Sep08**		
1.5.10.4	FY06 PVC Module R&D	250d	**03Oct05**	**28Sep06**		
1.5.10.5	FY07 PVC Module R&D	127d	**02Apr07**	**28Sep07**		
1.6	**Electronics R&D**	**774d**	**03Oct05**	**29Oct08**		
1.6.1	**APD Modules**	**675d**	**03Oct05**	**10Jun08**		
1.6.1.1	**Prototypes**	**496d**	**03Oct05**	**21Sep07**		
1.6.1.1.1	Prepare prototype specifications	5d	**03Oct05**	**07Oct05**		
1.6.1.1.2	**First Prototype**	**396d**	**03Oct05**	**01May07**		
1.6.1.1.2.1	**PCB**	**270d**	**01Dec05**	**28Dec06**		
1.6.1.1.2.1.1	Design	20d	**01Dec05**	**29Dec05**		**L.HU.PD.TECH.ET_M,80.00,**
1.6.1.1.2.1.2	**Fabricate**	**240d**	**03Jan06**	**12Dec06**		
1.6.1.1.2.1.2.1	Fabricate (HU)	155d	**03Jan06**	**10Aug06**	**1.6.1.1.2.1.1[FS]**	**M.HU.PD.MANDSPASS,2000.00,**
1.6.1.1.2.1.2.2	Fabricate (MINN)	240d	**03Jan06**	**12Dec06**	**1.6.1.1.2.1.1[FS]**	**L.UMNTC.PD.SCI.PHY,40.00,;M.UMNTC.PD. MANDSPASS,10000.00,**
1.6.1.1.2.1.2.3	Fabricate (FNAL)	220d	**03Jan06**	**10Nov06**	**1.6.1.1.2.1.1[FS]**	**M.UMNTC.PD.MANDSPASS,20000.00,**
1.6.1.1.2.1.3	Process	5d	**13Dec06**	**19Dec06**	**1.6.1.1.2.1.2.1[FS]; 1.6.1.1.2.1.2.2[FS]; 1.6.1.1.2.1.2.3[FS]**	**M.UMNTC.PD.MANDSPASS,2000.00,;L.UMNTC. PD.SCI.PHY,16.00,**
1.6.1.1.2.1.4	Qualify for mounting	245d	**03Jan06**	**19Dec06**	**1.6.1.1.2.1.2.1[SS]**	**L.UMNTC.PD.SCI.PHY,60.00,**
1.6.1.1.2.1.5	Ship to manufacturer	5d	**20Dec06**	**28Dec06**	**1.6.1.1.2.1.3[FS]**	**M.UMNTC.PD.MANDSPASS,20.00,**
1.6.1.1.2.2	**APD Detector Array**	**316d**	**03Oct05**	**08Jan07**		
1.6.1.1.2.2.1	Specify	5d	**03Oct05**	**07Oct05**		**L.HU.PD.ENG.EE_SR,8.00,;L.UMNTC.PD.SCI. PHY,16.00,**
1.6.1.1.2.2.2	Manufacture	145d	**08Jun06**	**08Jan07**	**1.6.1.1.2.2.1[FS]; 1.6.1.1.2.1.2.1[SS+110d]**	**M.FNAL.PPD.MANDS,180000.00,**
1.6.1.1.2.3	**Module**	**160d**	**01Mar06**	**13Oct06**		
1.6.1.1.2.3.1	Design	80d	**01Mar06**	**21Jun06**		**L.IU.PD.ENG.ME,48.00,**
1.6.1.1.2.3.2	Fabricate prototype	50d	**22Jun06**	**31Aug06**	**1.6.1.1.2.3.1[FS]**	**M.IU.PD.MANDSPASS,5000.00,**



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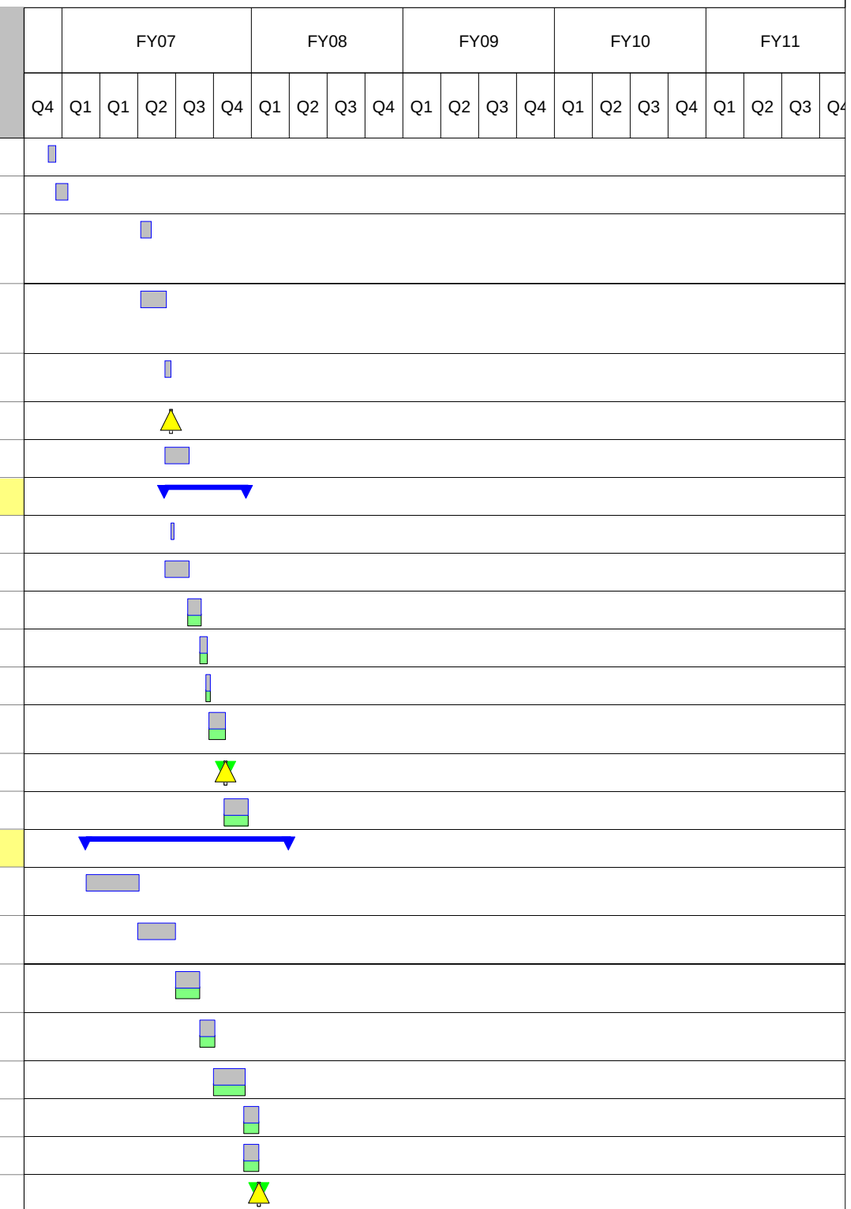
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.6.1.1.2.3.3	Assemble	10d	01Sep06	15Sep06	1.6.1.1.2.3.2[FS]	L.IU.PD.TECH.MT_W,40.00,
1.6.1.1.2.3.4	Test	20d	18Sep06	13Oct06	1.6.1.1.2.3.3[FS]	L.IU.PD.TECH.MT_W,40.00,
1.6.1.1.2.4	Assemble detector	15d	09Jan07	30Jan07	1.6.1.1.2.1.5[FS]; 1.6.1.1.2.3.4[FS]; 1.6.1.1.2.2.2[FS]	L.IU.PD.TECH.MT_W,8.00,;L.CT.PD.TECH.MT_W,8.00,
1.6.1.1.2.5	Test	40d	09Jan07	06Mar07	1.6.1.1.2.2.2[FS]	L.CT.PD.SCI.PHY,16.00,;L.IU.PD.TECH.MT_W,40.00,;L.CT.PD.TECH.MT_W,16.00,;L.CT.PD.TECH.UGRAD,80.00,
1.6.1.1.2.6	Qualify	10d	07Mar07	20Mar07	1.6.1.1.2.5[FS]	L.UMNTC.PD.SCI.PHY,4.00,;L.CT.PD.SCI.PHY,8.00,
1.6.1.1.2.7	APD module first prototypes qualified	0	20Mar07	20Mar07	1.6.1.1.2.6[FS]	
1.6.1.1.2.8	APD module value engineering - prototype 1	40d	07Mar07	01May07	1.6.1.1.2.5[FS]	L.IU.PD.TECH.MT_W,160.00,
1.6.1.1.3	**Second Prototype**	**140d**	**07Mar07**	**21Sep07**		
1.6.1.1.3.1	Procure prototype APDs	5d	21Mar07	27Mar07	1.6.1.1.2.7[FS]	M.FNAL.PPD.MANDS,40000.00,
1.6.1.1.3.2	Revise module design	40d	07Mar07	01May07	1.6.1.1.2.5[FS]	L.IU.PD.ENG.ME,160.00,
1.6.1.1.3.3	Fabricate second module	20d	02May07	30May07	1.6.1.1.3.2[FS]	M.IU.PD.MANDSPASS,15000.00,
1.6.1.1.3.4	Assemble module	10d	31May07	13Jun07	1.6.1.1.3.3[FS]	L.IU.PD.TECH.MT_W,40.00,
1.6.1.1.3.5	Assemble prototype	5d	14Jun07	20Jun07	1.6.1.1.3.1[FS]; 1.6.1.1.3.4[FS]	L.CT.PD.TECH.MT_W,24.00,
1.6.1.1.3.6	Test second prototype	25d	21Jun07	26Jul07	1.6.1.1.3.5[FS]	L.CT.PD.TECH.MT_W,8.00,;L.IU.PD.TECH.MT_W,40.00,;L.CT.PD.TECH.UGRAD,40.00,
1.6.1.1.3.7	APD modules second prototype completed	0	26Jul07	26Jul07	1.6.1.1.3.6[FS]	
1.6.1.1.3.8	APD module value engineering - prototype 2	40d	27Jul07	21Sep07	1.6.1.1.2.8[FS]; 1.6.1.1.3.7[FS]	L.IU.PD.TECH.MT_W,160.00,
1.6.1.2	**QA/QC Stations**	**271d**	**01Dec06**	**03Jan08**		
1.6.1.2.1	Specify	20d	01Dec06	03Jan07		L.UMNTC.PD.TECH.ET_M,80.00,;L.UMNTC.PD.SCI.PHY,8.00,
1.6.1.2.2	Design - 1	61d	04Jan07	30Mar07	1.6.1.2.1[FS]	L.UMNTC.PD.SCI.PHY,4.00,;L.UMNTC.PD.TECH.ET_M,100.00,
1.6.1.2.3	Design - 2	40d	02Apr07	25May07	1.6.1.2.2[FS]	L.UMNTC.PD.TECH.ET_M,100.00,;L.UMNTC.PD.SCI.PHY,4.00,
1.6.1.2.4	Manufacture	25d	29May07	02Jul07	1.6.1.2.3[FS]	L.UMNTC.PD.TECH.ET_M,100.00,;M.UMNTC.PD.MANDSPASS,20000.00,
1.6.1.2.5	Program	50d	03Jul07	12Sep07	1.6.1.2.4[FS]	L.UMNTC.PD.TECH.ET_M,200.00,
1.6.1.2.6	Qualify	25d	13Sep07	17Oct07	1.6.1.2.5[FS]	L.UMNTC.PD.TECH.ET_M,75.00,
1.6.1.2.7	Document	25d	13Sep07	17Oct07	1.6.1.2.6[SS]	L.UMNTC.PD.TECH.ET_M,25.00,
1.6.1.2.8	First QA/QC station ready	0	17Oct07	17Oct07	1.6.1.2.6[FS]; 1.6.1.2.7[FS]	



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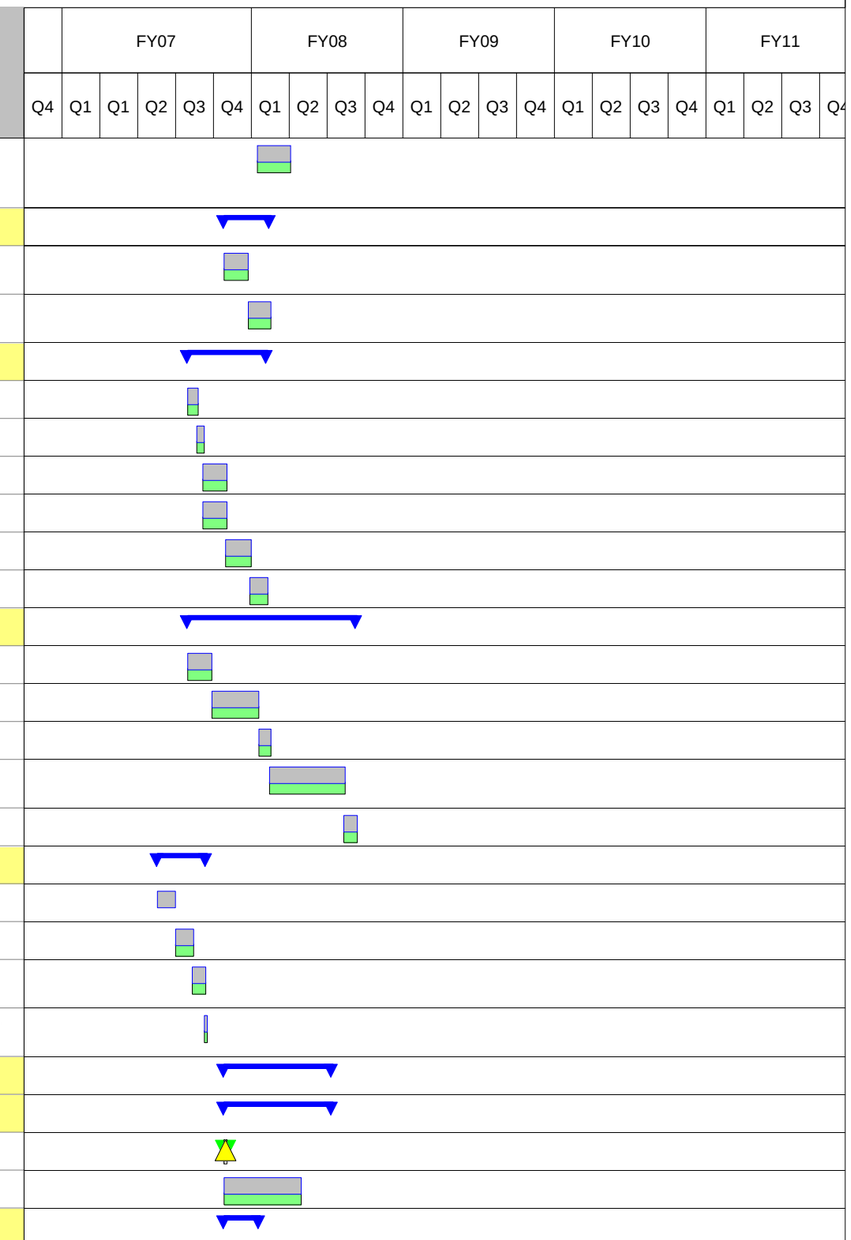
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.6.1.2.9	Manufacture two copies	50d	18Oct07	03Jan08	1.6.1.2.8[FS]	L.UMNTC.PD.TECH.ET_W,200.00,;L.UMNTC.PD.TECH.ET_M,200.00,;M.UMNTC.PD.MANDSPASS,20000.00,
1.6.1.2.10	**Quick Tester for Installation**	**80d**	**27Jul07**	**16Nov07**		
1.6.1.2.10.1	Design	40d	27Jul07	21Sep07	1.6.1.1.3.7[FS]	L.UMNTC.PD.SCI.PHY,16.00,;L.UMNTC.PD.TECH.ET_M,160.00,
1.6.1.2.10.2	Build	40d	24Sep07	16Nov07	1.6.1.2.10.1[FS]	M.UMNTC.PD.MANDSPASS,15000.00,;L.UMNTC.PD.TECH.ET_M,160.00,
1.6.1.3	**Water Cooling**	**135d**	**01May07**	**08Nov07**		
1.6.1.3.1	Model water flow	15d	01May07	21May07		L.UMNTC.PD.TECH.ET_M,60.00,
1.6.1.3.2	Design test for model	10d	22May07	05Jun07	1.6.1.3.1[FS]	L.UMNTC.PD.TECH.ET_M,40.00,
1.6.1.3.3	Procure manifolds	40d	06Jun07	01Aug07	1.6.1.3.2[FS]	M.UMNTC.PD.MANDSPASS,19200.00,
1.6.1.3.4	Procure other components	40d	06Jun07	01Aug07	1.6.1.3.3[SS]	M.UMNTC.PD.MANDSPASS,4800.00,
1.6.1.3.5	Assemble and test hardware	40d	02Aug07	27Sep07	1.6.1.3.3[FS]; 1.6.1.3.4[FS]	L.UMNTC.PD.TECH.ET_W,160.00,
1.6.1.3.6	Water cooling value engineering	30d	28Sep07	08Nov07	1.6.1.3.5[FS]	L.UMNTC.PD.TECH.ET_M,100.00,
1.6.1.4	**Direct Refrigerant Cooling**	**280d**	**01May07**	**10Jun08**		
1.6.1.4.1	Prepare specifications	40d	01May07	26Jun07		L.FNAL.PPD.ENG.ME,120.00,
1.6.1.4.2	Design system	80d	27Jun07	18Oct07	1.6.1.4.1[FS]	L.FNAL.PPD.ENG.ME,240.00,
1.6.1.4.3	Procure components	20d	19Oct07	15Nov07	1.6.1.4.2[FS]	M.FNAL.PPD.MANDS,5500.00,
1.6.1.4.4	Assemble and test hardware	120d	16Nov07	12May08	1.6.1.4.3[FS]	L.FNAL.PPD.ENG.ME,200.00,;L.FNAL.PPD.TECH.MT_W,280.00,
1.6.1.4.5	Document results	20d	13May08	10Jun08	1.6.1.4.4[FS]	L.FNAL.PPD.ENG.ME,40.00,
1.6.1.5	**Electronics Box**	**81d**	**19Feb07**	**12Jun07**		
1.6.1.5.1	Design electronics box - 1	30d	19Feb07	30Mar07		L.IU.PD.ENG.ME,60.00,
1.6.1.5.2	Design electronics box - 2	30d	02Apr07	11May07	1.6.1.5.1[FS]	L.IU.PD.ENG.ME,60.00,
1.6.1.5.3	Prototype electronics box	20d	14May07	11Jun07	1.6.1.5.2[FS]	M.IU.PD.MANDSPASS,500.00,;L.IU.PD.TECH.ET_W,80.00,
1.6.1.5.4	Qualify electronics box for production	1d	12Jun07	12Jun07	1.6.1.5.3[FS]	L.IU.PD.SCI.PHY,8.00,;L.UMNTC.PD.ENG.ME_SR,8.00,;L.CT.PD.SCI.PHY,8.00,;L.IU.PD.ENG.ME,8.00,
1.6.1.6	**Integration Prototype Detector**	**178d**	**27Jul07**	**11Apr08**		
1.6.1.6.1	**Module Production**	**178d**	**27Jul07**	**11Apr08**		
1.6.1.6.1.1	APD module production for IPND started	0	27Jul07	27Jul07	1.6.1.1.3.7[FS]	
1.6.1.6.1.2	APD engineering run	125d	27Jul07	29Jan08	1.6.1.6.1.1[FS]	
1.6.1.6.1.3	**Module Manufacture**	**60d**	**27Jul07**	**19Oct07**		



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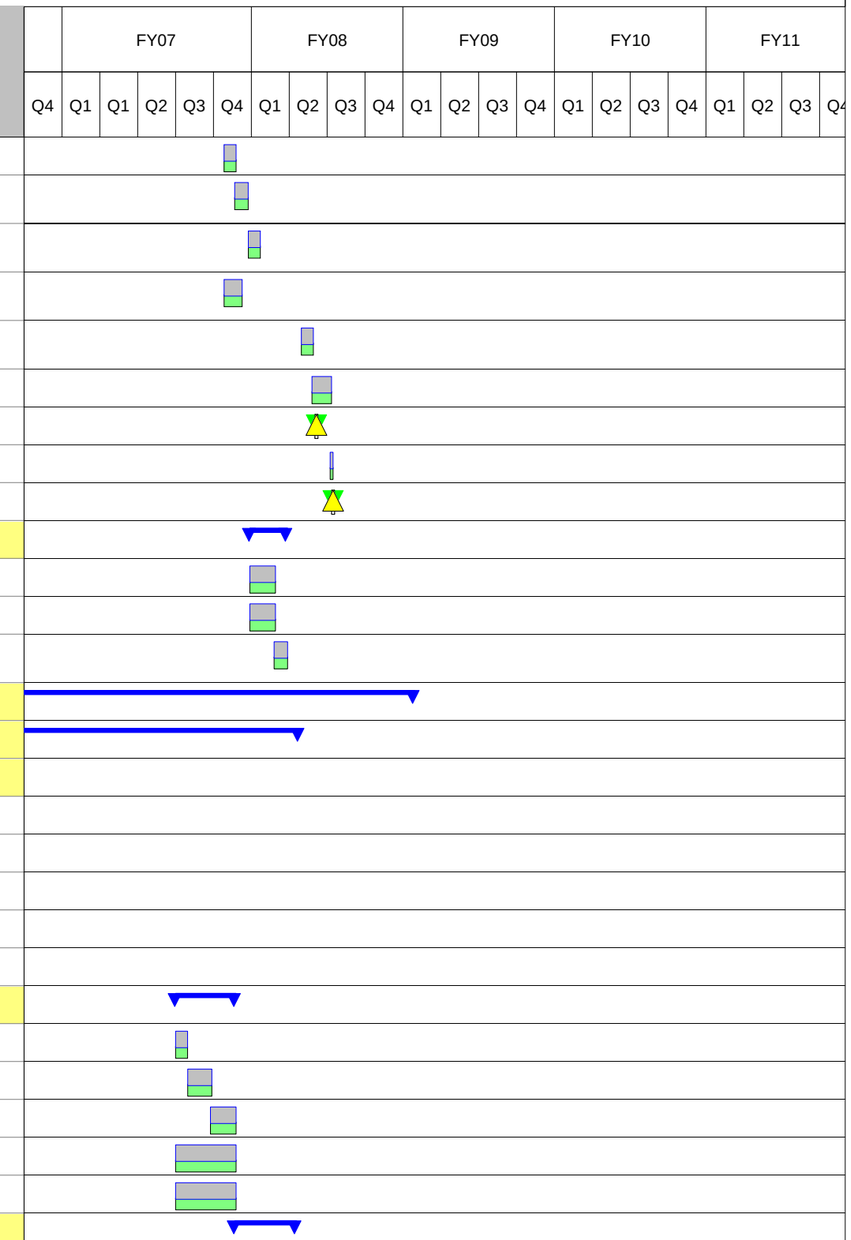
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.6.1.6.1.3.1	Design for manufacture	20d	27Jul07	23Aug07	1.6.1.6.1.1[FS]	L.IU.PD.ENG.ME,40.00,
1.6.1.6.1.3.2	Prototype mold	20d	24Aug07	21Sep07	1.6.1.6.1.3.1[FS]	M.IU.PD.MANDSPASS,37000.00,;L.IU.PD.SCI.PHY,8.00,;L.IU.PD.TECH.MT_W,40.00,
1.6.1.6.1.3.3	Pilot fabrication run	20d	24Sep07	19Oct07	1.6.1.6.1.3.2[FS]	M.IU.PD.MANDSPASS,4000.00,;L.IU.PD.TECH.MT_W,40.00,
1.6.1.6.1.4	PCB manufacture	30d	27Jul07	07Sep07	1.6.1.6.1.1[FS]	L.UMNTC.PD.SCI.PHY,8.00,;M.UMNTC.PD.MANDSPASS,10000.00,
1.6.1.6.1.5	Assemble	20d	30Jan08	26Feb08	1.6.1.6.1.4[FS]; 1.6.1.6.1.2[FS]; 1.6.1.6.1.3[FS]	L.IU.PD.TECH.ET_W,224.00,
1.6.1.6.1.6	Test	30d	27Feb08	08Apr08	1.6.1.6.1.5[FS]; 1.6.1.2.8[FS]	L.IU.PD.TECH.ET_W,168.00,
1.6.1.6.1.7	APD modules for 8-plane segment completed	0	04Mar08	04Mar08	1.6.1.6.1.6[SS+5d]	
1.6.1.6.1.8	Review	3d	09Apr08	11Apr08	1.6.1.6.1.6[FS]	L.UMNTC.PD.ENG.ME_SR,16.00,
1.6.1.6.1.9	APD modules for IPND completed	0	11Apr08	11Apr08	1.6.1.6.1.8[FS]; 1.6.1.6.1.7[FS]	
1.6.1.6.2	**Water Cooling (4 loops)**	**60d**	**28Sep07**	**26Dec07**		
1.6.1.6.2.1	Procure manifolds	40d	28Sep07	26Nov07	1.6.1.3.5[FS]	M.UMNTC.PD.MANDSPASS,48000.00,
1.6.1.6.2.2	Procure other components	40d	28Sep07	26Nov07	1.6.1.3.5[FS]	M.UMNTC.PD.MANDSPASS,19200.00,
1.6.1.6.2.3	Assemble and test hardware	20d	27Nov07	26Dec07	1.6.1.6.2.2[FS]; 1.6.1.6.2.1[FS]	L.UMNTC.PD.TECH.ET_W,160.00,;L.FNAL.PPD.TECH.ET_W,160.00,
1.6.2	**FEB**	**774d**	**03Oct05**	**29Oct08**		
1.6.2.1	**ASIC**	**579d**	**03Oct05**	**25Jan08**		
1.6.2.1.1	**ASIC Prototype I**	**136d**	**03Oct05**	**18Apr06**		
1.6.2.1.1.1	Design	56d	03Oct05	21Dec05		L.HU.PD.ENG.EE_SR,160.00,
1.6.2.1.1.2	Fabricate	40d	22Dec05	21Feb06	1.6.2.1.1.1[FS]	M.FNAL.PPD.MANDS,31500.00,
1.6.2.1.1.3	Test	40d	22Feb06	18Apr06	1.6.2.1.1.2[FS]	L.FNAL.PPD.ENG.EE,160.00,
1.6.2.1.1.4	Documentation	136d	03Oct05	18Apr06	1.6.2.1.1.1[SS]	L.FNAL.PPD.ENG.EE,80.00,
1.6.2.1.1.5	Administration	136d	03Oct05	18Apr06	1.6.2.1.1.1[SS]	L.HU.PD.ENG.EE_SR,160.00,
1.6.2.1.2	**ASIC Prototype II**	**100d**	**02Apr07**	**21Aug07**		
1.6.2.1.2.1	Design	20d	02Apr07	27Apr07	1.6.2.1.1.3[FS]; 1.6.2.3.8[FS]	L.HU.PD.ENG.EE_SR,16.00,
1.6.2.1.2.2	Fabricate	40d	30Apr07	25Jun07	1.6.2.1.2.1[FS]	M.FNAL.PPD.MANDS,31500.00,
1.6.2.1.2.3	Test	40d	26Jun07	21Aug07	1.6.2.1.2.2[FS]	L.FNAL.PPD.ENG.EE,80.00,
1.6.2.1.2.4	Documentation	100d	02Apr07	21Aug07	1.6.2.1.2.1[SS]	L.FNAL.PPD.ENG.EE,40.00,
1.6.2.1.2.5	Administration	100d	02Apr07	21Aug07	1.6.2.1.2.1[SS]	L.HU.PD.ENG.EE_SR,16.00,
1.6.2.1.3	**Near Detector ASIC Prototype**	**100d**	**22Aug07**	**17Jan08**		



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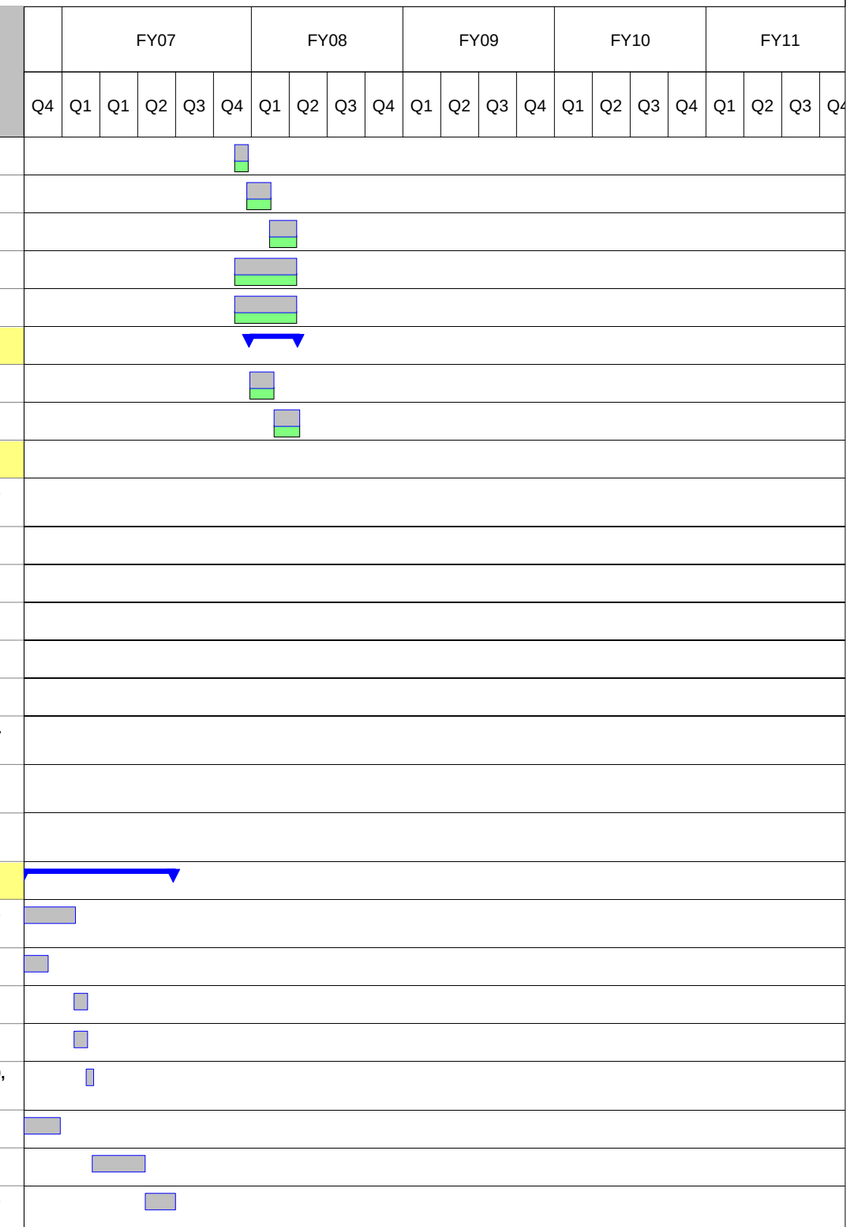
1.6.2.1.3.1	Design	20d	22Aug07	19Sep07	1.6.2.1.2.5[FS]	L.HU.PD.ENG.EE_SR,16.00,
1.6.2.1.3.2	Fabricate	40d	20Sep07	14Nov07	1.6.2.1.3.1[FS]	M.FNAL.PPD.MANDS,31500.00,
1.6.2.1.3.3	Test	40d	15Nov07	17Jan08	1.6.2.1.3.2[FS]	L.FNAL.PPD.ENG.EE,80.00,
1.6.2.1.3.4	Documentation	100d	22Aug07	17Jan08	1.6.2.1.3.1[SS]	L.FNAL.PPD.ENG.EE,40.00,
1.6.2.1.3.5	Administration	100d	22Aug07	17Jan08	1.6.2.1.3.1[SS]	L.HU.PD.ENG.EE_SR,16.00,
1.6.2.1.4	**IPND ASIC Production**	**80d**	**27Sep07**	**25Jan08**		
1.6.2.1.4.1	Fabricate	40d	27Sep07	21Nov07	1.6.2.4.7[FS]	M.FNAL.PPD.MANDS,100000.00,
1.6.2.1.4.2	Test	40d	26Nov07	25Jan08	1.6.2.1.4.1[FS]	L.FNAL.PPD.ENG.EE,80.00,
1.6.2.2	**FEB Prototype I**	**136d**	**03Oct05**	**18Apr06**		
1.6.2.2.1	Design	36d	03Oct05	21Nov05		L.HU.PD.ENG.EE,240.00,;L.HU.PD.TECH.ET_M,320.00,;L.HU.PD.ENG.EE_SR,240.00,
1.6.2.2.2	Fabricate PCB	20d	22Nov05	21Dec05	1.6.2.2.1[FS]	M.HU.PD.MANDSPASS,1000.00,
1.6.2.2.3	Procure parts	20d	22Nov05	21Dec05	1.6.2.2.1[FS]	M.HU.PD.MANDSPASS,1000.00,
1.6.2.2.4	Assemble	10d	22Dec05	09Jan06	1.6.2.2.2[FS]; 1.6.2.2.3[FS]	L.HU.PD.TECH.ET_M,40.00,
1.6.2.2.5	Develop firmware	36d	03Oct05	21Nov05	1.6.2.2.1[SS]	L.HU.PD.ENG.EE,320.00,
1.6.2.2.6	Develop software	20d	10Jan06	07Feb06	1.6.2.2.4[FS]	L.HU.PD.SCI.GRAD,40.00,
1.6.2.2.7	Test	50d	08Feb06	18Apr06	1.6.2.2.4[FS]; 1.6.2.2.6[FS]; 1.6.2.2.5[FS]	L.HU.PD.ENG.EE_SR,120.00,;L.HU.PD.ENG.EE,120.00,;L.HU.PD.TECH.ET_M,120.00,
1.6.2.2.8	Documentation	136d	03Oct05	18Apr06	1.6.2.2.1[SS]	L.HU.PD.ENG.EE_SR,80.00,;L.HU.PD.ENG.EE,40.00,;L.HU.PD.TECH.ET_M,60.00,
1.6.2.2.9	Administration	136d	03Oct05	18Apr06	1.6.2.2.1[SS]	L.HU.PD.ENG.EE_SR,240.00,;L.HU.PD.ENG.EE,40.00,
1.6.2.3	**FEB Prototype II**	**185d**	**03Jul06**	**29Mar07**		
1.6.2.3.1	Design	85d	03Jul06	31Oct06	1.6.2.2.7[FS]	L.HU.PD.ENG.EE,120.00,;L.HU.PD.TECH.ET_M,240.00,;L.HU.PD.ENG.EE_SR,80.00,
1.6.2.3.2	TEC regulator design	40d	03Jul06	28Aug06	1.6.2.3.1[SS]; 1.6.2.2.7[FS]	L.IU.PD.ENG.EE,160.00,
1.6.2.3.3	Fabricate PCB	20d	01Nov06	30Nov06	1.6.2.3.1[FS]; 1.6.2.3.2[FS]	M.HU.PD.MANDSPASS,1000.00,
1.6.2.3.4	Procure parts	20d	01Nov06	30Nov06	1.6.2.3.1[FS]	M.HU.PD.MANDSPASS,1000.00,
1.6.2.3.5	Assemble	10d	01Dec06	14Dec06	1.6.2.3.3[FS]; 1.6.2.3.4[FS]	L.HU.PD.ENG.EE,40.00,;L.HU.PD.TECH.ET_M,80.00,
1.6.2.3.6	Develop firmware	60d	03Jul06	26Sep06	1.6.2.3.1[SS]	L.HU.PD.ENG.EE,240.00,
1.6.2.3.7	Develop software	20d	15Dec06	18Jan07	1.6.2.3.5[FS]	L.HU.PD.SCI.GRAD,40.00,;L.HU.PD.ENG.EE,40.00,
1.6.2.3.8	Test	50d	19Jan07	29Mar07	1.6.2.3.5[FS]; 1.6.2.3.7[FS]; 1.6.2.3.6[FS]	L.HU.PD.ENG.EE,120.00,;L.HU.PD.TECH.ET_M,120.00,;L.HU.PD.ENG.EE_SR,80.00,



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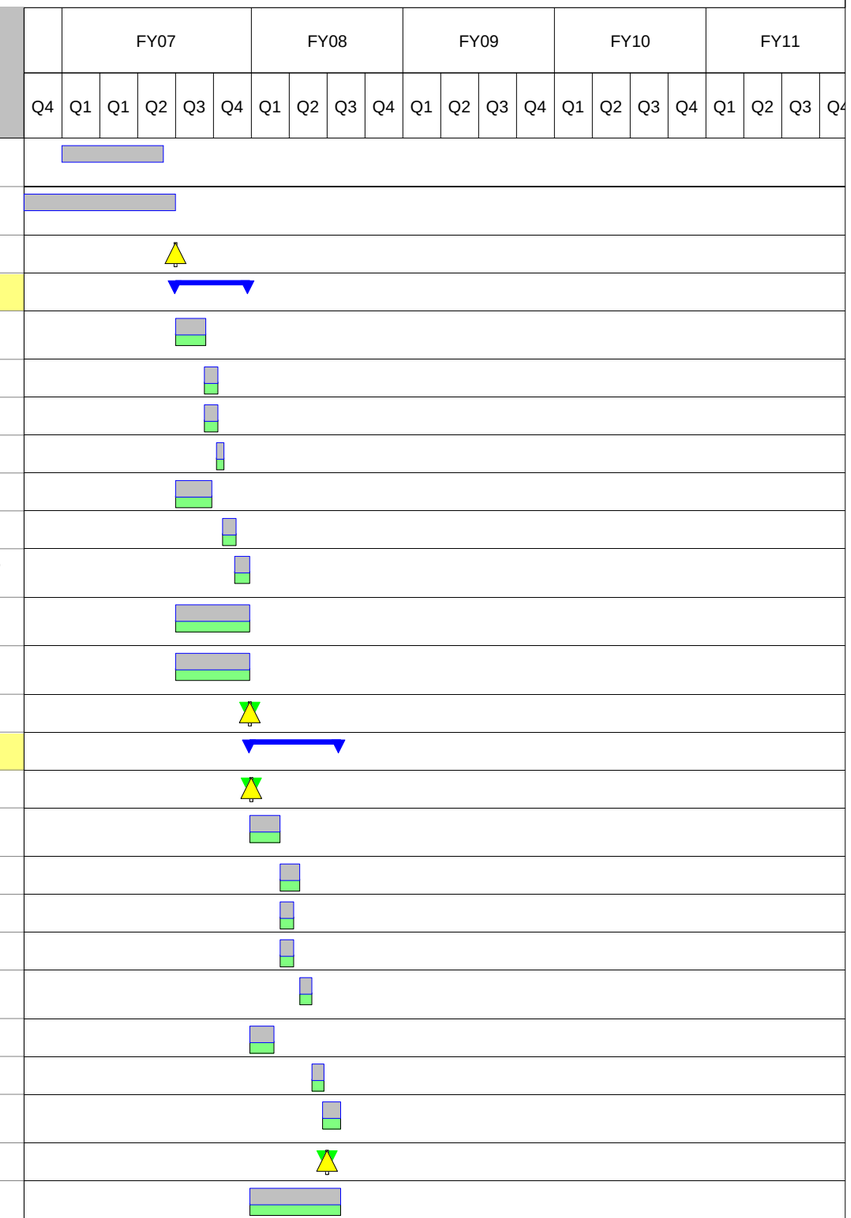
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.6.2.3.9	Documentation	100d	02Oct06	27Feb07	1.6.2.3.1[SS]	L.HU.PD.TECH.ET_M,72.00,;L.HU.PD.ENG.EE,40.00,;L.HU.PD.ENG.EE_SR,480.00,
1.6.2.3.10	Administration	185d	03Jul06	29Mar07	1.6.2.3.1[SS]	L.HU.PD.ENG.EE,40.00,;L.HU.PD.ENG.EE_SR,160.00,
1.6.2.3.11	FEB prototype II released to DAQ	0	29Mar07	29Mar07	1.6.2.3.8[FS]	
1.6.2.4	**FEB Prototype III**	**125d**	**02Apr07**	**26Sep07**		
1.6.2.4.1	Design	50d	02Apr07	11Jun07	1.6.2.3[FS]	L.HU.PD.ENG.EE_SR,40.00,;L.HU.PD.TECH.ET_M,200.00,;L.HU.PD.ENG.EE,80.00,
1.6.2.4.2	Fabricate PCB	20d	12Jun07	10Jul07	1.6.2.4.1[FS]	M.HU.PD.MANDSPASS,1250.00,
1.6.2.4.3	Procure parts	20d	12Jun07	10Jul07	1.6.2.4.1[FS]	M.HU.PD.MANDSPASS,1250.00,
1.6.2.4.4	Assemble	10d	11Jul07	24Jul07	1.6.2.4.2[FS]; 1.6.2.4.3[FS]	L.HU.PD.TECH.ET_M,40.00,
1.6.2.4.5	Develop firmware	60d	02Apr07	25Jun07	1.6.2.4.1[SS]	L.HU.PD.ENG.EE,240.00,
1.6.2.4.6	Develop software	20d	25Jul07	21Aug07	1.6.2.4.4[FS]	L.HU.PD.SCI.GRAD,40.00,
1.6.2.4.7	Test	25d	22Aug07	26Sep07	1.6.2.4.6[FS]; 1.6.2.4.4[FS]; 1.6.2.4.5[FS]	L.HU.PD.ENG.EE,168.00,;L.HU.PD.TECH.ET_M,120.00,;L.HU.PD.ENG.EE_SR,168.00,
1.6.2.4.8	Documentation	125d	02Apr07	26Sep07	1.6.2.4.1[SS]	L.HU.PD.ENG.EE_SR,80.00,;L.HU.PD.ENG.EE,40.00,;L.HU.PD.TECH.ET_M,80.00,
1.6.2.4.9	Administration	125d	02Apr07	26Sep07	1.6.2.4.1[SS]	L.HU.PD.ENG.EE_SR,160.00,;L.HU.PD.ENG.EE,40.00,
1.6.2.4.10	FEB prototype III released to DAQ	0	26Sep07	26Sep07	1.6.2.4.7[FS]	
1.6.2.5	**FEB Prototype IV (IPND)**	**150d**	**27Sep07**	**02May08**		
1.6.2.5.1	FEB modules for IPND started	0	27Sep07	27Sep07	1.6.2.4[FS]	
1.6.2.5.2	Design	50d	27Sep07	07Dec07	1.6.2.5.1[SS]	L.HU.PD.TECH.ET_M,200.00,;L.HU.PD.ENG.EE,40.00,;L.HU.PD.ENG.EE_SR,40.00,
1.6.2.5.3	Fabricate PCB	30d	10Dec07	25Jan08	1.6.2.5.2[FS]	M.HU.PD.MANDSPASS,18000.00,
1.6.2.5.4	Procure parts	20d	10Dec07	10Jan08	1.6.2.5.2[FS]	M.HU.PD.MANDSPASS,95000.00,
1.6.2.5.5	Produce electronics boxes	20d	10Dec07	10Jan08	1.6.2.5.4[SS]; 1.6.1.5.4[FS]	M.IU.PD.MANDSPASS,20000.00,
1.6.2.5.6	Assemble	20d	28Jan08	22Feb08	1.6.2.5.3[FS]; 1.6.2.5.4[FS]	M.HU.PD.MANDSPASS,15000.00,;L.HU.PD.TECH.ET_M,40.00,
1.6.2.5.7	Develop firmware	40d	27Sep07	21Nov07	1.6.2.5.2[SS]	L.HU.PD.ENG.EE,160.00,
1.6.2.5.8	Develop software	20d	25Feb08	21Mar08	1.6.2.5.6[FS]	L.HU.PD.SCI.GRAD,40.00,
1.6.2.5.9	Test	30d	24Mar08	02May08	1.6.2.5.6[FS]; 1.6.2.5.5[FS]; 1.6.2.5.8[FS]; 1.6.2.5.7[FS]	L.HU.PD.ENG.EE,40.00,;L.HU.PD.TECH.ET_M,120.00,;L.HU.PD.ENG.EE_SR,40.00,
1.6.2.5.10	FEB modules for 8-plane segment completed	0	28Mar08	28Mar08	1.6.2.5.9[SS+5d]	
1.6.2.5.11	Documentation	150d	27Sep07	02May08	1.6.2.5.2[SS]	L.HU.PD.ENG.EE_SR,40.00,;L.HU.PD.TECH.ET_M,80.00,;L.HU.PD.ENG.EE,40.00,



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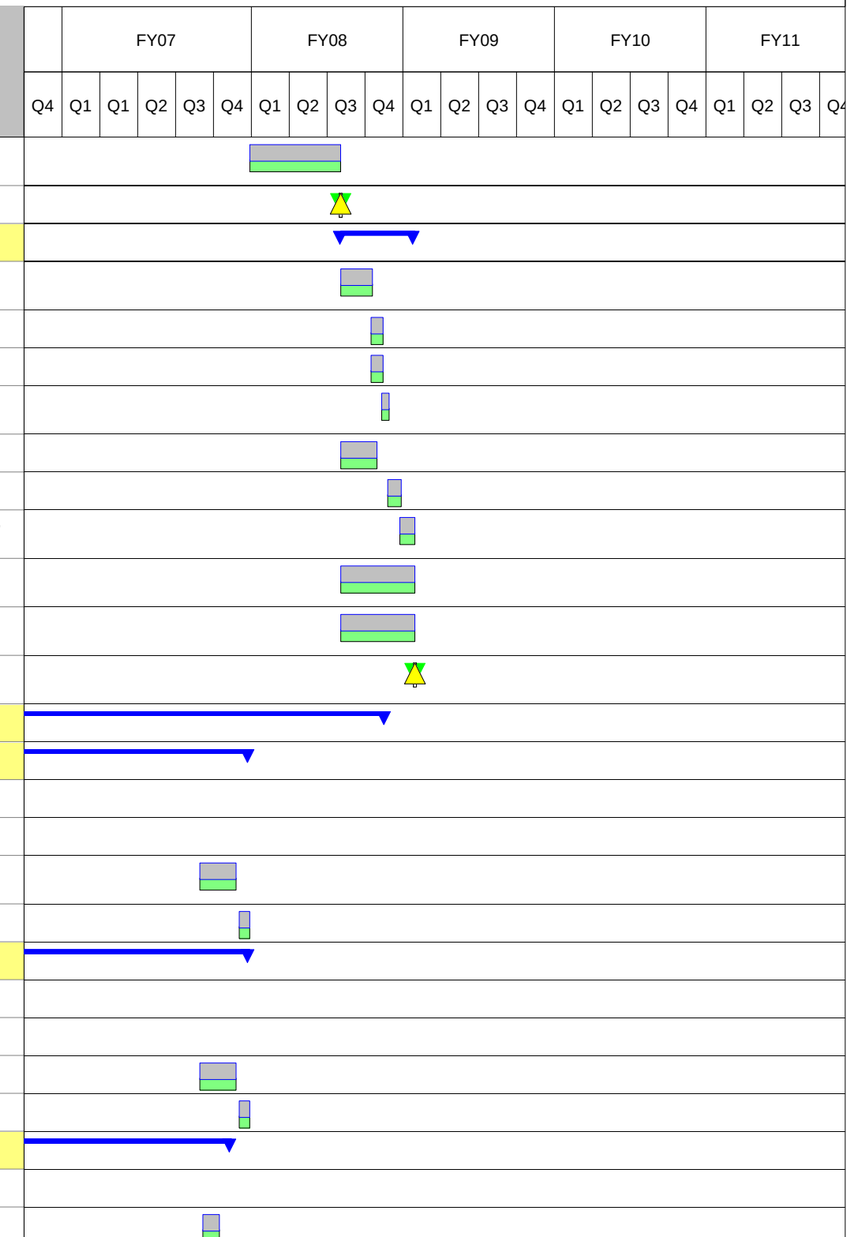
1.6.2.5.12	Administration	150d	27Sep07	02May08	1.6.2.5.2[SS]	L.HU.PD.ENG.EE,40.00,;L.HU.PD.ENG.EE_SR,120.00,
1.6.2.5.13	FEB modules for IPND completed	0	02May08	02May08	1.6.2.5.10[FS]; 1.6.2.5.9[FS]	
1.6.2.6	**FEB Prototype V (Near Detector)**	**125d**	**05May08**	**29Oct08**		
1.6.2.6.1	Design	50d	05May08	15Jul08	1.6.2.5.13[FS]	L.HU.PD.ENG.EE_SR,40.00,;L.HU.PD.TECH.ET_M,200.00,;L.HU.PD.ENG.EE,80.00,
1.6.2.6.2	Fabricate PCB	20d	16Jul08	12Aug08	1.6.2.6.1[FS]	M.HU.PD.MANDSPASS,1000.00,
1.6.2.6.3	Procure parts	20d	16Jul08	12Aug08	1.6.2.6.1[FS]	M.HU.PD.MANDSPASS,1000.00,
1.6.2.6.4	Assemble	10d	13Aug08	26Aug08	1.6.2.6.3[FS]; 1.6.2.1.3.3[FS]; 1.6.2.6.2[FS]	L.HU.PD.TECH.ET_M,40.00,
1.6.2.6.5	Develop firmware	60d	05May08	29Jul08	1.6.2.6.1[SS]	L.HU.PD.ENG.EE,240.00,
1.6.2.6.6	Develop software	20d	27Aug08	24Sep08	1.6.2.6.4[FS]	L.HU.PD.SCI.GRAD,40.00,
1.6.2.6.7	Test	25d	25Sep08	29Oct08	1.6.2.6.6[FS]; 1.6.2.6.5[FS]; 1.6.2.6.4[FS]	L.HU.PD.ENG.EE,168.00,;L.HU.PD.TECH.ET_M,120.00,;L.HU.PD.ENG.EE_SR,168.00,
1.6.2.6.8	Documentation	125d	05May08	29Oct08	1.6.2.6.1[SS]	L.HU.PD.ENG.EE,40.00,;L.HU.PD.ENG.EE_SR,80.00,;L.HU.PD.TECH.ET_M,80.00,
1.6.2.6.9	Administration	125d	05May08	29Oct08	1.6.2.6.1[SS]	L.HU.PD.ENG.EE_SR,160.00,;L.HU.PD.ENG.EE,40.00,
1.6.2.6.10	FEB prototype V for near detector released to DAQ	0	29Oct08	29Oct08	1.6.2.6.7[FS]	
1.6.3	**Power Distribution**	**725d**	**03Oct05**	**20Aug08**		
1.6.3.1	**Low Voltage**	**497d**	**03Oct05**	**24Sep07**		
1.6.3.1.1	Specify LV requirements	5d	03Oct05	07Oct05		
1.6.3.1.2	Specify LV power supply	5d	03Oct05	07Oct05		
1.6.3.1.3	Procure LV power supply	60d	01Jun07	24Aug07	1.6.3.1.1[FS]; 1.6.3.1.2[FS]; 1.6.3.3.1[FS]	M.UVA.PD.MANDSPASS,7793.00,
1.6.3.1.4	Test LV power supply	15d	04Sep07	24Sep07	1.6.3.1.3[FS+5d]	L.UVA.PD.SCI.PHY,20.00,
1.6.3.2	**High Voltage**	**497d**	**03Oct05**	**24Sep07**		
1.6.3.2.1	Specify HV requirements	5d	03Oct05	07Oct05		L.UVA.PD.SCI.PHY,20.00,
1.6.3.2.2	Specify HV power supply	5d	03Oct05	07Oct05		L.UVA.PD.SCI.PHY,20.00,
1.6.3.2.3	Procure HV power supply	60d	01Jun07	24Aug07	1.6.3.2.1[FS]; 1.6.3.2.2[FS]	M.UVA.PD.MANDSPASS,14754.00,
1.6.3.2.4	Test HV power supply	15d	04Sep07	24Sep07	1.6.3.2.3[FS+5d]	L.UVA.PD.SCI.PHY,40.00,
1.6.3.3	**Cabling Hardware**	**343d**	**03Apr06**	**10Aug07**		
1.6.3.3.1	Specify and design PDB to FEB harness	5d	01Jun06	07Jun06		L.UMNTC.PD.TECH.ET_W,40.00,
1.6.3.3.2	Procure PDB to FEB harness	25d	07Jun07	12Jul07	1.6.3.3.1[FS]	M.UVA.PD.MANDSPASS,4719.00,



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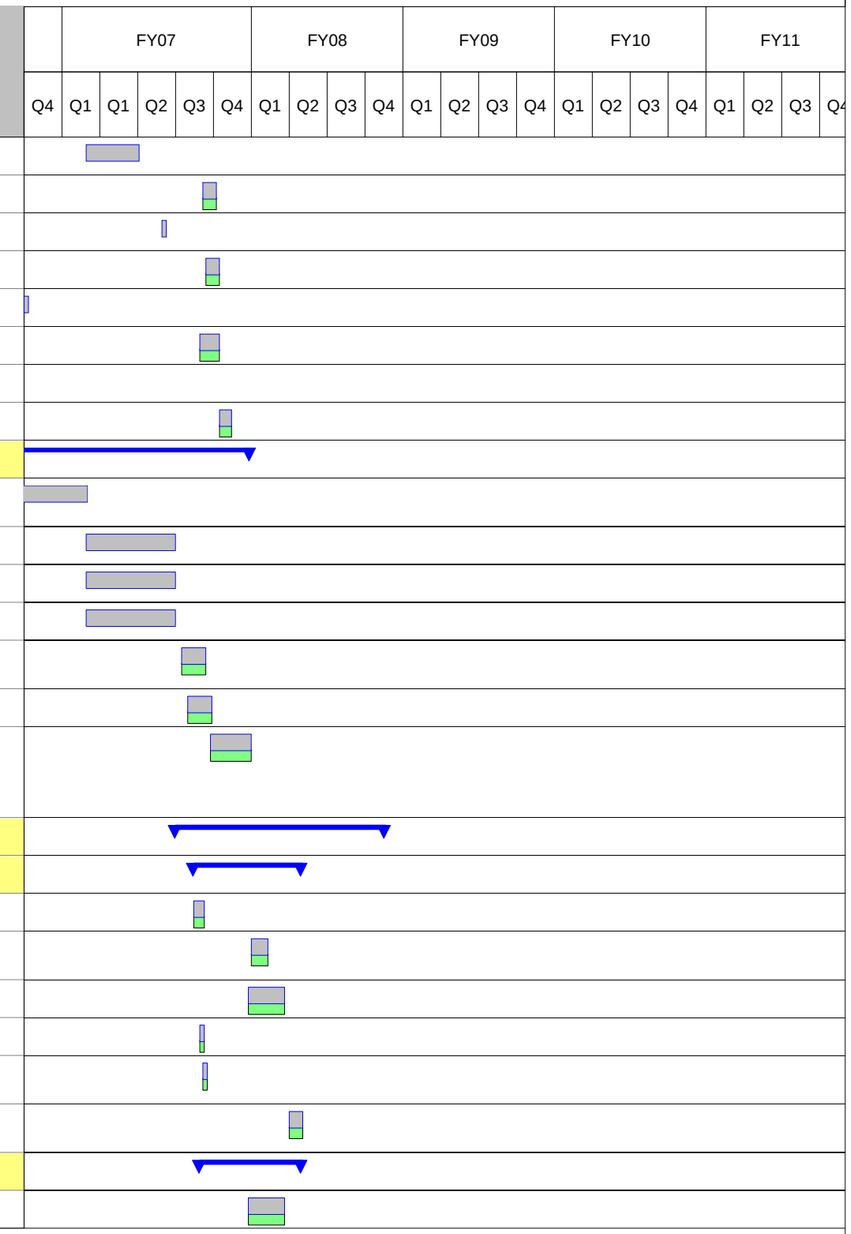
1.6.3.3.3	Specify LV supply to PDB cable	20d	01Dec06	03Jan07		L.UVA.PD.SCI.PD,8.00,;L.UVA.PD.SCI.PHY,8.00,
1.6.3.3.4	Procure LV supply to PDB cable	20d	07Jun07	05Jul07	1.6.3.3.3[FS]	M.UVA.PD.MANDSPASS,3818.00,
1.6.3.3.5	Specify LV sense cables	5d	01Mar07	07Mar07		L.UVA.PD.SCI.PHY,4.00,
1.6.3.3.6	Procure LV sense cables	20d	14Jun07	12Jul07	1.6.3.3.5[FS]	M.UVA.PD.MANDSPASS,182.00,
1.6.3.3.7	Specify HV supply to PDB cable	5d	03Jul06	10Jul06		L.UVA.PD.SCI.PD,8.00,
1.6.3.3.8	Procure HV supply to PDB cable	30d	01Jun07	13Jul07	1.6.3.3.7[FS]; 1.6.3.2.3[SS]	M.UVA.PD.MANDSPASS,1513.00,
1.6.3.3.9	Specify PDB to DCM cable	5d	03Apr06	07Apr06		L.UVA.PD.SCI.PHY,4.00,
1.6.3.3.10	Procure PDB to DCM cable	20d	16Jul07	10Aug07	1.6.3.3.9[FS]; 1.6.3.4.6[FS]	M.UVA.PD.MANDSPASS,42.00,
1.6.3.4	**Power Distribution Box**	**335d**	**01Jun06**	**28Sep07**		
1.6.3.4.1	Preliminary specifications for power distribution box	125d	01Jun06	28Nov06		L.UVA.PD.SCI.PHY,16.00,
1.6.3.4.2	Initial design of PDB backplane	80d	01Dec06	29Mar07	1.6.3.4.1[FS]	L.UVA.PD.ENG.EE,40.00,
1.6.3.4.3	Initial design of PDB card	80d	01Dec06	29Mar07	1.6.3.4.2[SS]	L.UVA.PD.ENG.EE,140.00,
1.6.3.4.4	Initial design of PDB crate	80d	01Dec06	29Mar07	1.6.3.4.1[FS]	L.UVA.PD.SCI.PHY,40.00,
1.6.3.4.5	Procure parts	40d	16Apr07	11Jun07	1.6.3.4.2[FS]; 1.6.3.4.3[FS]; 1.6.3.4.4[FS]; 1.6.3.4.1[FS]	M.UVA.PD.MANDSPASS,12863.00,
1.6.3.4.6	Build prototype	40d	30Apr07	25Jun07	1.6.3.4.5[SS+10d]	L.UVA.PD.ENG.EE,80.00,
1.6.3.4.7	Test and finalize design of prototype	67d	26Jun07	28Sep07	1.6.3.4.6[FS]; 1.6.3.3.10[FF]; 1.6.3.3.2[FF]; 1.6.3.3.4[FF]; 1.6.3.1.4[FF]; 1.6.3.3.8[FF]; 1.6.3.2.4[FF]; 1.6.3.3.6[FF]	L.UVA.PD.ENG.EE,160.00,
1.6.3.5	**IPND Electronics Infrastructure**	**351d**	**02Apr07**	**20Aug08**		
1.6.3.5.1	**Low Voltage**	**177d**	**15May07**	**30Jan08**		
1.6.3.5.1.1	Specify LV racks	15d	15May07	05Jun07		L.UVA.PD.SCI.PHY,8.00,
1.6.3.5.1.2	Procure LV racks	30d	01Oct07	09Nov07	1.6.3.5.1.1[FS]	L.UVA.PD.SCI.PHY,4.00,;M.UVA.PD. MANDSPASS,2028.00,
1.6.3.5.1.3	Procure LV power supplies	60d	25Sep07	19Dec07	1.6.3.1.4[FS]	M.UVA.PD.MANDSPASS,31172.00,
1.6.3.5.1.4	Define LV power supply test procedures	5d	01Jun07	07Jun07	1.6.3.1.3[SS]	L.UVA.PD.ENG.EE,8.00,
1.6.3.5.1.5	Setup LV power supply test stand	5d	08Jun07	14Jun07	1.6.3.5.1.4[FS]	M.UVA.PD.MANDSPASS,1000.00,;L.UVA.PD.ENG. EE,16.00,
1.6.3.5.1.6	Test LV power supplies	20d	02Jan08	30Jan08	1.6.3.5.1.3[FS+5d]; 1.6.3.5.1.4[FS]; 1.6.3.5.1.5[FS]	L.UVA.PD.SCI.PD,49.00,
1.6.3.5.2	**High Voltage**	**165d**	**01Jun07**	**30Jan08**		
1.6.3.5.2.1	Procure HV power supply	60d	25Sep07	19Dec07	1.6.3.2.4[FS]	M.UVA.PD.MANDSPASS,26270.00,



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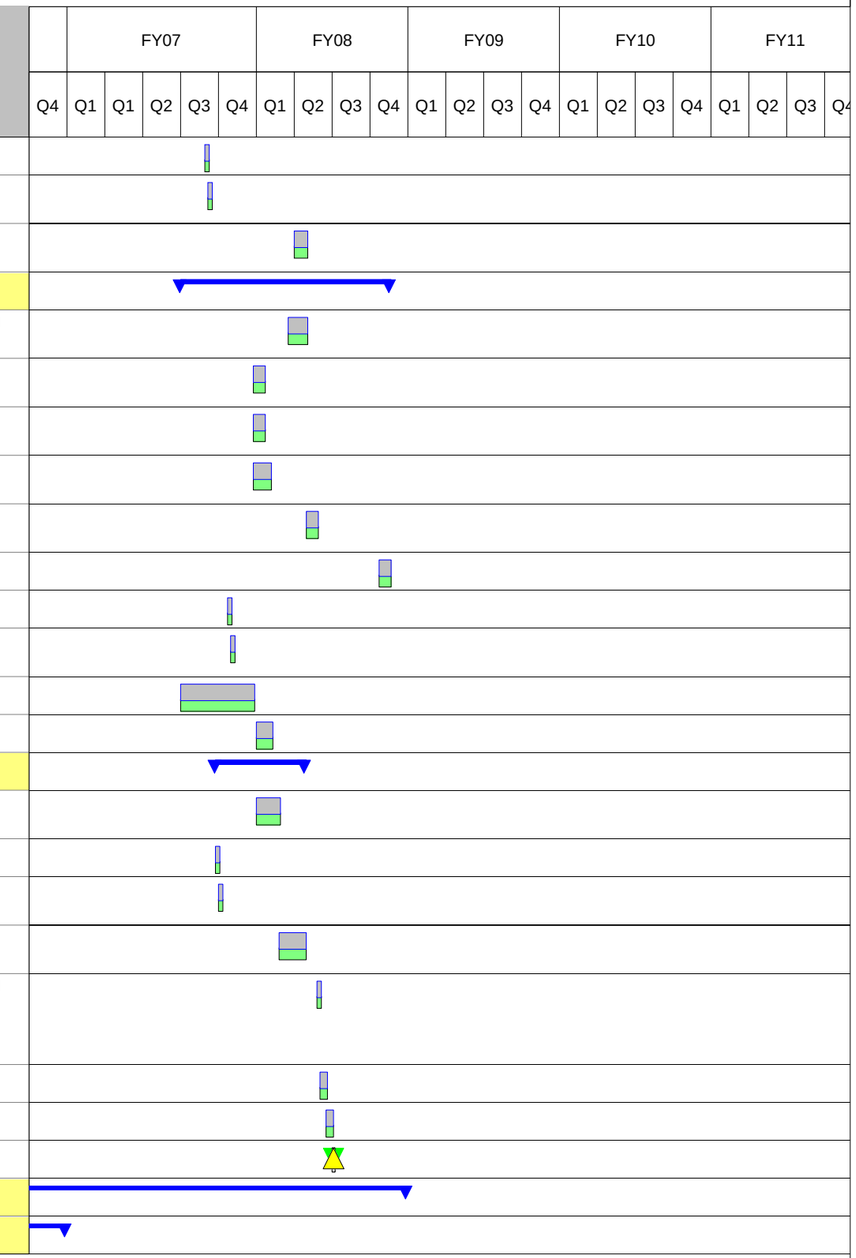
1.6.3.5.2.2	Define HV power supply test procedures	5d	01Jun07	07Jun07	1.6.3.2.3[SS]	L.UVA.PD.ENG.EE,8.00,
1.6.3.5.2.3	Setup HV power supply test stand	5d	08Jun07	14Jun07	1.6.3.5.2.2[FS]	M.UVA.PD.MANDSPASS,1000.00,;L.UVA.PD.ENG.EE,1.00,
1.6.3.5.2.4	Test HV power supply	20d	02Jan08	30Jan08	1.6.3.5.2.1[FS+5d]; 1.6.3.5.2.3[FS]; 1.6.3.5.2.2[FS]	L.UVA.PD.SCI.PD,48.00,
1.6.3.5.3	**Power Cables**	**351d**	**02Apr07**	**20Aug08**		
1.6.3.5.3.1	Procure PDB to FEB cables	25d	20Dec07	30Jan08	1.6.3.5.2.1[FS]	M.UVA.PD.MANDSPASS,4719.00,;L.UVA.PD.TECH.UGRAD,140.00,
1.6.3.5.3.2	Procure LV supply to PDB cable	20d	25Sep07	22Oct07	1.6.3.1.4[FS]	L.UVA.PD.TECH.UGRAD,3.00,;M.UVA.PD.MANDSPASS,3818.00,
1.6.3.5.3.3	Procure LV sense cables	20d	25Sep07	22Oct07	1.6.3.5.3.2[SS]	M.UVA.PD.MANDSPASS,182.00,;L.UVA.PD.TECH.UGRAD,10.00,
1.6.3.5.3.4	Procure HV supply to PDB cable	30d	25Sep07	05Nov07	1.6.3.2.4[FS]	L.UVA.PD.TECH.UGRAD,10.00,;M.UVA.PD.MANDSPASS,1513.00,
1.6.3.5.3.5	Procure PDB to DCM cable	20d	30Jan08	26Feb08	1.6.3.5.4.4[FS]	M.UVA.PD.MANDSPASS,42.00,;L.UVA.PD.SCI.PHY,4.00,
1.6.3.5.3.6	Procure ground cable	20d	24Jul08	20Aug08	1.8.5.7.1[FS-20d]	M.UVA.PD.MANDSPASS,1000.00,
1.6.3.5.3.7	Define cable test procedures	5d	25Jul07	31Jul07	1.6.3.4.7[SS+20d]; 1.6.3.4.1[FS]	L.UVA.PD.ENG.EE,8.00,
1.6.3.5.3.8	Setup cable test stand	5d	01Aug07	07Aug07	1.6.3.5.3.7[FS]	L.UVA.PD.ENG.EE,16.00,;M.UVA.PD.MANDSPASS,1000.00,
1.6.3.5.3.9	Specify cable tray	125d	02Apr07	26Sep07		L.UVA.PD.SCI.PHY,40.00,
1.6.3.5.3.10	Procure cable tray	30d	01Oct07	09Nov07	1.6.3.5.3.9[FS]	M.UVA.PD.MANDSPASS,1432.00,
1.6.3.5.4	**Power Distribution Box**	**147d**	**26Jun07**	**29Jan08**		
1.6.3.5.4.1	Procure PDB parts	40d	01Oct07	27Nov07	1.6.3.4.7[FS]	L.UVA.PD.SCI.PHY,4.00,;M.UVA.PD.MANDSPASS,57884.00,
1.6.3.5.4.2	Define test procedure for PDBs	5d	26Jun07	02Jul07	1.6.3.4.7[SS]	L.UVA.PD.ENG.EE,8.00,
1.6.3.5.4.3	Setup PDB test stand	5d	03Jul07	10Jul07	1.6.3.5.4.2[FS]	L.UVA.PD.ENG.EE,16.00,;M.UVA.PD.MANDSPASS,1000.00,
1.6.3.5.4.4	Assemble and test PDBs	40d	28Nov07	29Jan08	1.6.3.5.4.1[FS]; 1.6.3.5.4.2[FS]; 1.6.3.5.4.3[FS]	L.UVA.PD.TECH.ET_W,108.00,
1.6.3.5.5	Ship PDBs, cables, and supplies to Fermilab	4d	27Feb08	03Mar08	1.6.3.5.2.4[FS]; 1.6.3.5.1.6[FS]; 1.6.3.5.4.4[FS]; 1.6.3.5.3.5[FS]; 1.6.3.5.3.1[FS]; 1.6.3.5.3.4[FS]; 1.6.3.5.3.3[FS]; 1.6.3.5.3.2[FS]	M.UVA.PD.MANDSPASS,1045.00,;L.UVA.PD.TECH.MT_M,16.00,
1.6.3.5.6	Power Distribution System Test	10d	04Mar08	17Mar08	1.6.3.5.5[FS]	
1.6.3.5.7	Integrate with detector control system	10d	18Mar08	31Mar08	1.6.3.5.6[FS]	
1.6.3.5.8	IPND power distribution system online	0	31Mar08	31Mar08	1.6.3.5.7[FS]	
1.6.4	**Management - R&D Phase**	**752d**	**03Oct05**	**29Sep08**		
1.6.4.1	**FY06**	**250d**	**03Oct05**	**28Sep06**		



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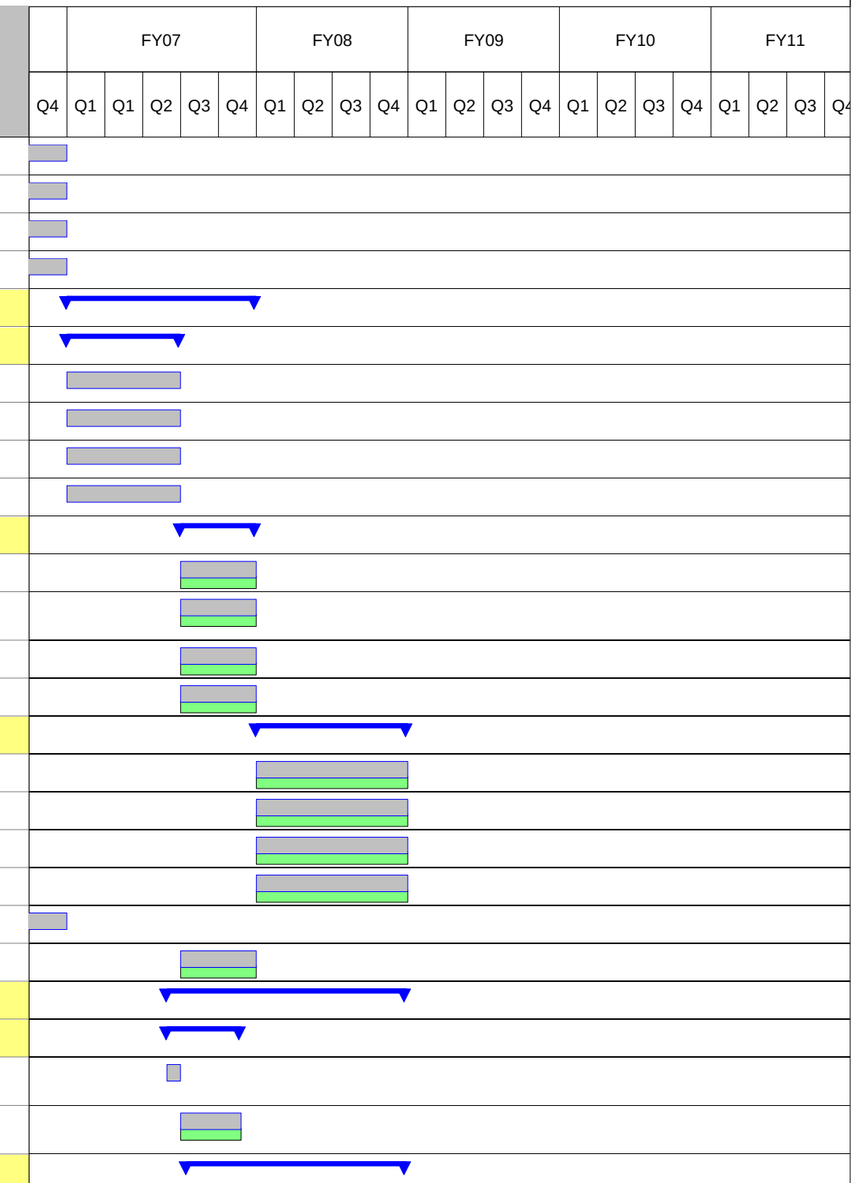
1.6.4.1.1	Labor	250d	03Oct05	28Sep06		L.UMNTC.PD.SCI.PHY,200.00,
1.6.4.1.2	Travel	250d	03Oct05	28Sep06		M.FNAL.PPD.MANDS,9000.00,
1.6.4.1.3	Equipment	250d	03Oct05	28Sep06		
1.6.4.1.4	Materials and supplies	250d	03Oct05	28Sep06		M.UMNTC.PD.MANDSPASS,5000.00,
1.6.4.2	**FY07**	**250d**	**02Oct06**	**28Sep07**		
1.6.4.2.1	**1HFY07**	**123d**	**02Oct06**	**30Mar07**		
1.6.4.2.1.1	Labor	123d	02Oct06	30Mar07	1.6.4.1.1[FS]	L.UMNTC.PD.SCI.PHY,100.00,
1.6.4.2.1.2	Travel	123d	02Oct06	30Mar07	1.6.4.1.2[FS]	M.FNAL.PPD.MANDS,4500.00,
1.6.4.2.1.3	Equipment	123d	02Oct06	30Mar07	1.6.4.1.3[FS]	
1.6.4.2.1.4	Materials and supplies	123d	02Oct06	30Mar07	1.6.4.1.4[FS]	M.UMNTC.PD.MANDSPASS,2500.00,
1.6.4.2.2	**2HFY07**	**127d**	**02Apr07**	**28Sep07**		
1.6.4.2.2.1	Labor	127d	02Apr07	28Sep07	1.6.4.2.1.1[FS]	L.UMNTC.PD.SCI.PHY,100.00,
1.6.4.2.2.2	Travel	127d	02Apr07	28Sep07	1.6.4.2.1.2[FS]	M.CT.PD.MANDSPASS,6000.00,;M.FNAL.PPD.MANDS,4500.00,;L.CT.PD.TECH.MT_M,40.00,
1.6.4.2.2.3	Equipment	127d	02Apr07	28Sep07	1.6.4.2.1.3[FS]	
1.6.4.2.2.4	Materials and supplies	127d	02Apr07	28Sep07		M.UMNTC.PD.MANDSPASS,2500.00,
1.6.4.3	**FY08**	**251d**	**01Oct07**	**29Sep08**		
1.6.4.3.1	Labor	251d	01Oct07	29Sep08	1.6.4.2.2.1[FS]	
1.6.4.3.2	Travel	251d	01Oct07	29Sep08	1.6.4.2.2.2[FS]	
1.6.4.3.3	Equipment	251d	01Oct07	29Sep08	1.6.4.2.2.3[FS]	
1.6.4.3.4	Materials and supplies	251d	01Oct07	29Sep08	1.6.4.2.2.4[FS]	
1.6.4.4	FY06 Electronics R&D	250d	03Oct05	28Sep06		
1.6.4.5	FY07 Electronics R&D	127d	02Apr07	28Sep07		
1.6.5	**Vertical Slice Tests**	**399d**	**01Mar07**	**26Sep08**		
1.6.5.1	**Vertical Slice Test 1**	**122d**	**01Mar07**	**21Aug07**		
1.6.5.1.1	Prepare apparatus	20d	01Mar07	28Mar07		M.CT.PD.MANDSPASS,2000.00,;L.CT.PD.TECH.MT_W,160.00,;L.CT.PD.SCI.PHY,20.00,
1.6.5.1.2	Operate apparatus	100d	02Apr07	21Aug07	1.6.5.1.1[FS]; 1.6.1.1.2.4[FS]	L.CT.PD.TECH.MT_W,200.00,;L.CT.PD.SCI.PHY,50.00,;M.CT.PD.MANDSPASS,600.00,
1.6.5.2	**Vertical Slice Test 2**	**366d**	**17Apr07**	**26Sep08**		



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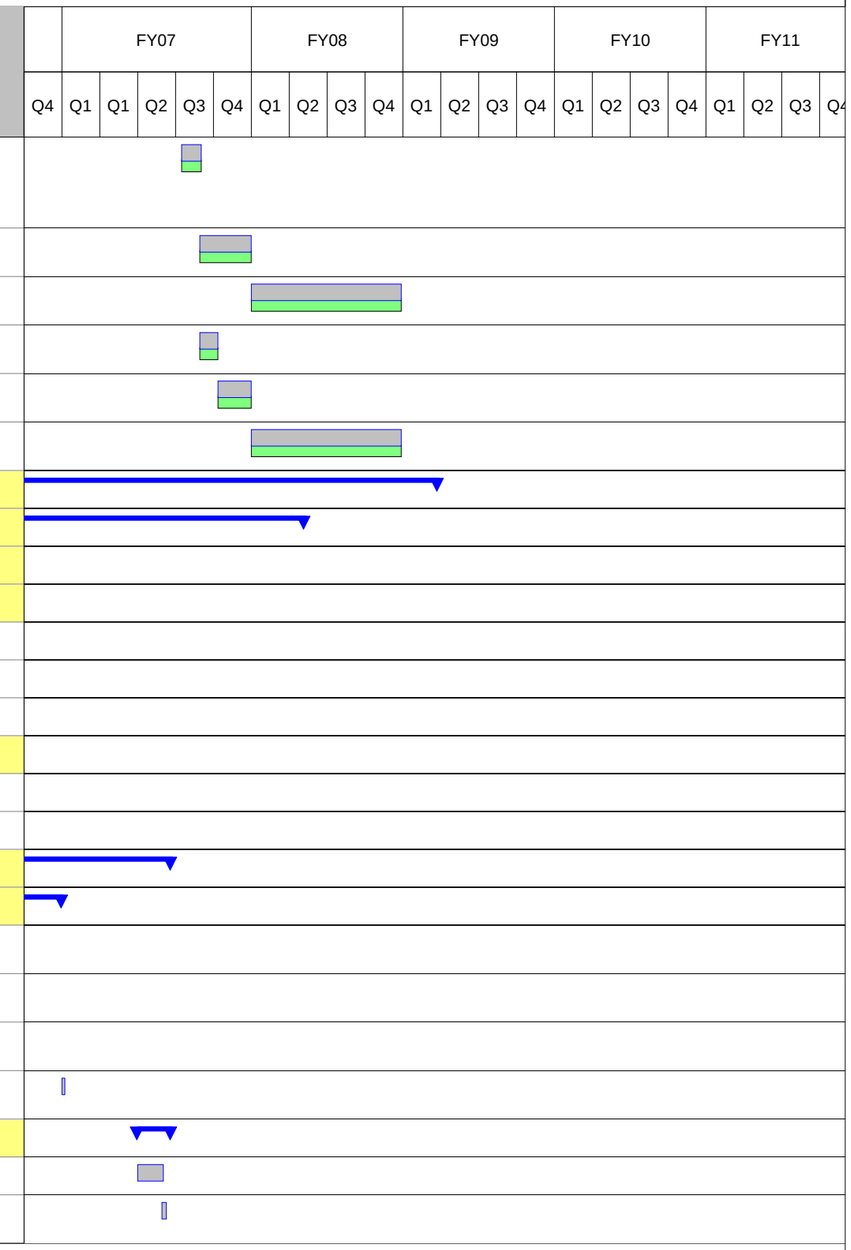
1.6.5.2.1	Prepare apparatus	30d	17Apr07	29May07	1.6.5.1.1[FS]	M.HU.PD.MANDSPASS,6000.00,;M.CT.PD. MANDSPASS,3050.00,;L.CT.PD.TECH.MT_W,350. 00,;L.CT.PD.SCI.PHY,20.00,;L.CT.PD.TECH. MT_M,160.00,
1.6.5.2.2	Operate apparatus - 2HFY07	86d	30May07	28Sep07	1.6.5.2.1[FS]	L.CT.PD.SCI.PHY,40.00,;L.CT.PD.TECH.MT_W,160 .00,;M.CT.PD.MANDSPASS,500.00,
1.6.5.2.3	Operate apparatus-FY08	250d	01Oct07	26Sep08	1.6.5.2.2[FS]	L.CT.PD.TECH.MT_W,500.00,;M.CT.PD. MANDSPASS,1500.00,;L.CT.PD.SCI.PHY,120.00,
1.6.5.2.4	Prepare fiber testing apparatus	30d	30May07	11Jul07	1.6.5.2.1[FS]	L.CT.PD.TECH.MT_W,160.00,;M.CT.PD. MANDSPASS,5000.00,;L.CT.PD.SCI.PHY,80.00,
1.6.5.2.5	Test vertical slice fibers - 2HFY07	56d	12Jul07	28Sep07	1.6.5.2.4[FS]	L.CT.PD.TECH.MT_W,56.00,;L.CT.PD.SCI.PHY,56. 00,
1.6.5.2.6	Test vertical slice fibers - FY08	250d	01Oct07	26Sep08	1.6.5.2.5[FS]	L.CT.PD.TECH.MT_W,250.00,;L.CT.PD.SCI. PHY,250.00,
1.7	**DAQ System R&D**	**812d**	**03Oct05**	**26Dec08**		
1.7.1	**DAQ Software**	**488d**	**01Mar06**	**08Feb08**		
1.7.1.1	**DAQ Software Standards and Tools**	**70d**	**01Mar06**	**07Jun06**		
1.7.1.1.1	**DAQ Software Standards**	**70d**	**01Mar06**	**07Jun06**		
1.7.1.1.1.1	DAQ software coding standards document	60d	01Mar06	23May06		L.FNAL.CD.CP.SD_06,160.00,
1.7.1.1.1.2	DAQ software development cycle document	60d	01Mar06	23May06		L.FNAL.CD.CP.SD_06,160.00,
1.7.1.1.1.3	DAQ software review procedures document	10d	24May06	07Jun06	1.7.1.1.1.2[FS]; 1.7.1.1.1.1[FS]	L.FNAL.CD.CP.SD_06,32.00,
1.7.1.1.2	**DAQ Software Tools**	**60d**	**01Mar06**	**23May06**		
1.7.1.1.2.1	DAQ software general tools	60d	01Mar06	23May06		L.FNAL.CD.CP.SD_06,160.00,
1.7.1.1.2.2	DAQ software languages	60d	01Mar06	23May06		L.FNAL.CD.CP.SD_06,160.00,
1.7.1.2	**Error Handling System**	**243d**	**03Apr06**	**21Mar07**		
1.7.1.2.1	**Error Handling System Requirements**	**128d**	**03Apr06**	**02Oct06**		
1.7.1.2.1.1	Error handling system requirements document draft 1	10d	03Apr06	14Apr06		L.FNAL.CD.CP.SD_06,40.00,
1.7.1.2.1.2	Review error handling system requirements document	4d	17Apr06	20Apr06	1.7.1.2.1.1[FS]	L.FNAL.CD.CP.SD_06,16.00,
1.7.1.2.1.3	Draft 2 error handling system requirements document	3d	21Apr06	25Apr06	1.7.1.2.1.2[FS]	L.FNAL.CD.CP.SD_06,16.00,
1.7.1.2.1.4	Finalize error handling system requirements document	1d	02Oct06	02Oct06	1.7.1.2.1.3[FS]	L.FNAL.CD.CP.SD,4.00,
1.7.1.2.2	**Error Handling System Design**	**56d**	**02Jan07**	**21Mar07**		
1.7.1.2.2.1	Error handling system design document draft	40d	02Jan07	27Feb07	1.7.1.2.1.4[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.2.2.2	Review error handling system design document	8d	28Feb07	09Mar07	1.7.1.2.2.1[FS]	L.FNAL.CD.CP.SD,32.00,



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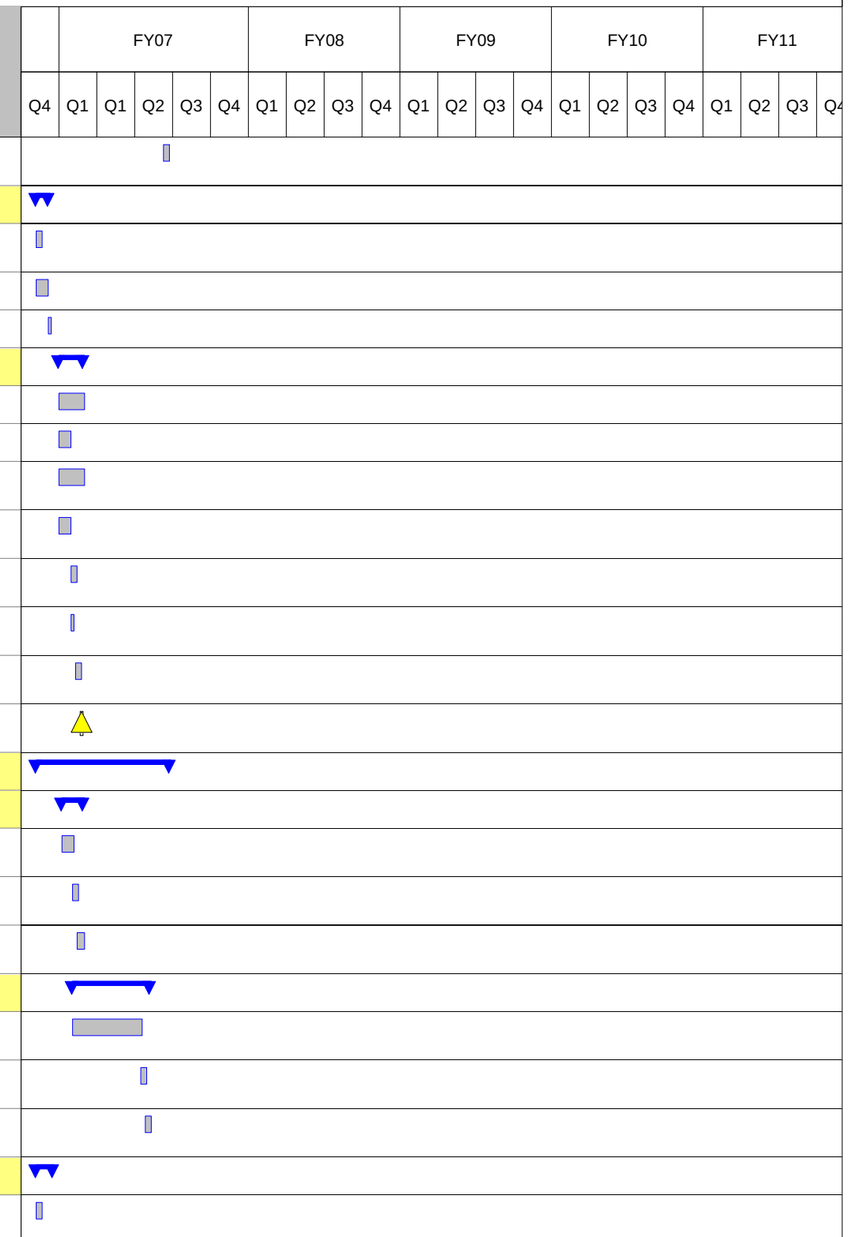
1.7.1.2.2.3	Finalize error handling system design document	8d	12Mar07	21Mar07	1.7.1.2.2.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.2.3	**Error Handling Systems Evaluation**	**24d**	**07Aug06**	**08Sep06**		
1.7.1.2.3.1	Find candidates error handling system software	10d	07Aug06	18Aug06		L.FNAL.CD.CP.SD_06,40.00,
1.7.1.2.3.2	Evaluate error handling system candidates	20d	07Aug06	01Sep06	1.7.1.2.3.1[SS]	L.FNAL.CD.CP.SD_06,80.00,
1.7.1.2.3.3	Review error handling system evaluations	4d	05Sep06	08Sep06	1.7.1.2.3.2[FS]	L.FNAL.CD.CP.SD_06,16.00,
1.7.1.2.4	**Error Handling System-First Release**	**40d**	**02Oct06**	**28Nov06**		
1.7.1.2.4.1	Develop initial error logger	40d	02Oct06	28Nov06	1.7.1.2.3.3[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.2.4.2	Develop error handling system client interface	20d	02Oct06	27Oct06	1.7.1.2.4.1[SS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.2.4.3	Develop error handling system top level interface	40d	02Oct06	28Nov06	1.7.1.2.4.1[SS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.2.4.4	Develop error handling system test and verification suite	20d	02Oct06	27Oct06	1.7.1.2.4.1[SS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.2.4.5	Write error handling system user documentation	10d	30Oct06	10Nov06	1.7.1.2.4.4[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.2.4.6	Perform error handling system tests and verification for first release	4d	30Oct06	02Nov06	1.7.1.2.4.4[FS]	L.FNAL.CD.CP.SD,16.00,
1.7.1.2.4.7	Review error handling system software, tests and documentation for first release	8d	13Nov06	22Nov06	1.7.1.2.4.5[FS]; 1.7.1.2.4.6[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.2.4.8	Error handling system for first software release	0	22Nov06	22Nov06	1.7.1.2.4.7[FS]	
1.7.1.3	**Message Passing System**	**159d**	**07Aug06**	**27Mar07**		
1.7.1.3.1	**Message Passing System Requirements**	**36d**	**09Oct06**	**29Nov06**		
1.7.1.3.1.1	Message passing system requirements document draft	20d	09Oct06	03Nov06		L.FNAL.CD.CP.SD,80.00,
1.7.1.3.1.2	Review message passing system requirements document	8d	06Nov06	15Nov06	1.7.1.3.1.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.3.1.3	Finalize message passing system requirements document	8d	16Nov06	29Nov06	1.7.1.3.1.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.3.2	**Message Passing System Design**	**61d**	**06Nov06**	**07Feb07**		
1.7.1.3.2.1	Message passing system design document draft	45d	06Nov06	16Jan07	1.7.1.3.1.1[FS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.3.2.2	Review message passing system design document	8d	17Jan07	26Jan07	1.7.1.3.2.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.3.2.3	Finalize message passing system design document	8d	29Jan07	07Feb07	1.7.1.3.2.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.3.3	**Message Passing Systems Evaluation**	**31d**	**07Aug06**	**19Sep06**		
1.7.1.3.3.1	Find candidates for the message passing system software	10d	07Aug06	18Aug06	1.7.1.2.3.1[SS]	L.FNAL.CD.CP.SD_06,40.00,



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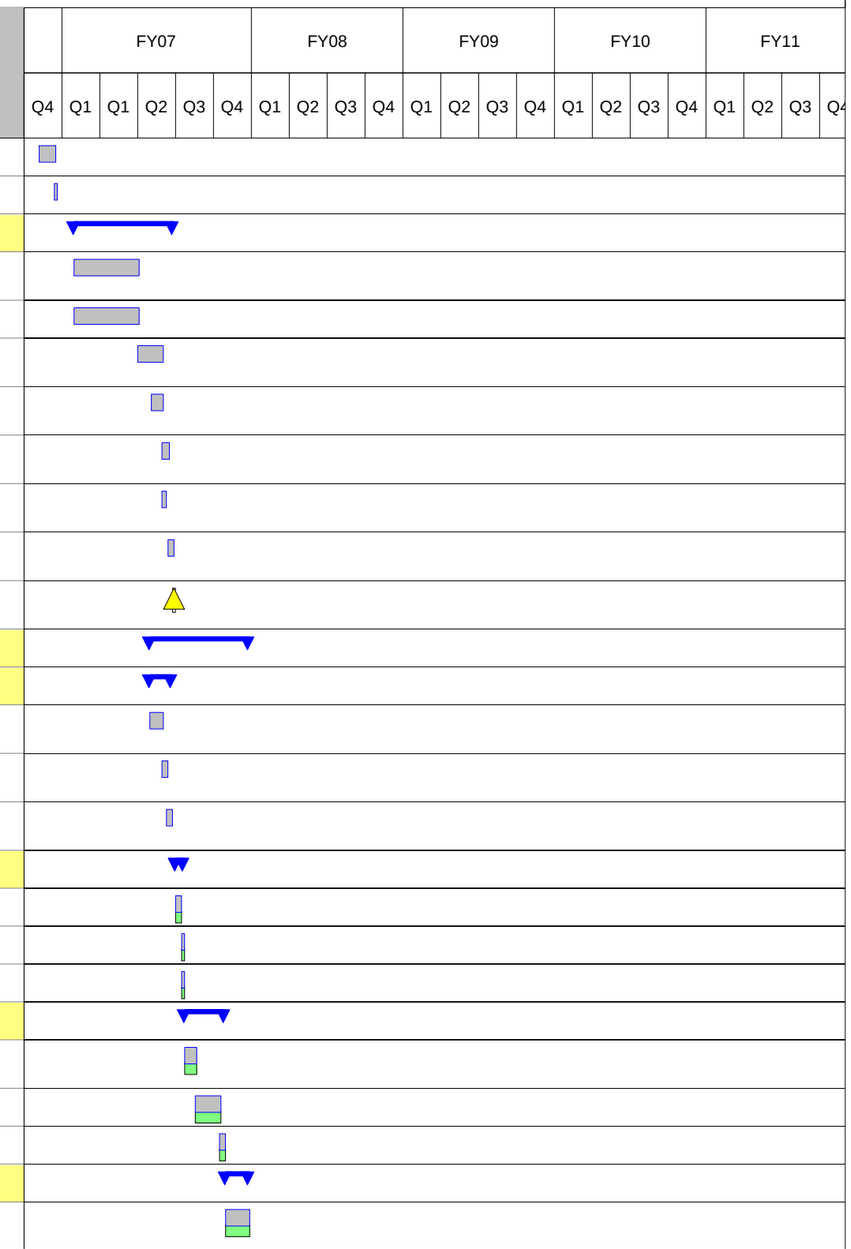
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.7.1.3.3.2	Evaluate message passing system candidates	26d	07Aug06	12Sep06	1.7.1.3.3.1[SS]	L.FNAL.CD.CP.SD_06,80.00,
1.7.1.3.3.3	Review message passing system evaluations	5d	13Sep06	19Sep06	1.7.1.3.3.2[FS]	L.FNAL.CD.CP.SD_06,32.00,
1.7.1.3.4	**Message Passing System-First Release**	**98d**	**01Nov06**	**27Mar07**		
1.7.1.3.4.1	Develop message passing system message framework	40d	01Nov06	03Jan07	1.7.1.3.3.3[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.3.4.2	Develop message passing system client	40d	01Nov06	03Jan07	1.7.1.3.4.1[SS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.3.4.3	Develop message passing system server code	40d	04Jan07	01Mar07	1.7.1.3.4.2[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.3.4.4	Develop message passing system test and verification suite	20d	02Feb07	01Mar07	1.7.1.3.4.3[SS+20d]	L.FNAL.CD.CP.SD,80.00,
1.7.1.3.4.5	Write message passing system user documentation	10d	02Mar07	15Mar07	1.7.1.3.4.4[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.3.4.6	Perform message passing system tests and verification for first release	4d	02Mar07	07Mar07	1.7.1.3.4.4[FS]	L.FNAL.CD.CP.SD,16.00,
1.7.1.3.4.7	Review message passing system software, tests and documentation for first release	8d	16Mar07	27Mar07	1.7.1.3.4.6[FS]; 1.7.1.3.4.5[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.3.4.8	Message passing system for software first release	0	27Mar07	27Mar07	1.7.1.3.4.7[FS]	
1.7.1.4	**Run Control System**	**165d**	**01Feb07**	**24Sep07**		
1.7.1.4.1	**Run Control System Requirements**	**36d**	**01Feb07**	**22Mar07**		
1.7.1.4.1.1	Run control system requirements document draft	20d	01Feb07	28Feb07		L.FNAL.CD.CP.SD,80.00,
1.7.1.4.1.2	Review run control system requirements document	8d	01Mar07	12Mar07	1.7.1.4.1.1[FS]	L.FNAL.CD.CP.SD,16.00,
1.7.1.4.1.3	Finalize run control system requirements document	8d	13Mar07	22Mar07	1.7.1.4.1.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.4.2	**Run Control System Design**	**15d**	**02Apr07**	**20Apr07**		
1.7.1.4.2.1	Run control system design document draft	10d	02Apr07	13Apr07	1.7.1.4.1.3[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.4.2.2	Review run control system design document	5d	16Apr07	20Apr07	1.7.1.4.2.1[FS]	L.FNAL.CD.CP.SD,16.00,
1.7.1.4.2.3	Finalize run control system design document	5d	16Apr07	20Apr07	1.7.1.4.2.2[SS]; 1.7.1.4.1.3[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.4.3	**Run Control Systems Evaluation**	**68d**	**23Apr07**	**27Jul07**		
1.7.1.4.3.1	Find candidates for run control system software	20d	23Apr07	18May07	1.7.1.4.2.3[FS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.4.3.2	Evaluate run control system candidates	40d	21May07	17Jul07	1.7.1.4.3.1[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.4.3.3	Review run control system evaluations	8d	18Jul07	27Jul07	1.7.1.4.3.2[FS]	L.FNAL.CD.CP.SD,16.00,
1.7.1.4.4	**Run Control System-First Release**	**40d**	**30Jul07**	**24Sep07**		
1.7.1.4.4.1	Develop initial run control system framework	40d	30Jul07	24Sep07	1.7.1.2.4.8[FS]; 1.7.1.3.4.8[FS]; 1.7.1.4.3.3[FS]	L.FNAL.CD.CP.SD,160.00,



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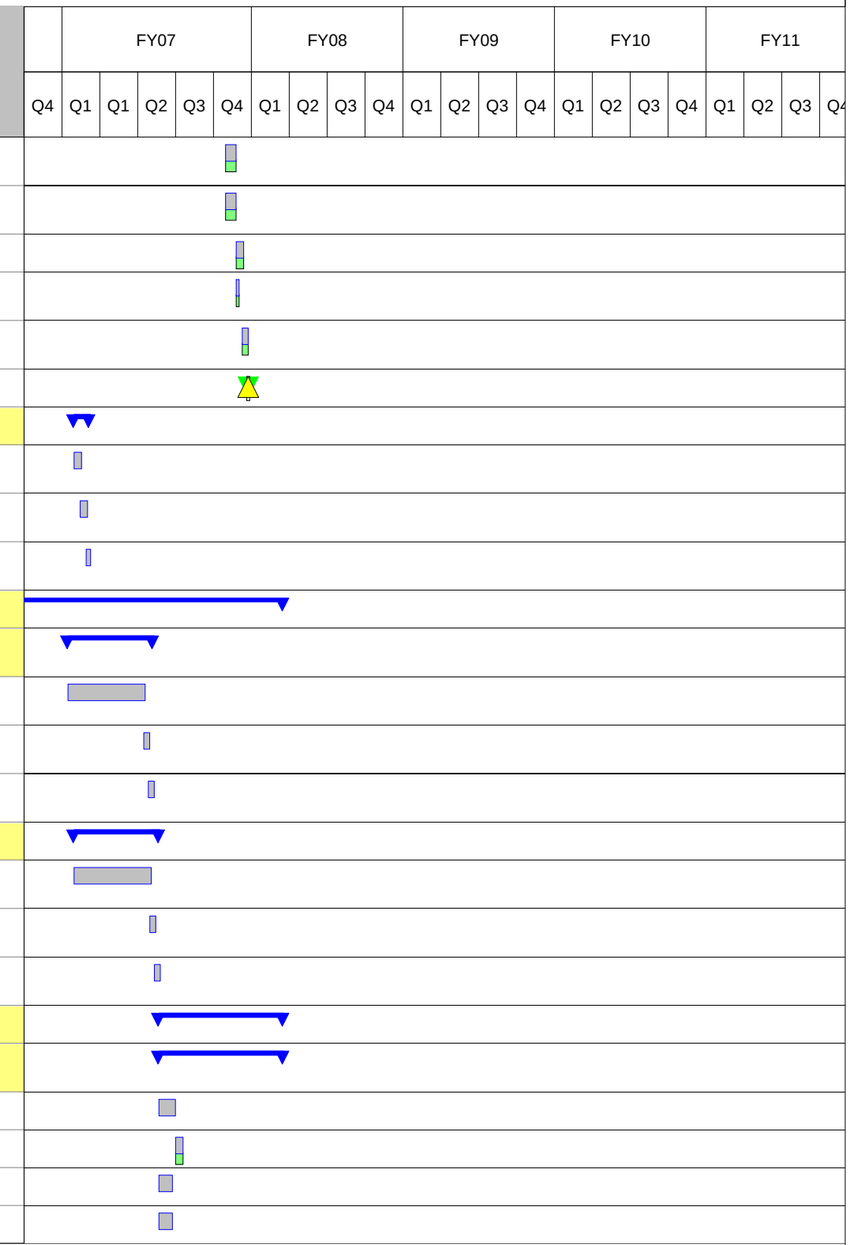
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.7.1.4.4.2	Develop initial run control command line interface	20d	30Jul07	24Aug07	1.7.1.4.4.1[SS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.4.4.3	Develop run control system test and verification suite	20d	30Jul07	24Aug07	1.7.1.4.4.1[SS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.4.4.4	Write run control system user documentation	10d	27Aug07	10Sep07	1.7.1.4.4.3[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.4.4.5	Perform run control system tests and verification for first release	4d	27Aug07	30Aug07	1.7.1.4.4.3[FS]	L.FNAL.CD.CP.SD,16.00,
1.7.1.4.4.6	Review run control system software, tests and documentation for first release	8d	11Sep07	20Sep07	1.7.1.4.4.5[FS]; 1.7.1.4.4.4[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.4.4.7	Run control system for software first release	0	20Sep07	20Sep07	1.7.1.4.4.6[FS]	
1.7.1.5	**DAQ Software Architecture Overview**	**26d**	**01Nov06**	**08Dec06**		
1.7.1.5.1	DAQ software architecture overview draft document	10d	01Nov06	14Nov06		L.FNAL.CD.CP.SD,120.00,
1.7.1.5.2	Review DAQ software architecture overview document	8d	15Nov06	28Nov06	1.7.1.5.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.5.3	Finalize DAQ software architecture overview document	8d	29Nov06	08Dec06	1.7.1.5.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.6	**Event Buffer Farm Software**	**411d**	**01May06**	**17Dec07**		
1.7.1.6.1	**Event Buffer Farm Software Requirements**	**76d**	**16Oct06**	**07Feb07**		
1.7.1.6.1.1	Event buffer farm software requirements document draft	60d	16Oct06	16Jan07		L.FNAL.CD.CP.SD,120.00,
1.7.1.6.1.2	Review event buffer farm software requirements document	8d	17Jan07	26Jan07	1.7.1.6.1.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.6.1.3	Finalize event buffer farm software requirements document	8d	29Jan07	07Feb07	1.7.1.6.1.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.6.2	**Event Buffer Farm Software Design**	**76d**	**30Oct06**	**21Feb07**		
1.7.1.6.2.1	Event buffer farm software design document draft	60d	30Oct06	30Jan07	1.7.1.6.1.1[SS+10d]	L.FNAL.CD.CP.SD,160.00,
1.7.1.6.2.2	Review event buffer farm software design document	8d	31Jan07	09Feb07	1.7.1.6.2.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.6.2.3	Finalize event buffer farm software design document	8d	12Feb07	21Feb07	1.7.1.6.2.2[FS]; 1.7.1.6.1.3[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.6.3	**Event Buffer Farm Core Software**	**208d**	**22Feb07**	**17Dec07**		
1.7.1.6.3.1	**Event Buffer Farm Core Software-First Release**	**208d**	**22Feb07**	**17Dec07**		
1.7.1.6.3.1.1	Develop initial circular memory buffer - 1	27d	22Feb07	30Mar07	1.7.1.6.2.3[FS]	L.FNAL.CD.CP.SD,108.00,
1.7.1.6.3.1.2	Develop initial circular memory buffer - 2	13d	02Apr07	18Apr07	1.7.1.6.3.1.1[FS]; 1.7.1.6.2.3[FS]	L.FNAL.CD.CP.SD,52.00,
1.7.1.6.3.1.3	Develop network manager	20d	22Feb07	21Mar07	1.7.1.6.3.1.1[SS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.6.3.1.4	Develop software event builder	20d	22Feb07	21Mar07	1.7.1.6.3.1.1[SS]	L.FNAL.CD.CP.SD,80.00,



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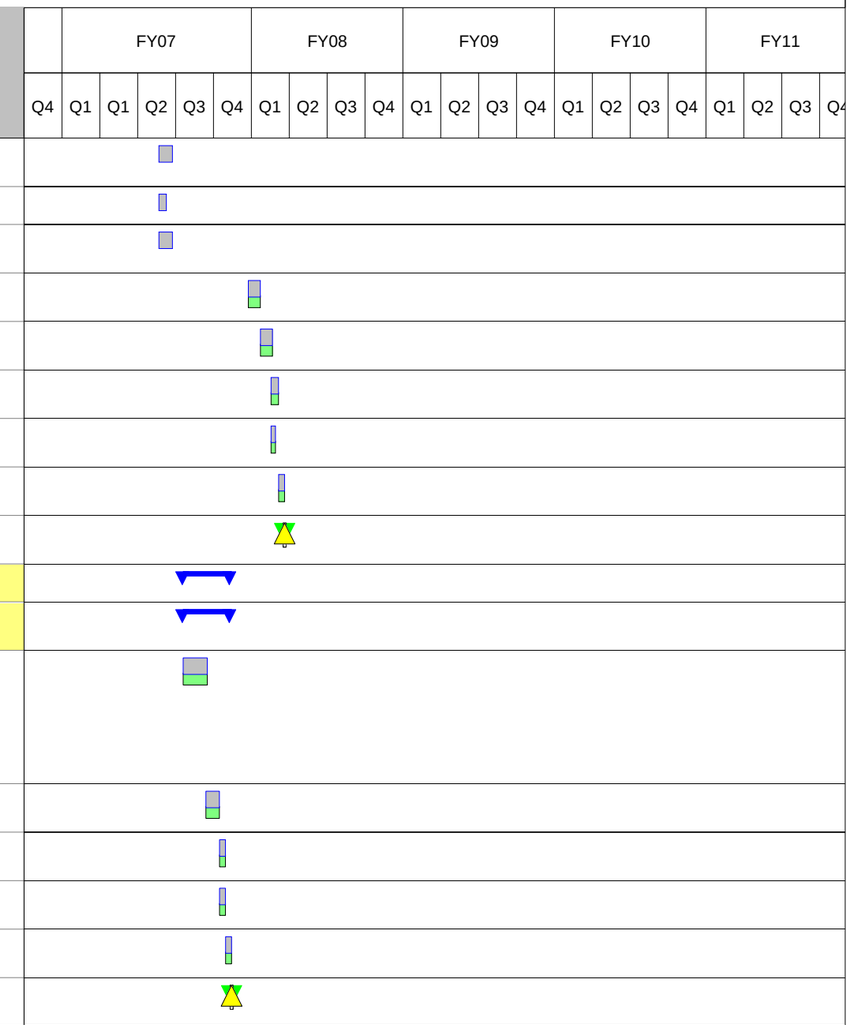
1.7.1.6.3.1.5	Integrate error handling and monitoring support in the event buffer farm core software	20d	22Feb07	21Mar07	1.7.1.6.3.1.1[SS]; 1.7.1.2.4.2[FS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.6.3.1.6	Develop trigger handling code	10d	22Feb07	07Mar07	1.7.1.6.3.1.1[SS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.6.3.1.7	Develop support for sending events to the data logger	20d	22Feb07	21Mar07	1.7.1.6.3.1.1[SS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.6.3.1.8	Integrate run control support in the event buffer farm core software	20d	25Sep07	22Oct07	1.7.1.6.3.1.1[SS]; 1.7.1.4.4.1[FS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.6.3.1.9	Write event buffer farm core software test and verification suite for first release	20d	23Oct07	19Nov07	1.7.1.6.3.1.8[FS]; 1.7.1.6.3.1.5[FS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.6.3.1.10	Write event buffer farm core software user documentation for first release	10d	20Nov07	05Dec07	1.7.1.6.3.1.9[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.6.3.1.11	Perform event buffer farm core software tests and verification for first release	4d	20Nov07	27Nov07	1.7.1.6.3.1.9[FS]	L.FNAL.CD.CP.SD,16.00,
1.7.1.6.3.1.12	Review event buffer farm core software, tests and documentation for first release	8d	06Dec07	17Dec07	1.7.1.6.3.1.11[FS]; 1.7.1.6.3.1.10[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.6.3.1.13	Event buffer farm core software for software first release	0	17Dec07	17Dec07	1.7.1.6.3.1.12[FS]	
1.7.1.6.4	**Event Buffer Farm Server**	**80d**	**19Apr07**	**10Aug07**		
1.7.1.6.4.1	**Event Buffer Farm Server-First Release**	**80d**	**19Apr07**	**10Aug07**		
1.7.1.6.4.1.1	Write first release event buffer farm server code	40d	19Apr07	14Jun07	1.7.1.6.3.1.7[FS]; 1.7.1.6.3.1.3[FS]; 1.7.1.6.3.1.4[FS]; 1.7.1.6.3.1.6[FS]; 1.7.1.6.3.1.2[FS]; 1.7.1.6.3.1.5[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.6.4.1.2	Write event buffer farm server test and verification suite for first release	20d	15Jun07	13Jul07	1.7.1.6.4.1.1[FS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.6.4.1.3	Write event buffer farm server user documentation for software first release	10d	16Jul07	27Jul07	1.7.1.6.4.1.2[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.6.4.1.4	Perform event buffer farm server tests and verification for software first release	10d	16Jul07	27Jul07	1.7.1.6.4.1.2[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.6.4.1.5	Review event buffer farm server, tests and documentation for software first release	10d	30Jul07	10Aug07	1.7.1.6.4.1.3[FS]; 1.7.1.6.4.1.4[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.6.4.1.6	Event buffer farm server for software first release	0	10Aug07	10Aug07	1.7.1.6.4.1.5[FS]	
1.7.1.6.5	**Linux Kernel Support for Trace**	**44d**	**01May06**	**30Jun06**		
1.7.1.6.5.1	Build kernel with support for trace	20d	01May06	26May06		L.FNAL.CD.CP.SD_06,80.00,
1.7.1.6.5.2	Write trace kernel support test and verification suite for software first release	8d	30May06	08Jun06	1.7.1.6.5.1[FS]	L.FNAL.CD.CP.SD_06,32.00,
1.7.1.6.5.3	Write trace kernel support user documentation for software first release	8d	09Jun06	20Jun06	1.7.1.6.5.2[FS]	L.FNAL.CD.CP.SD_06,32.00,
1.7.1.6.5.4	Perform trace kernel support tests and verification for software first release	4d	09Jun06	14Jun06	1.7.1.6.5.2[FS]	L.FNAL.CD.CP.SD_06,16.00,



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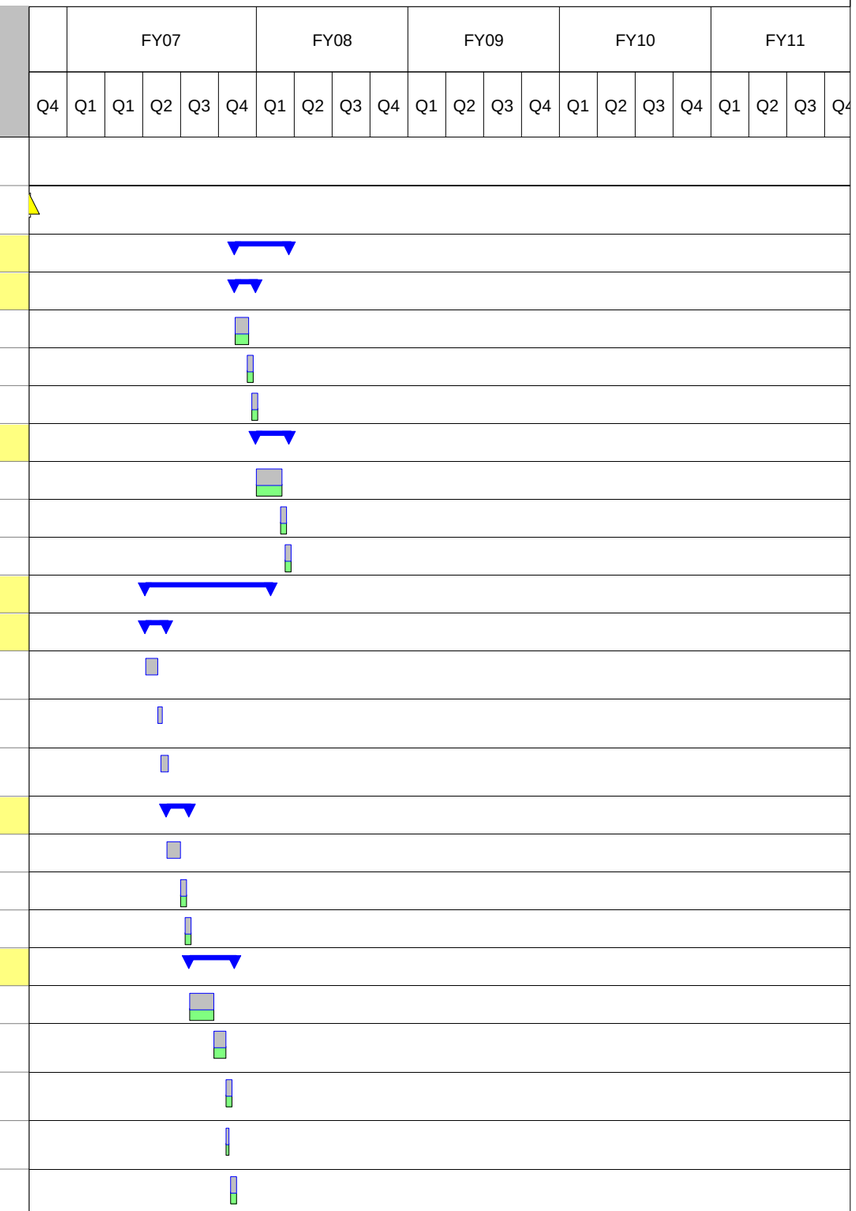
1.7.1.6.5.5	Review trace kernel support, tests and documentation for software first release	8d	21Jun06	30Jun06	1.7.1.6.5.3[FS]; 1.7.1.6.5.4[FS]	L.FNAL.CD.CP.SD_06,32.00,
1.7.1.6.5.6	Trace kernel support for software first release	0	30Jun06	30Jun06	1.7.1.6.5.5[FS]	
1.7.1.7	**Data Logger**	**92d**	**13Aug07**	**21Dec07**		
1.7.1.7.1	**Data Logger Requirements**	**36d**	**13Aug07**	**02Oct07**		
1.7.1.7.1.1	Data logger requirements document draft	20d	13Aug07	10Sep07	1.7.1.6.4.1.6[FS]; 1.7.1.5.3[FS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.7.1.2	Review data logger requirements document	8d	11Sep07	20Sep07	1.7.1.7.1.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.7.1.3	Finalize data logger requirements document	8d	21Sep07	02Oct07	1.7.1.7.1.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.7.2	**Data Logger Design**	**56d**	**03Oct07**	**21Dec07**		
1.7.1.7.2.1	Data logger design document draft	40d	03Oct07	29Nov07	1.7.1.7.1.3[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.7.2.2	Review data logger design document	8d	30Nov07	11Dec07	1.7.1.7.2.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.7.2.3	Finalize data logger design document	8d	12Dec07	21Dec07	1.7.1.7.2.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.8	**Global Trigger System**	**215d**	**08Jan07**	**08Nov07**		
1.7.1.8.1	**Global Trigger System Requirements**	**36d**	**08Jan07**	**27Feb07**		
1.7.1.8.1.1	Global trigger system requirements document draft	20d	08Jan07	05Feb07		L.UMND.PD.SCI.PHY,80.00,
1.7.1.8.1.2	Review global trigger system requirements document	8d	06Feb07	15Feb07	1.7.1.8.1.1[FS]	L.UMND.PD.SCI.PHY,32.00,
1.7.1.8.1.3	Finalize global trigger system requirements document	8d	16Feb07	27Feb07	1.7.1.8.1.2[FS]	L.UMND.PD.SCI.PHY,32.00,
1.7.1.8.2	**Global Trigger System Design**	**39d**	**28Feb07**	**23Apr07**		
1.7.1.8.2.1	Global trigger system design document draft	23d	28Feb07	30Mar07	1.7.1.8.1.3[FS]	L.UMND.PD.SCI.PHY,80.00,
1.7.1.8.2.2	Review global trigger system design document	8d	02Apr07	11Apr07	1.7.1.8.2.1[FS]	L.UMND.PD.SCI.PHY,32.00,
1.7.1.8.2.3	Finalize global trigger system design document	8d	12Apr07	23Apr07	1.7.1.8.2.2[FS]	L.UMND.PD.SCI.PHY,32.00,
1.7.1.8.3	**Global Trigger System-First Release**	**78d**	**24Apr07**	**13Aug07**		
1.7.1.8.3.1	Develop initial global trigger server framework	40d	24Apr07	19Jun07	1.7.1.8.2.3[FS]	L.UMND.PD.SCI.PHY,160.00,
1.7.1.8.3.2	Write global trigger system test and verification suite for software first release	20d	20Jun07	18Jul07	1.7.1.8.3.1[FS]	L.UMND.PD.SCI.PHY,80.00,
1.7.1.8.3.3	Write global trigger system user documentation for software first release	10d	19Jul07	01Aug07	1.7.1.8.3.2[FS]	L.UMND.PD.SCI.PHY,40.00,
1.7.1.8.3.4	Perform global trigger system tests and verification for software first release	4d	19Jul07	24Jul07	1.7.1.8.3.2[FS]	L.UMND.PD.SCI.PHY,16.00,
1.7.1.8.3.5	Review global trigger system, tests and documentation for software first release	8d	02Aug07	13Aug07	1.7.1.8.3.4[FS]; 1.7.1.8.3.3[FS]	L.UMND.PD.SCI.PHY,32.00,



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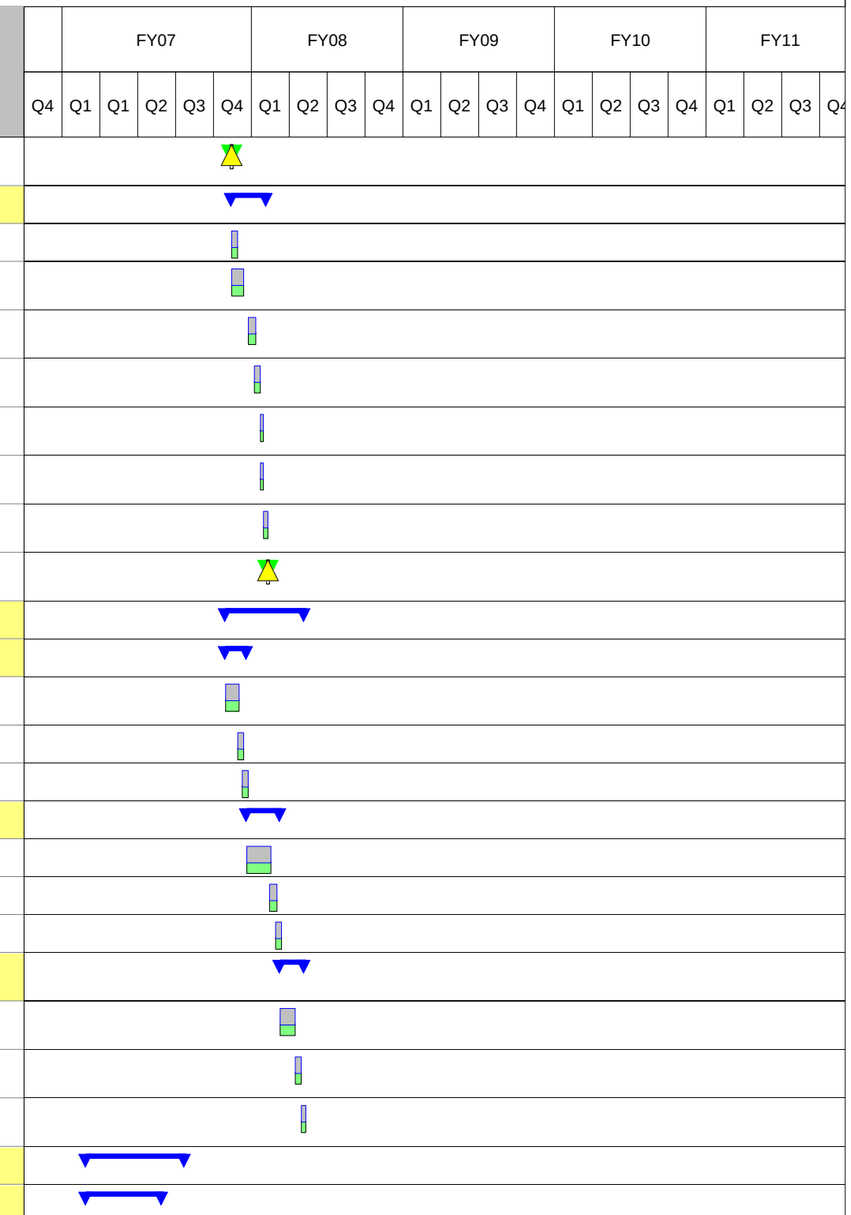
June 4-6, 2007

WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.7.1.8.3.6	Global trigger system for software first release	0	13Aug07	13Aug07	1.7.1.8.3.5[FS]	
1.7.1.8.4	**Global Trigger System-Second Release**	**62d**	**14Aug07**	**08Nov07**		
1.7.1.8.4.1	Develop beam signal trigger	10d	14Aug07	27Aug07	1.7.1.8.3.6[FS]	L.UMND.PD.SCI.PHY,40.00,
1.7.1.8.4.2	Integrate error handling and monitoring support in the global trigger server	20d	14Aug07	11Sep07	1.7.1.8.4.1[SS]; 1.7.1.2.4.2[FS]	L.UMND.PD.SCI.PHY,80.00,
1.7.1.8.4.3	Integrate run control support in the global trigger server	10d	25Sep07	08Oct07	1.7.1.4.4.1[FS]; 1.7.1.8.4.1[FS]	L.UMND.PD.SCI.PHY,40.00,
1.7.1.8.4.4	Update global trigger system test and verification suite for software second release	10d	09Oct07	22Oct07	1.7.1.8.4.3[FS]	L.UMND.PD.SCI.PHY,40.00,
1.7.1.8.4.5	Update global trigger system user documentation for software second release	5d	23Oct07	29Oct07	1.7.1.8.4.4[FS]	L.UMND.PD.SCI.PHY,20.00,
1.7.1.8.4.6	Perform global trigger system tests and verification for software second release	4d	23Oct07	26Oct07	1.7.1.8.4.4[FS]	L.UMND.PD.SCI.PHY,16.00,
1.7.1.8.4.7	Review global trigger system, tests and documentation for software second release	8d	30Oct07	08Nov07	1.7.1.8.4.5[FS]; 1.7.1.8.4.6[FS]	L.UMND.PD.SCI.PHY,32.00,
1.7.1.8.4.8	Global trigger system for software second release	0	08Nov07	08Nov07	1.7.1.8.4.7[FS]	
1.7.1.9	**DAQ Monitor System**	**130d**	**01Aug07**	**08Feb08**		
1.7.1.9.1	**DAQ Monitor System Requirements**	**36d**	**01Aug07**	**20Sep07**		
1.7.1.9.1.1	DAQ monitor system requirements document draft	20d	01Aug07	28Aug07		L.FNAL.CD.CP.SD,80.00,
1.7.1.9.1.2	Review DAQ monitor requirements document	8d	29Aug07	10Sep07	1.7.1.9.1.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.9.1.3	Finalize DAQ monitor requirements document	8d	11Sep07	20Sep07	1.7.1.9.1.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.9.2	**DAQ Monitor System Design**	**56d**	**21Sep07**	**11Dec07**		
1.7.1.9.2.1	DAQ monitor system design document draft	40d	21Sep07	15Nov07	1.7.1.9.1.3[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.1.9.2.2	Review DAQ monitor system design document	8d	16Nov07	29Nov07	1.7.1.9.2.1[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.9.2.3	Finalize DAQ monitor system design document	8d	30Nov07	11Dec07	1.7.1.9.2.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.9.3	**DAQ Monitor Software and Development Languages Evaluation**	**38d**	**12Dec07**	**08Feb08**		
1.7.1.9.3.1	Find candidates for DAQ monitor software and development languages	20d	12Dec07	14Jan08	1.7.1.9.2.3[FS]	L.FNAL.CD.CP.SD,80.00,
1.7.1.9.3.2	Evaluate DAQ monitor software and development languages	10d	15Jan08	29Jan08	1.7.1.9.3.1[FS]	L.FNAL.CD.CP.SD,40.00,
1.7.1.9.3.3	Review DAQ monitor software and development languages evaluations	8d	30Jan08	08Feb08	1.7.1.9.3.2[FS]	L.FNAL.CD.CP.SD,32.00,
1.7.1.10	**Online Databases**	**97d**	**01Dec06**	**23Apr07**		
1.7.1.10.1	**General Online Database Infrastructure**	**60d**	**01Dec06**	**01Mar07**		



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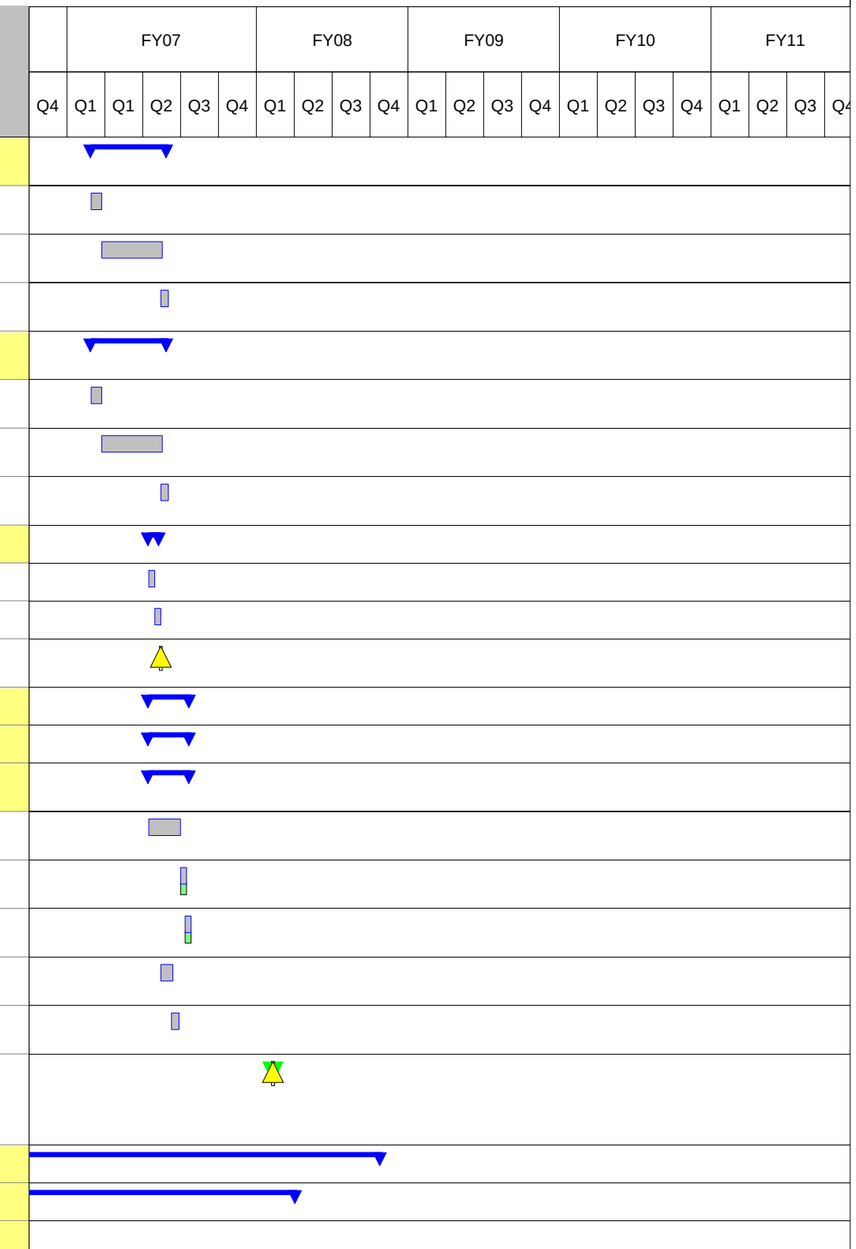
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.7.1.10.1.1	**General Online Database Requirements**	**60d**	**01Dec06**	**01Mar07**		
1.7.1.10.1.1.1	General online database requirements document draft	15d	**01Dec06**	**21Dec06**		**L.FNAL.CD.CP.SD,120.00,**
1.7.1.10.1.1.2	Review general online database requirements document	35d	**26Dec06**	**15Feb07**	**1.7.1.10.1.1.1[FS]**	**L.FNAL.CD.CP.SD,24.00,**
1.7.1.10.1.1.3	Finalize general online database requirements document	10d	**16Feb07**	**01Mar07**	**1.7.1.10.1.1.2[FS]**	**L.FNAL.CD.CP.SD,32.00,**
1.7.1.10.1.2	**Online Database Backup & Failover Requirements**	**60d**	**01Dec06**	**01Mar07**		
1.7.1.10.1.2.1	Online database backup & falilover requirements document draft	15d	**01Dec06**	**21Dec06**	**1.7.1.10.1.1.1[SS]**	**L.FNAL.CD.CP.SD,80.00,**
1.7.1.10.1.2.2	Review online database backup & failover requirements document	35d	**26Dec06**	**15Feb07**	**1.7.1.10.1.2.1[FS]**	**L.FNAL.CD.CP.SD,32.00,**
1.7.1.10.1.2.3	Finalize online database backup & faliover requirements document	10d	**16Feb07**	**01Mar07**	**1.7.1.10.1.2.2[FS]**	**L.FNAL.CD.CP.SD,32.00,**
1.7.1.10.1.5	**Database Deployment to Development**	**20d**	**16Jan07**	**12Feb07**		
1.7.1.10.1.5.1	Deploy databases on development server	10d	**16Jan07**	**29Jan07**		**L.FNAL.CD.CP.SD,40.00,**
1.7.1.10.1.5.2	Configure development database servers	10d	**30Jan07**	**12Feb07**	**1.7.1.10.1.5.1[FS]**	**L.FNAL.CD.CP.SD,20.00,**
1.7.1.10.1.5.3	Development database servers released for use	0	**12Feb07**	**12Feb07**	**1.7.1.10.1.5.2[FS]**	
1.7.1.10.2	**Database Applications**	**70d**	**16Jan07**	**23Apr07**		
1.7.1.10.2.2	**Online Hardware Database Application**	**70d**	**16Jan07**	**23Apr07**		
1.7.1.10.2.2.1	**Online Hardware Application Specification**	**70d**	**16Jan07**	**23Apr07**		
1.7.1.10.2.2.1.1	Develop online hardware application specification	54d	**16Jan07**	**30Mar07**		**L.FNAL.CD.CP.SD,80.00,**
1.7.1.10.2.2.1.2	Review online hardware application specification	8d	**02Apr07**	**11Apr07**	**1.7.1.10.2.2.1.1[FS]**	**L.FNAL.CD.CP.SD,32.00,**
1.7.1.10.2.2.1.3	Finalize online hardware application specification	8d	**12Apr07**	**23Apr07**	**1.7.1.10.2.2.1.2[FS]**	**L.FNAL.CD.CP.SD,32.00,**
1.7.1.10.2.2.3	Prototype online hardware application and database access	20d	**13Feb07**	**12Mar07**	**1.7.1.10.1.5.3[FS]**	**L.FNAL.CD.CP.SD,60.00,**
1.7.1.10.2.2.4	Implement & test online hardware application in the development environment	10d	**13Mar07**	**26Mar07**	**1.7.1.10.2.2.3[FS]**	**L.FNAL.CD.CP.SD,40.00,**
1.7.1.11	DAQ software ready for IPND	0	**08Nov07**	**08Nov07**	**1.7.1.6.3.1.8[FS]; 1.7.1.4.4.7[FS]; 1.7.1.8.4.8[FS]; 1.7.1.6.4.1.6[FS]; 1.7.1.2.4.8[FS]; 1.7.1.3.4.8[FS]**	
1.7.2	**DAQ Hardware**	**613d**	**22Feb06**	**29Jul08**		
1.7.2.1	**Data Concentrator**	**469d**	**22Feb06**	**04Jan08**		
1.7.2.1.1	**Requirements**	**25d**	**01May06**	**05Jun06**		



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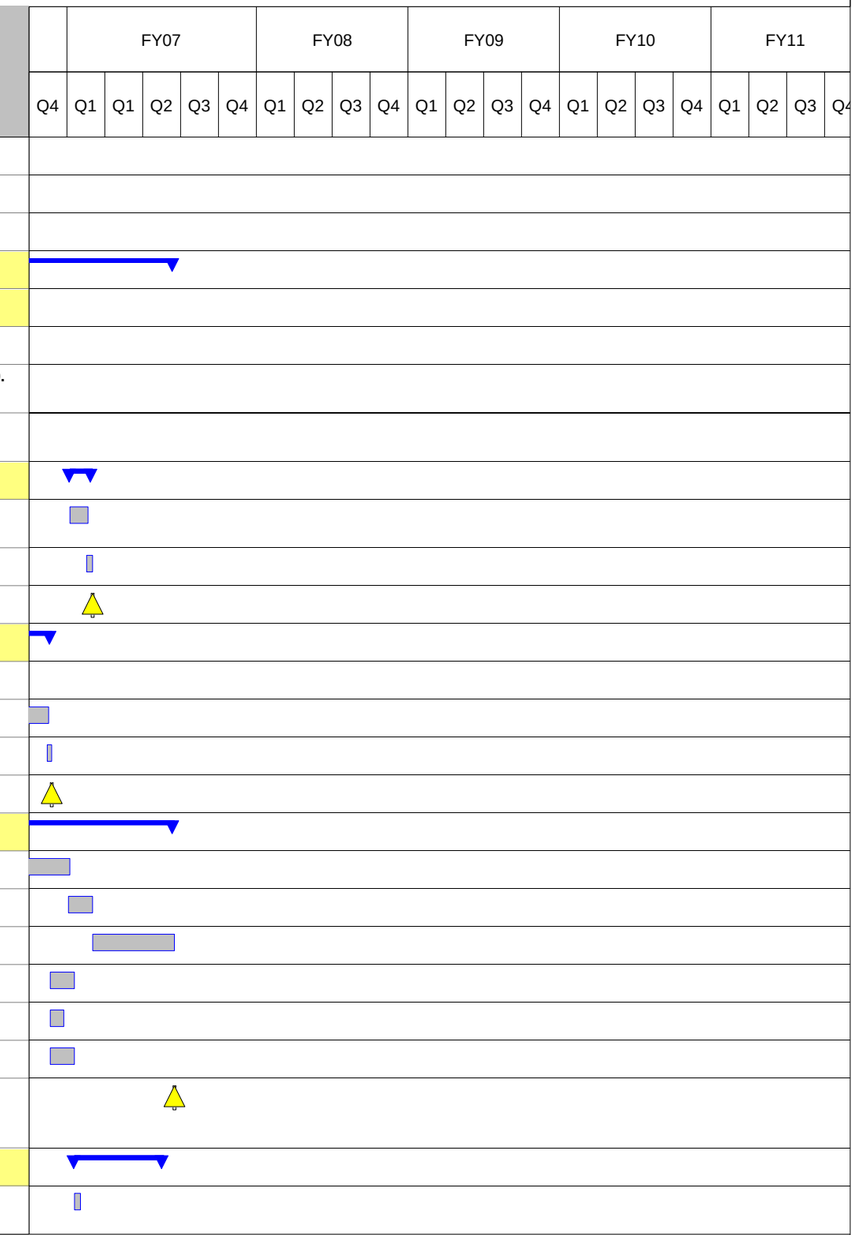
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.7.2.1.1.1	Prepare requirements document	20d	01May06	26May06		L.FNAL.CD.ENG.EE,80.00,
1.7.2.1.1.2	Review requirements	5d	30May06	05Jun06	1.7.2.1.1.1[FS]	L.FNAL.CD.CP.SD,8.00,;L.FNAL.CD.ENG.EE,8.00,
1.7.2.1.1.3	Requirements approved	0	05Jun06	05Jun06	1.7.2.1.1.2[FS]	
1.7.2.1.2	**Design**	**268d**	**22Feb06**	**16Mar07**		
1.7.2.1.2.1	**Evaluation**	**73d**	**22Feb06**	**05Jun06**		
1.7.2.1.2.1.1	Order evaluation kits	5d	22Feb06	28Feb06		L.FNAL.CD.ENG.EE,16.00,
1.7.2.1.2.1.2	Benchmark evaluation kits	65d	01Mar06	31May06	1.7.2.1.2.1.1[FS]	L.FNAL.CD.CP.SD,240.00,;L.FNAL.CD.ENG.EE,240.00,
1.7.2.1.2.1.3	Select architecture	3d	01Jun06	05Jun06	1.7.2.1.2.1.2[FS]	L.FNAL.CD.ENG.EE,24.00,;L.FNAL.CD.CP.SD,24.00,
1.7.2.1.2.2	**Specifications**	**35d**	**09Oct06**	**28Nov06**		
1.7.2.1.2.2.1	Prepare specifications document	30d	09Oct06	17Nov06	1.7.2.1.2.1.3[FS]	L.FNAL.CD.CP.SD,80.00,;L.FNAL.CD.ENG.EE,160.00,
1.7.2.1.2.2.2	Review specifications	5d	20Nov06	28Nov06	1.7.2.1.2.2.1[FS]	L.FNAL.CD.ENG.EE,8.00,;L.FNAL.CD.CP.SD,8.00,
1.7.2.1.2.2.3	Specifications approved	0	28Nov06	28Nov06	1.7.2.1.2.2.2[FS]	
1.7.2.1.2.3	**Circuit Design**	**55d**	**06Jun06**	**22Aug06**		
1.7.2.1.2.3.1	Generate schematic symbols	10d	06Jun06	19Jun06	1.7.2.1.2.1.3[FS]	L.FNAL.CD.TECH.ET_M,40.00,
1.7.2.1.2.3.2	Enter schematic	40d	20Jun06	15Aug06	1.7.2.1.2.3.1[FS]	L.FNAL.CD.ENG.EE,240.00,
1.7.2.1.2.3.3	Review schematic	5d	16Aug06	22Aug06	1.7.2.1.2.3.2[FS]	L.FNAL.CD.ENG.EE,16.00,
1.7.2.1.2.3.4	Schematic approved	0	22Aug06	22Aug06	1.7.2.1.2.3.3[FS]	
1.7.2.1.2.4	**Firmware Design**	**195d**	**06Jun06**	**16Mar07**		
1.7.2.1.2.4.1	Design FPGA firmware	85d	06Jun06	04Oct06	1.7.2.1.2.1.3[FS]	L.FNAL.CD.ENG.EE,240.00,
1.7.2.1.2.4.2	Design OS port	40d	05Oct06	01Dec06	1.7.2.1.2.4.1[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.2.1.2.4.3	Design embedded software	70d	04Dec06	16Mar07	1.7.2.1.2.4.2[FS]	L.FNAL.CD.CP.SD,160.00,
1.7.2.1.2.5	Board design	40d	23Aug06	18Oct06	1.7.2.1.2.3.4[FS]	L.FNAL.CD.TECH.ET_M,240.00,
1.7.2.1.2.6	Packaging design	20d	23Aug06	20Sep06	1.7.2.1.2.3.4[FS]	L.FNAL.CD.TECH.ET_M,80.00,
1.7.2.1.2.7	Simulation	40d	23Aug06	18Oct06	1.7.2.1.2.3.4[FS]	L.FNAL.CD.ENG.EE,240.00,
1.7.2.1.2.8	Data concentrator design completed	0	16Mar07	16Mar07	1.7.2.1.2.6[FS]; 1.7.2.1.2.3[FS]; 1.7.2.1.2.7[FS]; 1.7.2.1.2.5[FS]; 1.7.2.1.2.4[FS]	
1.7.2.1.3	**Prototype Manufacture**	**80d**	**19Oct06**	**16Feb07**		
1.7.2.1.3.1	Prepare PCB manufacturing requirements document	10d	19Oct06	01Nov06	1.7.2.1.2.5[FS]	L.FNAL.CD.TECH.ET_M,40.00,



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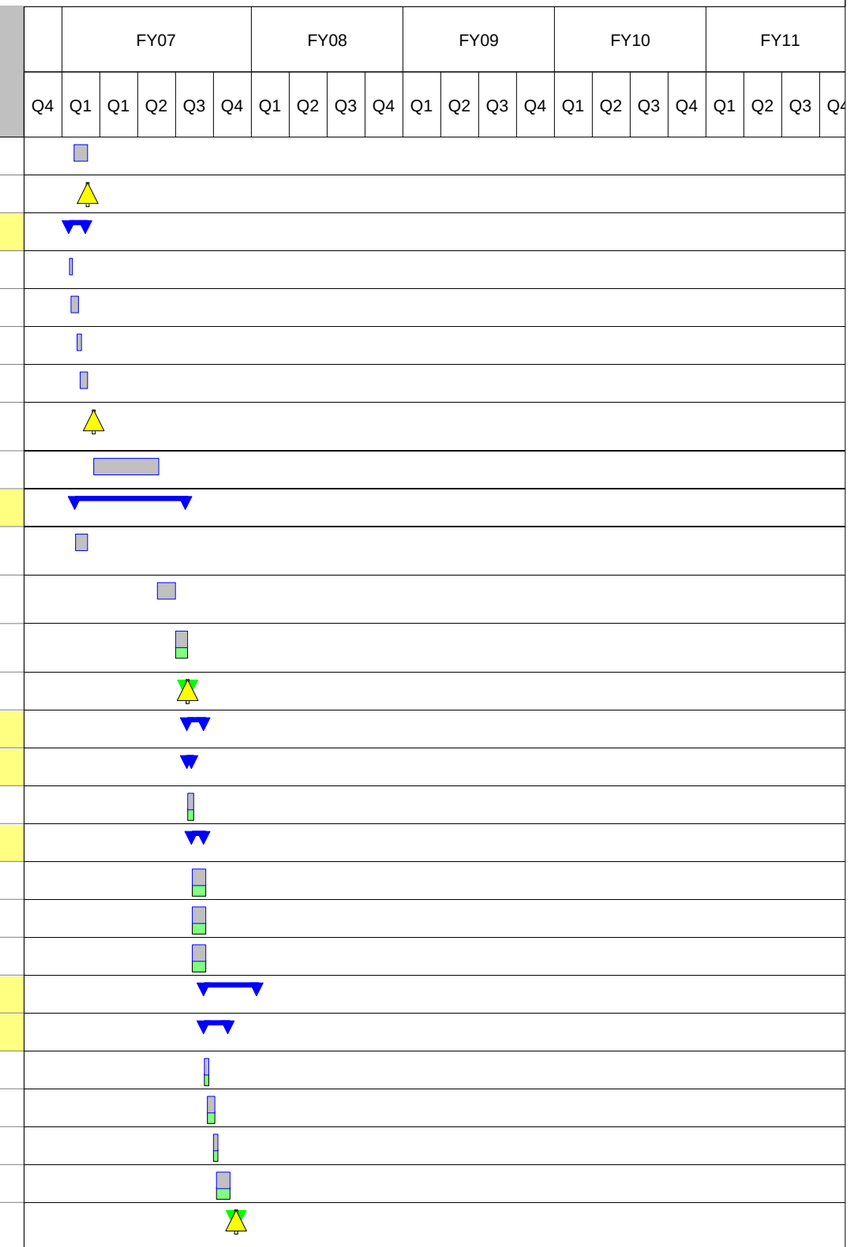
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.7.2.1.3.2	Review PCB manufacturing	20d	02Nov06	01Dec06	1.7.2.1.3.1[FS]	L.FNAL.CD.ENG.EE,8.00,
1.7.2.1.3.3	PCB manufacturing approved	0	01Dec06	01Dec06	1.7.2.1.3.2[FS]	
1.7.2.1.3.4	**Order Prototype Manufacture**	**30d**	**19Oct06**	**01Dec06**		
1.7.2.1.3.4.1	Write purchase requisitions	5d	19Oct06	25Oct06	1.7.2.1.2.5[FS]	
1.7.2.1.3.4.2	Obtain project approvals	10d	26Oct06	08Nov06	1.7.2.1.3.4.1[FS]	
1.7.2.1.3.4.3	Write purchase orders	5d	09Nov06	15Nov06	1.7.2.1.3.4.2[FS]	L.FNAL.CD.ENG.EE,16.00,
1.7.2.1.3.4.4	Place purchase orders	10d	16Nov06	01Dec06	1.7.2.1.3.4.3[FS]	M.FNAL.PPD.MANDS,10000.00,
1.7.2.1.3.5	Prototype data concentrator PCBs and components received	0	15Dec06	15Dec06	1.7.2.1.3.4.4[FS+10d]	
1.7.2.1.3.6	Assemble prototype data concentrators	40d	18Dec06	16Feb07	1.7.2.1.3.5[FS]	L.FNAL.CD.TECH.ET_M,120.00,
1.7.2.1.4	**Prototype Test**	**118d**	**06Nov06**	**27Apr07**		
1.7.2.1.4.1	Write test procedures document	15d	06Nov06	28Nov06	1.7.2.1.2.5[FS]	L.FNAL.CD.TECH.ET_M,40.00,;L.FNAL.CD.ENG.EE,80.00,
1.7.2.1.4.2	Perform standalone board tests	30d	19Feb07	30Mar07	1.7.2.1.3.6[FS]	L.FNAL.CD.ENG.EE,160.00,;L.FNAL.CD.TECH.ET_M,240.00,
1.7.2.1.4.3	Perform interface tests	20d	02Apr07	27Apr07	1.7.2.1.4.2[FS]	L.FNAL.CD.ENG.EE,80.00,;L.FNAL.CD.TECH.ET_M,80.00,
1.7.2.1.4.4	DCM prototype completed	0	27Apr07	27Apr07	1.7.2.1.4.3[FS]	
1.7.2.1.5	**Pre-production Design Modifications**	**30d**	**30Apr07**	**11Jun07**		
1.7.2.1.5.1	**Specifications**	**10d**	**30Apr07**	**11May07**		
1.7.2.1.5.1.1	Prepare specifications document	10d	30Apr07	11May07	1.7.2.1.4[FS]	L.FNAL.CD.ENG.EE,40.00,
1.7.2.1.5.2	**Circuit Design**	**20d**	**14May07**	**11Jun07**		
1.7.2.1.5.2.1	Schematic entry	20d	14May07	11Jun07	1.7.2.1.5.1.1[FS]	L.FNAL.CD.ENG.EE,80.00,
1.7.2.1.5.3	Board design	20d	14May07	11Jun07	1.7.2.1.5.1.1[FS]	L.FNAL.CD.TECH.ET_M,80.00,
1.7.2.1.5.4	Simulation	20d	14May07	11Jun07	1.7.2.1.5.1.1[FS]	L.FNAL.CD.ENG.EE,120.00,
1.7.2.1.6	**Integration Prototype Near Detector DCM**	**90d**	**12Jun07**	**17Oct07**		
1.7.2.1.6.1	**IPND DCM Procurement**	**40d**	**12Jun07**	**07Aug07**		
1.7.2.1.6.1.1	Write purchase requests	5d	12Jun07	18Jun07	1.7.2.1.5[FS]	L.FNAL.CD.ENG.EE,16.00,
1.7.2.1.6.1.2	Obtain project approvals	10d	19Jun07	02Jul07	1.7.2.1.6.1.1[FS]	L.FNAL.CD.ENG.EE,8.00,
1.7.2.1.6.1.3	Write purchase orders	5d	03Jul07	10Jul07	1.7.2.1.6.1.2[FS]	L.FNAL.CD.ENG.EE,16.00,
1.7.2.1.6.1.4	Place purchase orders	20d	11Jul07	07Aug07	1.7.2.1.6.1.3[FS]	M.FNAL.PPD.MANDS,20000.00,
1.7.2.1.6.2	IPND data concentrator PCBs and components received	0	21Aug07	21Aug07	1.7.2.1.6.1.4[FS+10d]	



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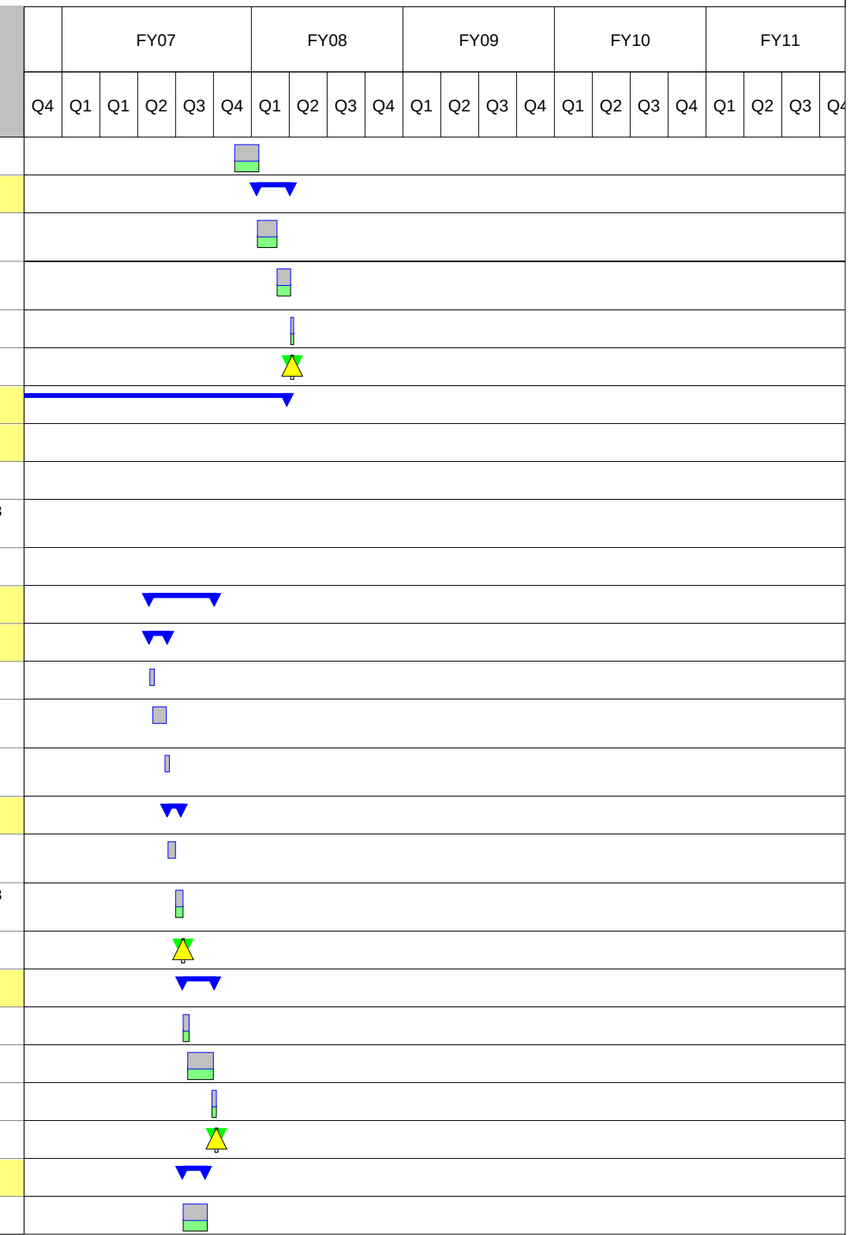
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.7.2.1.6.3	Assemble IPND data concentrators	40d	22Aug07	17Oct07	1.7.2.1.6.2[FS]	L.FNAL.CD.TECH.ET_M,240.00,
1.7.2.1.7	**Test Integ**	**51d**	**18Oct07**	**04Jan08**		
1.7.2.1.7.1	Perform standalone boards tests	30d	18Oct07	30Nov07	1.7.2.1.6.3[FS]	L.FNAL.CD.ENG.EE,160.00,;L.FNAL.CD.TECH.ET_M,240.00,
1.7.2.1.7.2	Perform interface tests	20d	03Dec07	03Jan08	1.7.2.1.7.1[FS]	L.FNAL.CD.TECH.ET_M,80.00,;L.FNAL.CD.ENG.EE,80.00,
1.7.2.1.7.3	Review test results	1d	04Jan08	04Jan08	1.7.2.1.7.2[FS]	
1.7.2.1.8	IPND data concentrators ready for installation	0	04Jan08	04Jan08	1.7.2.1.7.3[FS]	
1.7.2.2	**Control and Timing System**	**418d**	**01May06**	**28Dec07**		
1.7.2.2.1	**Requirements**	**25d**	**01May06**	**05Jun06**		
1.7.2.2.1.1	Prepare requirements document	20d	01May06	26May06	1.7.2.1.1.1[SS]	L.FNAL.CD.ENG.EE,80.00,
1.7.2.2.1.2	Review requirements	5d	30May06	05Jun06	1.7.2.2.1.1[FS]	L.FNAL.CD.TECH.ET_M,8.00,;L.FNAL.CD.ENG.EE,8.00,
1.7.2.2.1.3	Requirements approved	0	05Jun06	05Jun06	1.7.2.2.1.2[FS]	
1.7.2.2.2	**Design**	**110d**	**01Feb07**	**06Jul07**		
1.7.2.2.2.1	**Evaluation**	**30d**	**01Feb07**	**14Mar07**		
1.7.2.2.2.1.1	Order evaluation kits	5d	01Feb07	07Feb07	1.7.2.2.1.3[FS]	L.FNAL.CD.ENG.EE,16.00,
1.7.2.2.2.1.2	Benchmark evaluation kits	20d	08Feb07	07Mar07	1.7.2.2.2.1.1[FS]	L.FNAL.CD.ENG.EE,120.00,;L.FNAL.CD.TECH.ET_M,120.00,
1.7.2.2.2.1.3	Select architecture	5d	08Mar07	14Mar07	1.7.2.2.2.1.2[FS]	L.FNAL.CD.ENG.EE,24.00,;L.FNAL.CD.TECH.ET_M,24.00,
1.7.2.2.2.2	**Specifications**	**25d**	**15Mar07**	**18Apr07**		
1.7.2.2.2.2.1	Prepare specifications document	12d	15Mar07	30Mar07	1.7.2.2.2.1.3[FS]	L.FNAL.CD.ENG.EE,240.00,;L.FNAL.CD.TECH.ET_M,40.00,
1.7.2.2.2.2.2	Review specifications	13d	02Apr07	18Apr07	1.7.2.2.2.2.1[FS]	L.FNAL.CD.ENG.EE,8.00,;L.FNAL.CD.TECH.ET_M,8.00,
1.7.2.2.2.2.3	Specifications approved	0	18Apr07	18Apr07	1.7.2.2.2.2.2[FS]	
1.7.2.2.2.3	**Circuit Design**	**55d**	**19Apr07**	**06Jul07**		
1.7.2.2.2.3.1	Generate schematic symbols	10d	19Apr07	02May07	1.7.2.2.2.2.3[FS]	L.FNAL.CD.TECH.ET_M,40.00,
1.7.2.2.2.3.2	Enter schematic	40d	03May07	28Jun07	1.7.2.2.2.3.1[FS]	L.FNAL.CD.ENG.EE,240.00,
1.7.2.2.2.3.3	Review schematic	5d	29Jun07	06Jul07	1.7.2.2.2.3.2[FS]	L.FNAL.CD.ENG.EE,16.00,
1.7.2.2.2.3.4	Schematic approved	0	06Jul07	06Jul07	1.7.2.2.2.3.3[FS]	
1.7.2.2.2.4	**Firmware Design**	**40d**	**19Apr07**	**14Jun07**		
1.7.2.2.2.4.1	Design FPGA firmware	40d	19Apr07	14Jun07	1.7.2.2.2.2.3[FS]	L.FNAL.CD.ENG.EE,240.00,



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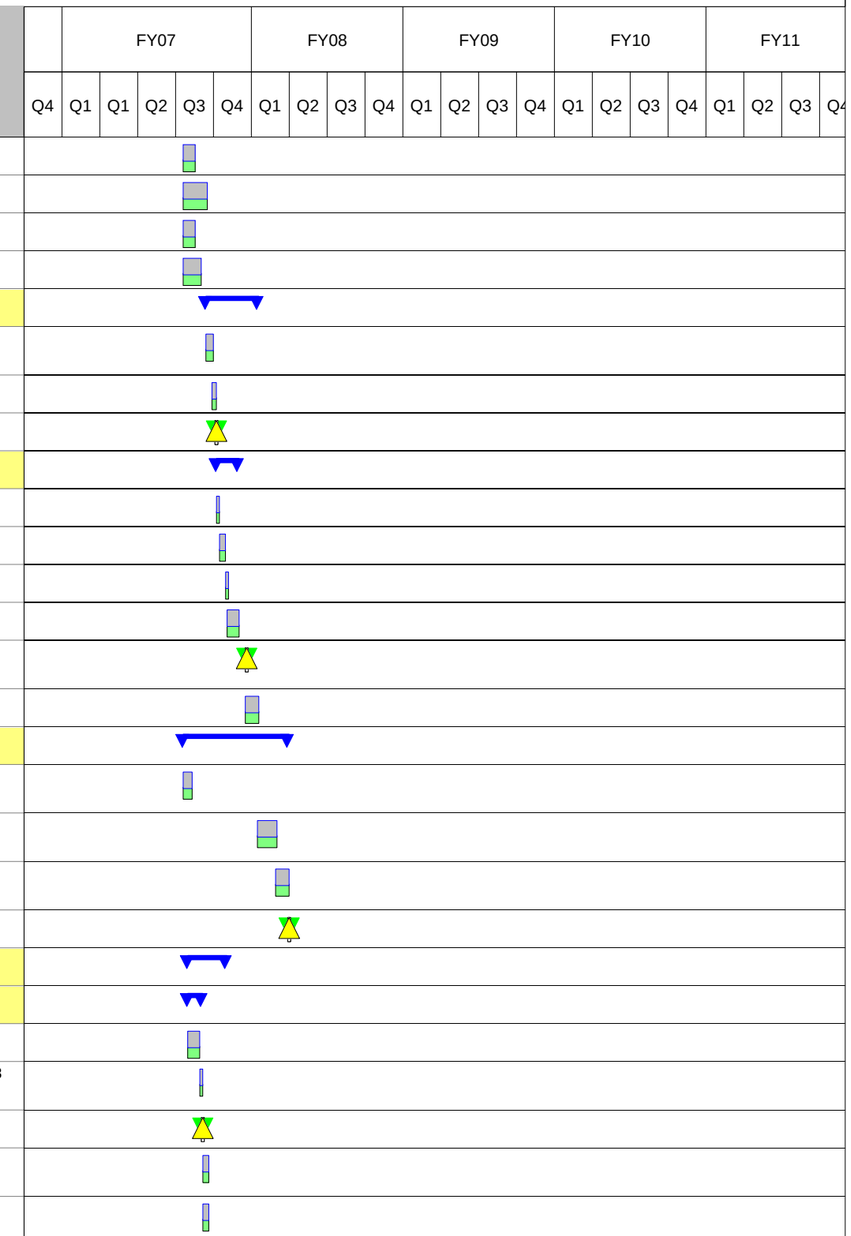
1.7.2.2.2.4.2	Design embedded software	20d	19Apr07	16May07	1.7.2.2.2.2.3[FS]	L.FNAL.CD.CP.SD,120.00,
1.7.2.2.2.5	Board design	40d	19Apr07	14Jun07	1.7.2.2.2.2.3[FS]	L.FNAL.CD.TECH.ET_M,240.00,
1.7.2.2.2.6	Packaging design	20d	19Apr07	16May07	1.7.2.2.2.2.3[FS]	L.FNAL.CD.TECH.ET_M,80.00,
1.7.2.2.2.7	Simulation	30d	19Apr07	31May07	1.7.2.2.2.2.3[FS]	L.FNAL.CD.ENG.EE,160.00,
1.7.2.2.3	**Prototype Manufacture**	**85d**	**15Jun07**	**15Oct07**		
1.7.2.2.3.1	Prepare PCB manufacturing requirements document	10d	15Jun07	28Jun07	1.7.2.2.2.4[FS]	L.FNAL.CD.TECH.ET_M,40.00,
1.7.2.2.3.2	Review PCB manufacturing	5d	29Jun07	06Jul07	1.7.2.2.3.1[FS]	L.FNAL.CD.ENG.EE,8.00,
1.7.2.2.3.3	PCB manufacturing approved	0	06Jul07	06Jul07	1.7.2.2.3.2[FS]	
1.7.2.2.3.4	**Prototype Procurement**	**40d**	**09Jul07**	**31Aug07**		
1.7.2.2.3.4.1	Write purchase requests	5d	09Jul07	13Jul07	1.7.2.2.3.3[FS]	L.FNAL.CD.ENG.EE,16.00,
1.7.2.2.3.4.2	Obtain project approvals	10d	16Jul07	27Jul07	1.7.2.2.3.4.1[FS]	L.FNAL.CD.ENG.EE,8.00,
1.7.2.2.3.4.3	Write purchase orders	5d	30Jul07	03Aug07	1.7.2.2.3.4.2[FS]	L.FNAL.CD.ENG.EE,16.00,
1.7.2.2.3.4.4	Place purchase orders	20d	06Aug07	31Aug07	1.7.2.2.3.4.3[FS]	M.FNAL.PPD.MANDS,16000.00,
1.7.2.2.3.5	Prototype PCBs and components received for control and timing system	0	17Sep07	17Sep07	1.7.2.2.3.4.4[FS+10d]	
1.7.2.2.3.6	Assemble prototypes	20d	18Sep07	15Oct07	1.7.2.2.3.5[FS]	L.FNAL.CD.TECH.ET_M,120.00,
1.7.2.2.4	**Prototype Test**	**175d**	**19Apr07**	**28Dec07**		
1.7.2.2.4.1	Write test procedures document	15d	19Apr07	09May07	1.7.2.2.2.2.3[FS]	L.FNAL.CD.ENG.EE,80.00,;L.FNAL.CD.TECH. ET_M,40.00,
1.7.2.2.4.2	Perform standalone board tests	30d	16Oct07	28Nov07	1.7.2.2.3.6[FS]; 1.7.2.2.4.1[FS]	L.FNAL.CD.TECH.ET_M,120.00,;L.FNAL.CD.ENG. EE,160.00,
1.7.2.2.4.3	Perform interface tests	20d	29Nov07	28Dec07	1.7.2.2.4.2[FS]	L.FNAL.CD.TECH.ET_M,80.00,;L.FNAL.CD.ENG. EE,80.00,
1.7.2.2.4.4	Control and timing prototype tests completed	0	28Dec07	28Dec07	1.7.2.2.4.3[FS]	
1.7.2.3	**Network**	**65d**	**30Apr07**	**31Jul07**		
1.7.2.3.1	**Requirements**	**25d**	**30Apr07**	**04Jun07**		
1.7.2.3.1.1	Prepare requirements document	20d	30Apr07	25May07	1.7.2.1.4.4[FS]	L.FNAL.CD.ENG.EE,80.00,
1.7.2.3.1.2	Review requirements	5d	29May07	04Jun07	1.7.2.3.1.1[FS]	L.FNAL.CD.TECH.ET_M,8.00,;L.FNAL.CD.ENG.EE,8 .00,
1.7.2.3.1.3	Requirements approved	0	04Jun07	04Jun07	1.7.2.3.1.2[FS]	
1.7.2.3.2	Order network test equipment	10d	05Jun07	18Jun07	1.7.2.3.1.3[FS]	L.FNAL.CD.ENG.EE,8.00,;M.FNAL.PPD. MANDS,20000.00,
1.7.2.3.3	Order evaluation network equipment	10d	05Jun07	18Jun07	1.7.2.3.1.3[FS]	M.FNAL.PPD.MANDS,8000.00,;L.FNAL.CD.ENG. EE,8.00,



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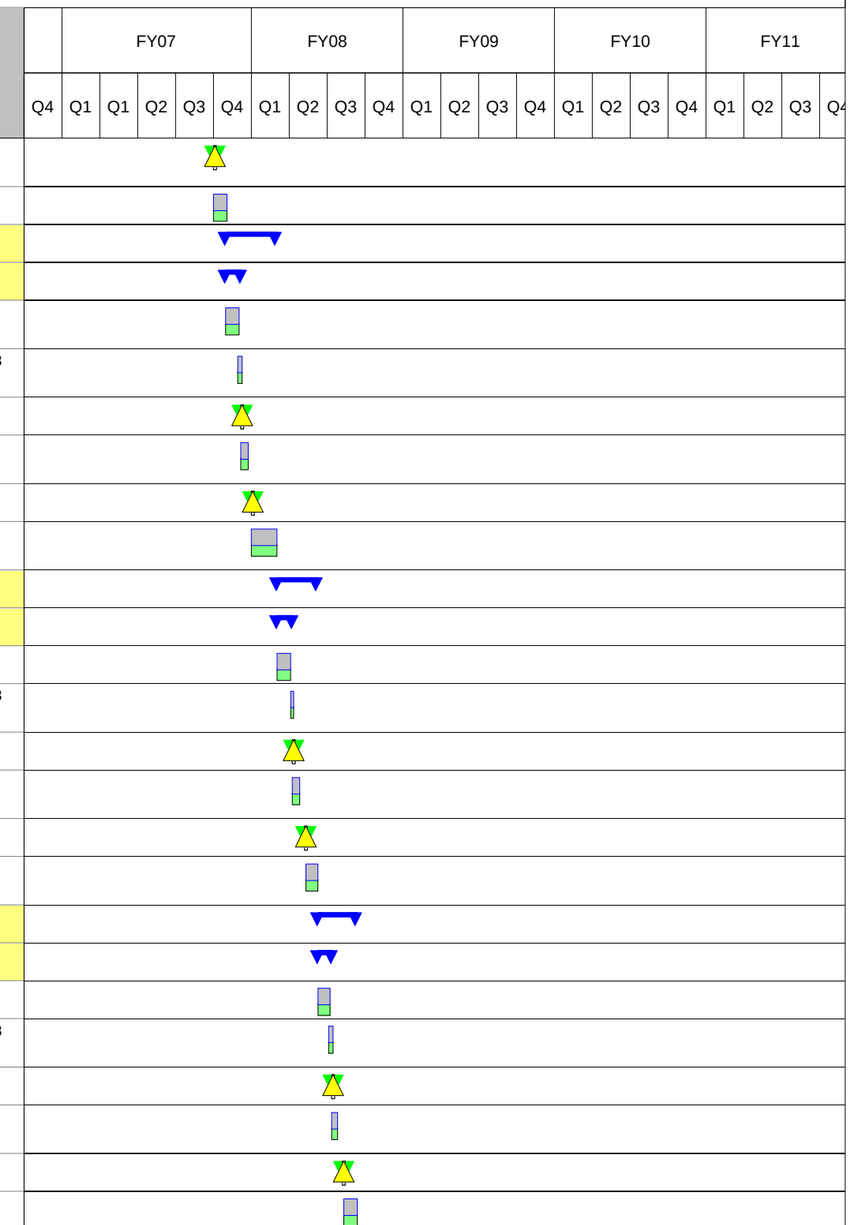
1.7.2.3.4	Evaluation components received	0	02Jul07	02Jul07	1.7.2.3.3[FS+10d]; 1.7.2.3.2[FS+10d]	
1.7.2.3.5	Test evaluation components	20d	03Jul07	31Jul07	1.7.2.3.4[FS]	
1.7.2.4	**Control Room Equipment and Infrastucture**	**85d**	**01Aug07**	**30Nov07**		
1.7.2.4.1	**Requirements**	**25d**	**01Aug07**	**05Sep07**		
1.7.2.4.1.1	Prepare requirements document	20d	01Aug07	28Aug07	1.7.2.3.5[FS]	L.FNAL.CD.ENG.EE,80.00,;L.FNAL.CD.TECH. ET_M,80.00,
1.7.2.4.1.2	Review requirements	5d	29Aug07	05Sep07	1.7.2.4.1.1[FS]	L.FNAL.CD.ENG.EE,8.00,;L.FNAL.CD.TECH.ET_M,8 .00,
1.7.2.4.1.3	Requirements approved	0	05Sep07	05Sep07	1.7.2.4.1.2[FS]	
1.7.2.4.2	Order evaluation components	10d	06Sep07	19Sep07	1.7.2.4.1.3[FS]	M.FNAL.PPD.MANDS,10000.00,;L.FNAL.CD.ENG. EE,8.00,
1.7.2.4.3	Evaluation components received	0	03Oct07	03Oct07	1.7.2.4.2[FS+10d]	
1.7.2.4.4	Test evaluation components	40d	04Oct07	30Nov07	1.7.2.4.3[FS]	L.FNAL.CD.TECH.ET_M,160.00,;L.FNAL.CD.ENG. EE,160.00,
1.7.2.5	**Buffer Farm**	**65d**	**03Dec07**	**07Mar08**		
1.7.2.5.1	**Requirements**	**25d**	**03Dec07**	**10Jan08**		
1.7.2.5.1.1	Prepare requirements document	20d	03Dec07	03Jan08	1.7.2.4.4[FS]	L.FNAL.CD.ENG.EE,80.00,
1.7.2.5.1.2	Review requirements	5d	04Jan08	10Jan08	1.7.2.5.1.1[FS]	L.FNAL.CD.ENG.EE,8.00,;L.FNAL.CD.TECH.ET_M,8 .00,
1.7.2.5.1.3	Requirements approved	0	10Jan08	10Jan08	1.7.2.5.1.2[FS]	
1.7.2.5.2	Order evaluation components	10d	11Jan08	25Jan08	1.7.2.5.1.3[FS]	M.FNAL.PPD.MANDS,20000.00,;L.FNAL.CD.ENG. EE,8.00,
1.7.2.5.3	Evaluation components received	0	08Feb08	08Feb08	1.7.2.5.2[FS+10d]	
1.7.2.5.4	Test evaluation components	20d	11Feb08	07Mar08	1.7.2.5.3[FS]	L.FNAL.CD.ENG.EE_SR,80.00,;L.FNAL.CD.TECH. ET_M,80.00,
1.7.2.6	**Data Storage**	**65d**	**10Mar08**	**09Jun08**		
1.7.2.6.1	**Requirements**	**25d**	**10Mar08**	**11Apr08**		
1.7.2.6.1.1	Prepare requirements document	20d	10Mar08	04Apr08	1.7.2.5.4[FS]	L.FNAL.CD.ENG.EE,80.00,
1.7.2.6.1.2	Review requirements	5d	07Apr08	11Apr08	1.7.2.6.1.1[FS]	L.FNAL.CD.ENG.EE,8.00,;L.FNAL.CD.TECH.ET_M,8 .00,
1.7.2.6.1.3	Requirements approved	0	11Apr08	11Apr08	1.7.2.6.1.2[FS]	
1.7.2.6.2	Order evaluation components	10d	14Apr08	25Apr08	1.7.2.6.1.3[FS]	L.FNAL.CD.ENG.EE,8.00,;M.FNAL.PPD. MANDS,6000.00,
1.7.2.6.3	Evaluation components received	0	09May08	09May08	1.7.2.6.2[FS+10d]	
1.7.2.6.4	Test evaluation components	20d	12May08	09Jun08	1.7.2.6.3[FS]	L.FNAL.CD.ENG.EE,80.00,;L.FNAL.CD.TECH. ET_M,80.00,



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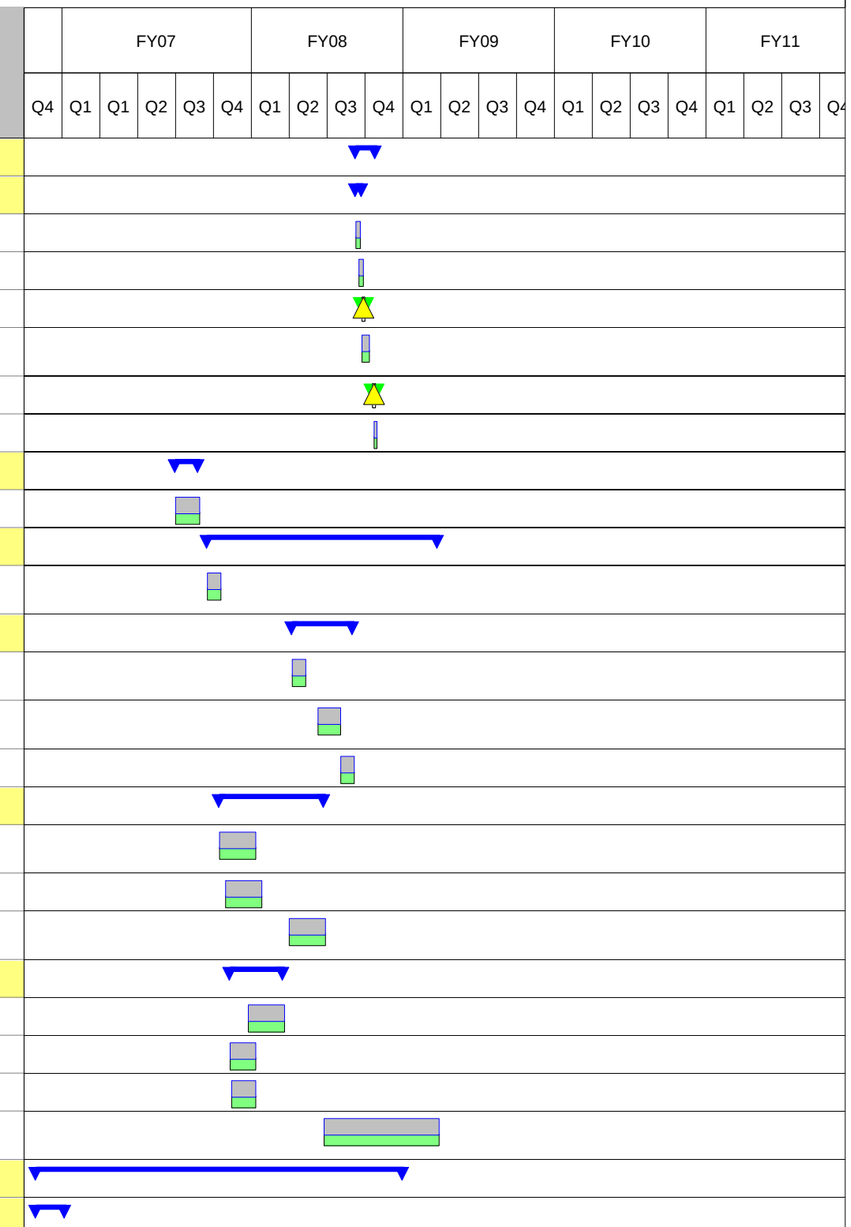
1.7.2.7	**Cabling**	**35d**	**10Jun08**	**29Jul08**		
1.7.2.7.1	**Requirements**	**10d**	**10Jun08**	**23Jun08**		
1.7.2.7.1.1	Prepare requirements document	5d	**10Jun08**	**16Jun08**	**1.7.2.6.4[FS]**	**L.FNAL.CD.ENG.EE,24.00,**
1.7.2.7.1.2	Review requirements	5d	**17Jun08**	**23Jun08**	**1.7.2.7.1.1[FS]**	**L.FNAL.CD.ENG.EE,8.00,**
1.7.2.7.1.3	Requirements approved	0	**23Jun08**	**23Jun08**	**1.7.2.7.1.2[FS]**	
1.7.2.7.2	Order evaluation components	10d	**24Jun08**	**08Jul08**	**1.7.2.7.1.3[FS]**	**M.FNAL.PPD.MANDS,2000.00,;L.FNAL.CD.ENG. EE,8.00,**
1.7.2.7.3	Evaluation components received	0	**22Jul08**	**22Jul08**	**1.7.2.7.2[FS+10d]**	
1.7.2.7.4	Test evaluation components	5d	**23Jul08**	**29Jul08**	**1.7.2.7.3[FS]**	**L.FNAL.CD.TECH.ET_M,24.00,**
1.7.2.8	**Databases**	**40d**	**02Apr07**	**25May07**		
1.7.2.8.1	Procure database computers	40d	**02Apr07**	**25May07**		**M.FNAL.PPD.MANDS,5000.00,**
1.7.3	**Integration**	**383d**	**19Jun07**	**26Dec08**		
1.7.3.1	Install and test integration test facility (ITF)	20d	**19Jun07**	**17Jul07**	**1.7.2.1.3.4.4[FS]; 1.7.2.3.3[FS]**	**L.FNAL.CD.ENG.EE,160.00,;L.FNAL.CD.TECH. ET_M,240.00,;L.FNAL.CD.CP.SD,80.00,**
1.7.3.2	**Buffer Farm Evaluation**	**100d**	**11Jan08**	**02Jun08**	**1.7.3.1[FS]**	
1.7.3.2.1	Write performance requirements and benchmark tests document	20d	**11Jan08**	**08Feb08**	**1.7.2.5.1.3[FS]**	**L.FNAL.CD.CP.SD,80.00,**
1.7.3.2.2	Write benchmark tests	40d	**10Mar08**	**02May08**	**1.7.2.5.2[FS]; 1.7.2.5.4[FS]; 1.7.3.2.1[FS]**	**L.FNAL.CD.CP.SD,160.00,**
1.7.3.2.3	Perform benchmark tests	20d	**05May08**	**02Jun08**	**1.7.2.5.4[FS]; 1.7.3.2.2[FS]**	**L.FNAL.CD.CP.SD,120.00,**
1.7.3.3	**Readout Electronics Integration Testing**	**173d**	**18Jul07**	**26Mar08**	**1.7.3.1[FS]**	
1.7.3.3.1	Integrate data concentrators	60d	**18Jul07**	**10Oct07**	**1.7.2.1.4[FS]**	**L.FNAL.CD.TECH.ET_M,240.00,;L.FNAL.CD.ENG. EE,240.00,**
1.7.3.3.2	Integrate data and control network	60d	**01Aug07**	**24Oct07**	**1.7.2.3.5[FS]**	**L.FNAL.CD.ENG.EE,320.00,**
1.7.3.3.3	Integrate timing system	60d	**02Jan08**	**26Mar08**	**1.7.2.2.4[FS]**	**L.FNAL.CD.ENG.EE,160.00,;L.FNAL.CD.TECH. ET_M,80.00,**
1.7.3.4	**Software Integration Testing**	**90d**	**13Aug07**	**19Dec07**	**1.7.3.1[FS]**	
1.7.3.4.1	Integrate RCS single node	60d	**25Sep07**	**19Dec07**	**1.7.1.4.4[FS]**	**L.FNAL.CD.CP.SD,320.00,**
1.7.3.4.2	Integrate event building	40d	**13Aug07**	**08Oct07**	**1.7.1.6.4.1[FS]**	**L.FNAL.CD.CP.SD,160.00,**
1.7.3.4.3	Integrate trigger	40d	**14Aug07**	**09Oct07**	**1.7.1.8.3.6[FS]**	**L.FNAL.CD.CP.SD,160.00,**
1.7.3.5	Consultation	190d	**27Mar08**	**26Dec08**	**1.7.3.3[FS]**	**L.FNAL.CD.TECH.ET_M,80.00,;L.FNAL.CD.CP. SD,480.00,;L.FNAL.CD.ENG.EE,320.00,**
1.7.4	**Detector Control System**	**548d**	**01Aug06**	**03Oct08**		
1.7.4.1	**Detector Control System Requirements**	**49d**	**01Aug06**	**09Oct06**		



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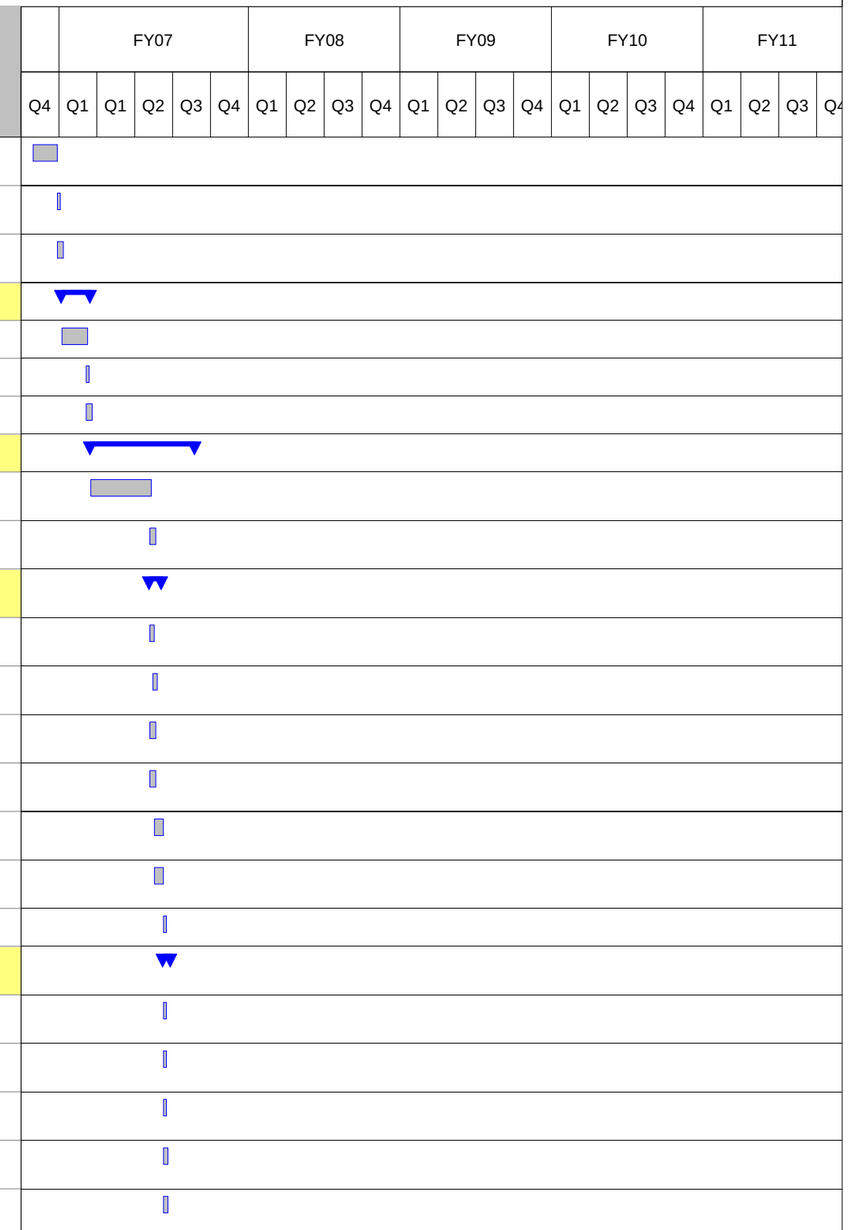
1.7.4.1.1	Prepare detector control system requirements document draft	40d	01Aug06	26Sep06		L.UVA.PD.SCI.PD,160.00,
1.7.4.1.2	Review detector control system requirements document	1d	27Sep06	27Sep06	1.7.4.1.1[FS]	L.UVA.PD.SCI.PHY,8.00,
1.7.4.1.3	Finalize detector control system requirements document	8d	28Sep06	09Oct06	1.7.4.1.2[FS]	L.UVA.PD.SCI.PD,32.00,
1.7.4.2	**Detector Control System Design**	**49d**	**10Oct06**	**19Dec06**		
1.7.4.2.1	Detector control system design document draft	40d	10Oct06	06Dec06	1.7.4.1.3[FS]	L.UVA.PD.SCI.PD,160.00,
1.7.4.2.2	Review detector control system design document	1d	07Dec06	07Dec06	1.7.4.2.1[FS]	L.UVA.PD.SCI.PHY,8.00,
1.7.4.2.3	Finalize detector control system design document	8d	08Dec06	19Dec06	1.7.4.2.2[FS]	L.UVA.PD.SCI.PD,32.00,
1.7.4.3	**Detector Control System Evaluation**	**108d**	**20Dec06**	**25May07**		
1.7.4.3.1	Find candidates for detector control system software	30d	20Dec06	06Feb07	1.7.4.2.3[FS]	L.UVA.PD.SCI.PD,120.00,
1.7.4.3.2	Find candidates for detector control system hardware monitoring/readout	8d	07Feb07	16Feb07	1.7.4.2.3[FS]; 1.7.4.3.1[FS]	L.UVA.PD.SCI.PD,32.00,
1.7.4.3.3	**Detector Control System Candidate Evaluation**	**23d**	**07Feb07**	**09Mar07**		
1.7.4.3.3.1	Evaluate DCM detector controls readout methods	5d	07Feb07	13Feb07	1.7.4.3.1[FS]	L.UVA.PD.SCI.PD,20.00,
1.7.4.3.3.2	Evaluate FEB detector controls readout methods	5d	14Feb07	20Feb07	1.7.4.3.3.1[FS]; 1.7.4.3.1[FS]	L.UVA.PD.SCI.PD,20.00,
1.7.4.3.3.3	Evaluate high voltage controls readout interfaces	8d	07Feb07	16Feb07	1.7.4.3.1[FS]	L.UVA.PD.SCI.PD,32.00,
1.7.4.3.3.4	Evaluate low voltage controls readout interfaces	8d	07Feb07	16Feb07	1.7.4.3.1[FS]	L.UVA.PD.SCI.PD,32.00,
1.7.4.3.3.5	Evaluate water cooling system controls readout interfaces	12d	19Feb07	06Mar07	1.7.4.3.1[FS]; 1.7.4.3.2[FS]	L.UVA.PD.SCI.PD,48.00,
1.7.4.3.3.6	Evaluate enviromental sensor system readout interfaces	15d	19Feb07	09Mar07	1.7.4.3.1[FS]; 1.7.4.3.2[FS]	L.UVA.PD.SCI.PD,60.00,
1.7.4.3.4	Review detector control system evaluations	1d	12Mar07	12Mar07	1.7.4.3.3[FS]	L.UVA.PD.SCI.PD,4.00,
1.7.4.3.5	**Detector Controls System Prototype Hardware Procurement**	**14d**	**13Mar07**	**30Mar07**		
1.7.4.3.5.1	Purchase prototype detector controls channel server computer	1d	13Mar07	13Mar07	1.7.4.3.4[FS]	M.UVA.PD.MANDSPASS,6575.00,;L.UVA.PD.SCI.PD,4.00,
1.7.4.3.5.2	Purchase prototype detector controls monitoring computer	1d	13Mar07	13Mar07	1.7.4.3.4[FS]	M.UVA.PD.MANDSPASS,2250.00,;L.UVA.PD.SCI.PD,4.00,
1.7.4.3.5.3	Purchase prototype readout interface boards for channel server	1d	13Mar07	13Mar07	1.7.4.3.4[FS]	M.UVA.PD.MANDSPASS,498.00,;L.UVA.PD.SCI.PD,4.00,
1.7.4.3.5.4	Obtain and assemble prototype DCM for detector controls testing	5d	13Mar07	19Mar07	1.7.4.3.4[FS]	L.UVA.PD.SCI.PD,20.00,
1.7.4.3.5.5	Obtain and assemble prototype FEB for detector controls testing	5d	13Mar07	19Mar07	1.7.4.3.4[FS]	L.UVA.PD.SCI.PD,20.00,



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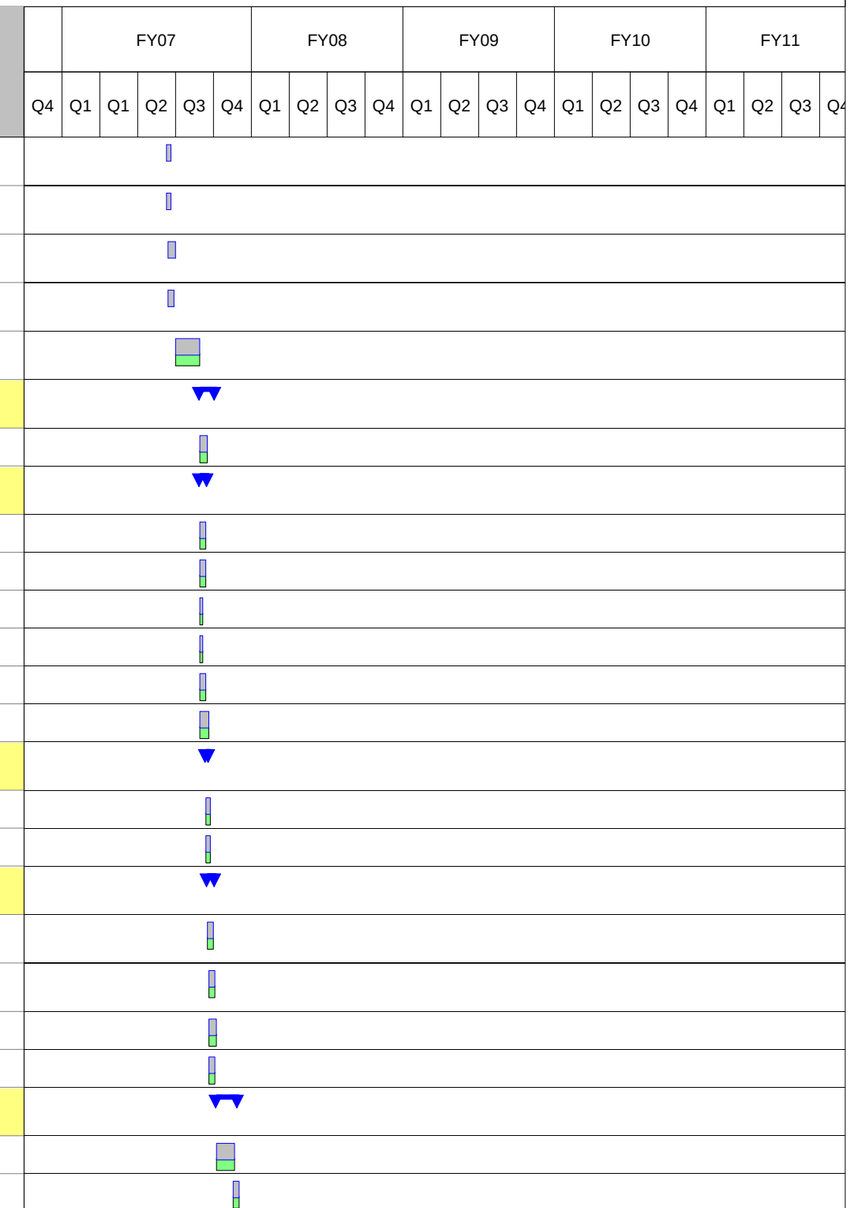
1.7.4.3.5.6	Procure and assemble prototype high voltage system for detector controls testing	5d	13Mar07	19Mar07	1.7.4.3.4[FS]	M.UVA.PD.MANDSPASS,25194.00,;L.UVA.PD.SCI.PD,20.00,
1.7.4.3.5.7	Procure and assemble prototype low voltage system for detector controls testing	5d	13Mar07	19Mar07	1.7.4.3.4[FS]	M.UVA.PD.MANDSPASS,3720.00,;L.UVA.PD.SCI.PD,20.00,
1.7.4.3.5.8	Procure and assemble prototype water cooling sensor pack for detector controls testing	13d	14Mar07	30Mar07	1.7.4.3.5.3[FS]; 1.7.4.3.4[FS]	M.UVA.PD.MANDSPASS,300.00,;L.UVA.PD.SCI.PD,60.00,
1.7.4.3.5.9	Procure and assemble prototype enviromental monitoring system for detector controls testing	10d	14Mar07	27Mar07	1.7.4.3.4[FS]; 1.7.4.3.5.3[FS]	M.UVA.PD.MANDSPASS,5200.00,;L.UVA.PD.SCI.PD,40.00,
1.7.4.3.6	Develop detector controls test stand	40d	02Apr07	25May07	1.7.4.3.5[FS]	M.UVA.PD.MANDSPASS,3200.00,;L.UVA.PD.SCI.PD,160.00,
1.7.4.4	**Detector Control Software Configuration For Experiment**	**28d**	**29May07**	**06Jul07**		
1.7.4.4.1	Develop channel server master (EPICs)	12d	29May07	13Jun07	1.7.4.3.6[FS]; 1.7.4.3.4[FS]	L.UVA.PD.SCI.PD,48.00,
1.7.4.4.2	**Channel Server Master IOC (input output controller) Modules Development**	**15d**	**29May07**	**18Jun07**		
1.7.4.4.2.1	Develop DCM IOC	10d	29May07	11Jun07	1.7.4.3.6[FS]; 1.7.4.3.5.4[FS]	L.UVA.PD.SCI.PD,40.00,
1.7.4.4.2.2	Develop FEB IOC	10d	29May07	11Jun07	1.7.4.3.5.5[FS]; 1.7.4.3.6[FS]	L.UVA.PD.SCI.PD,40.00,
1.7.4.4.2.3	Develop HV IOC	4d	29May07	01Jun07	1.7.4.3.6[FS]; 1.7.4.3.5.6[FS]	L.UVA.PD.SCI.PD,16.00,
1.7.4.4.2.4	Develop LV IOC	4d	29May07	01Jun07	1.7.4.3.5.7[FS]; 1.7.4.3.6[FS]	L.UVA.PD.SCI.PD,16.00,
1.7.4.4.2.5	Develop water cooling IOC	10d	29May07	11Jun07	1.7.4.3.6[FS]; 1.7.4.3.5.8[FS]	L.UVA.PD.SCI.PD,40.00,
1.7.4.4.2.6	Develop enviromental sensors IOC	15d	29May07	18Jun07	1.7.4.3.6[FS]; 1.7.4.3.5.9[FS]	L.UVA.PD.SCI.PD,60.00,
1.7.4.4.3	**Detector Controls System Intergration On Test Stand**	**6d**	**14Jun07**	**21Jun07**		
1.7.4.4.3.1	Determine load scaling	6d	14Jun07	21Jun07	1.7.4.4.1[FS]	L.UVA.PD.SCI.PD,24.00,
1.7.4.4.3.2	Develop system failure and fall over recovery	5d	14Jun07	20Jun07	1.7.4.4.1[FS]	L.UVA.PD.SCI.PD,20.00,
1.7.4.4.4	**Client Application Prototypes Development**	**13d**	**19Jun07**	**06Jul07**		
1.7.4.4.4.1	Develop individual system controls clients ("expert" clients)	8d	19Jun07	28Jun07	1.7.4.4.1[FS]; 1.7.4.4.2[FS]	L.UVA.PD.SCI.PD,32.00,
1.7.4.4.4.2	Develop general intergrated basic controls clients	8d	22Jun07	03Jul07	1.7.4.4.1[FS]; 1.7.4.4.3[FS]	L.UVA.PD.SCI.PD,32.00,
1.7.4.4.4.3	Develop individual system alarm clients	10d	22Jun07	06Jul07	1.7.4.4.1[FS]; 1.7.4.4.3[FS]	L.UVA.PD.SCI.PD,40.00,
1.7.4.4.4.4	Develop general intergrated alarms client	8d	21Jun07	02Jul07	1.7.4.4.3.2[FS]	L.UVA.PD.SCI.PD,32.00,
1.7.4.5	**Detector Controls Graphical User Interfaces Development**	**38d**	**09Jul07**	**29Aug07**		
1.7.4.5.1	Develop detector controls monitoring GUI	30d	09Jul07	17Aug07	1.7.4.4[FS]; 1.7.4.4.4[FS]	L.UVA.PD.SCI.PD,120.00,
1.7.4.5.2	Develop detector controls logging and history GUI	8d	20Aug07	29Aug07	1.7.4.4[FS]; 1.7.4.5.1[FS]	L.UVA.PD.SCI.PD,32.00,



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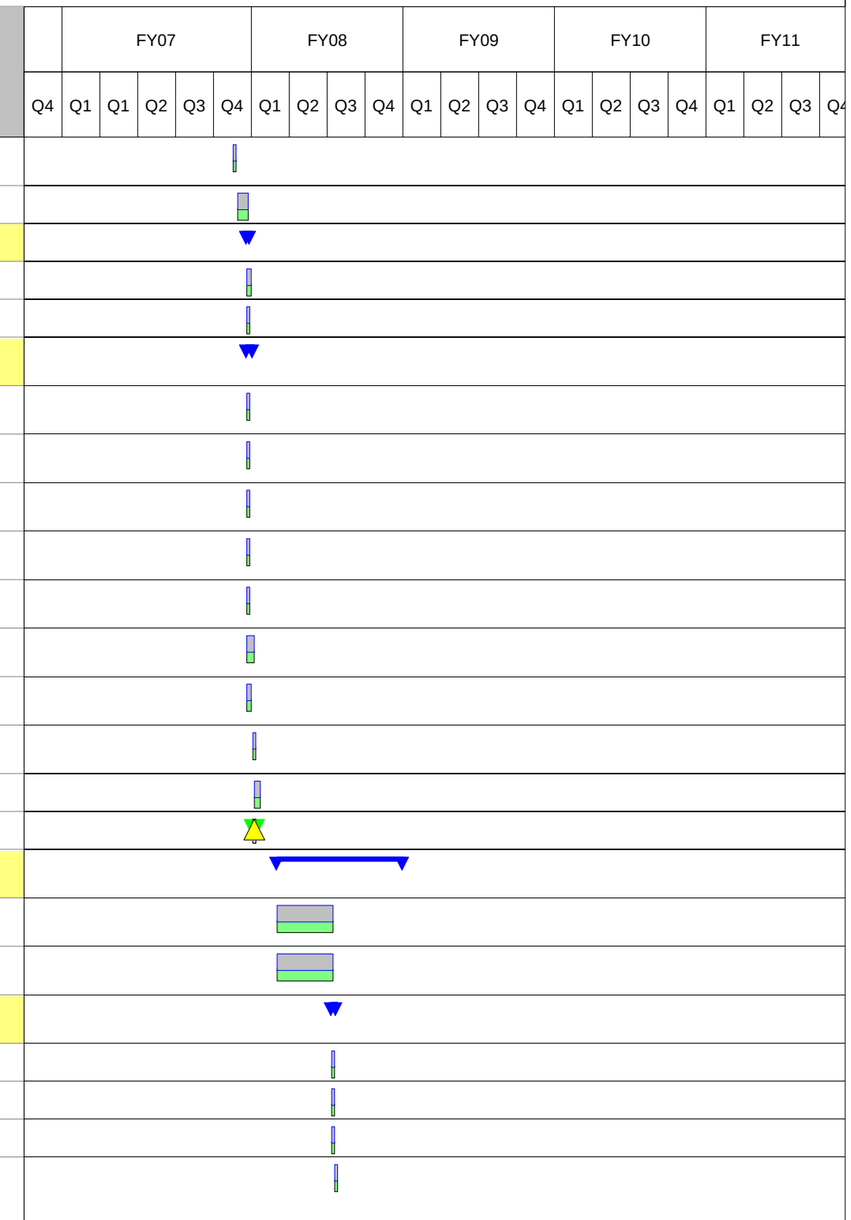
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.7.4.5.3	Develop detector controls remote inspect client (web browser based)	5d	20Aug07	24Aug07	1.7.4.4[FS]; 1.7.4.5.1[FS]	L.UVA.PD.SCI.PD,20.00,
1.7.4.6	Develop detector control diagnostics and test suite	15d	30Aug07	20Sep07	1.7.4.5[FS]	L.UNIV_N.PD.SCI.PD,60.00,
1.7.4.7	**User and Expert Level System Documentation**	**6d**	**21Sep07**	**28Sep07**		
1.7.4.7.1	Write detector controls user documentation	6d	21Sep07	28Sep07	1.7.4.5[FS]; 1.7.4.6[FS]	L.UVA.PD.SCI.PD,24.00,
1.7.4.7.2	Write system monitoring user documentation	4d	21Sep07	26Sep07	1.7.4.6[FS]	L.UVA.PD.SCI.PD,16.00,
1.7.4.8	**Detector Control System Tests And Verification For Release**	**10d**	**21Sep07**	**04Oct07**		
1.7.4.8.1	Perform high voltage controls and monitoring verification for release	2d	21Sep07	24Sep07	1.7.4.6[FS]	L.UVA.PD.SCI.PD,8.00,
1.7.4.8.2	Perform low voltage controls and monitoring verification for release	2d	21Sep07	24Sep07	1.7.4.6[FS]	L.UVA.PD.SCI.PD,8.00,
1.7.4.8.3	Perform DCM controls and monitoring verification for release	2d	21Sep07	24Sep07	1.7.4.6[FS]	L.UVA.PD.SCI.PD,8.00,
1.7.4.8.4	Perform FEB controls and monitoring verification for release	2d	21Sep07	24Sep07	1.7.4.6[FS]	L.UVA.PD.SCI.PD,8.00,
1.7.4.8.5	Perform water cooling system controls and monitoring verification for release	4d	21Sep07	26Sep07	1.7.4.6[FS]	L.UVA.PD.SCI.PD,16.00,
1.7.4.8.6	Perform enviromental system controls and monitoring verification for release	10d	21Sep07	04Oct07	1.7.4.6[FS]	L.UVA.PD.SCI.PD,40.00,
1.7.4.8.7	Perform logging and database intergration verification for release	5d	21Sep07	27Sep07	1.7.4.6[FS]	L.UVA.PD.SCI.PD,20.00,
1.7.4.9	Review detector control system software, tests and documentation for first release	1d	05Oct07	05Oct07	1.7.4.7[FS]; 1.7.4.8[FS]	L.UVA.PD.SCI.PD,4.00,
1.7.4.10	Perform security audit for detector control system	10d	08Oct07	19Oct07	1.7.4.9[FS]	L.UVA.PD.CP.SE,40.00,
1.7.4.11	Detector control system released	0	05Oct07	05Oct07	1.7.4.9[FS]	
1.7.4.12	**Detector Control System Procurement and Fabrication (IPND)**	**212d**	**03Dec07**	**03Oct08**		
1.7.4.12.1	Procure detector controls counting house computing hardware and infrastructure (IPND)	90d	03Dec07	11Apr08		M.UVA.PD.MANDSPASS,14663.00,
1.7.4.12.2	Procure detector controls readout systems and sensor packs (IPND)	90d	03Dec07	11Apr08	1.7.4.12.1[SS]	M.UVA.PD.MANDSPASS,10525.00,
1.7.4.12.3	**Detector Controls Computing Setup (IPND)**	**9d**	**14Apr08**	**24Apr08**		
1.7.4.12.3.1	Setup and configure DCS master server	5d	14Apr08	18Apr08	1.7.4.12.1[FS]	L.UVA.PD.SCI.PD,40.00,
1.7.4.12.3.2	Setup and configure DCS readout servers	5d	14Apr08	18Apr08	1.7.4.12.1[FS]	L.UVA.PD.SCI.PD,40.00,
1.7.4.12.3.3	Setup and configure DCSNet for IPND	2d	14Apr08	15Apr08	1.7.4.12.1[FS]	L.UVA.PD.SCI.PD,16.00,
1.7.4.12.3.4	Install servers and switches in IPND electronics and control facilities	4d	21Apr08	24Apr08	1.7.4.12.3.1[FS]; 1.7.4.12.3.2[FS]; 1.7.4.12.3.3[FS]	L.UVA.PD.SCI.PD,32.00,



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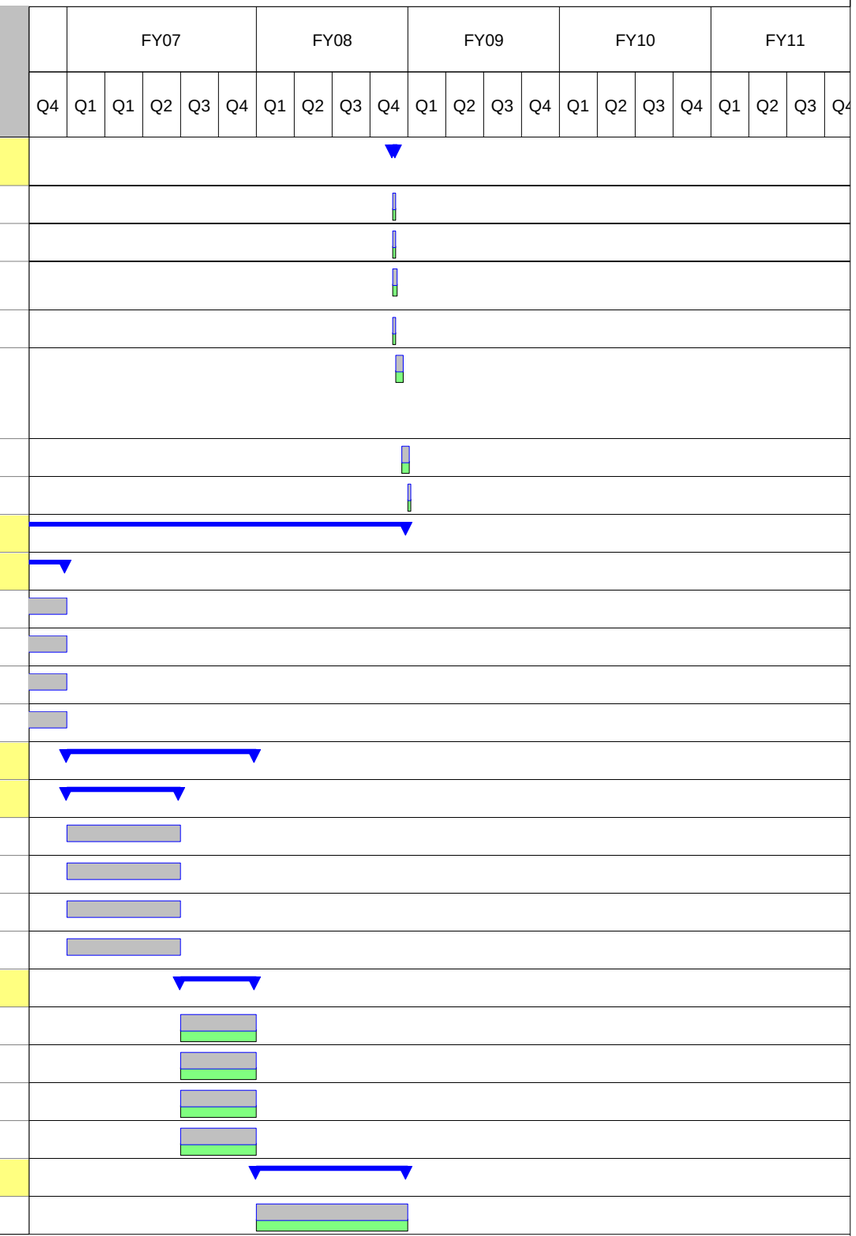
1.7.4.12.4	**Detector Controls Readout Systems Setup (IPND)**	**4d**	**28Aug08**	**03Sep08**		
1.7.4.12.4.1	Setup water cooling monitors and sensors	2d	**28Aug08**	**29Aug08**	**1.8.5.7.4[SS]**	**L.UVA.PD.SCI.PD,16.00,**
1.7.4.12.4.2	Setup power supply monitors and sensors	2d	**28Aug08**	**29Aug08**	**1.7.4.12.2[FS]; 1.7.4.12.4.1[SS]**	**L.UVA.PD.SCI.PD,16.00,**
1.7.4.12.4.3	Setup general environmental and detector sensors	4d	**28Aug08**	**03Sep08**	**1.7.4.12.2[FS]; 1.7.4.12.4.2[SS]**	**L.UVA.PD.SCI.PD,32.00,**
1.7.4.12.4.4	Setup DCM/FEB monitors	2d	**28Aug08**	**29Aug08**	**1.7.4.12.2[FS]; 1.7.4.12.4.3[SS]**	**L.UVA.PD.SCI.PD,16.00,**
1.7.4.12.5	Test DCS systems on IPND	10d	**04Sep08**	**17Sep08**	**1.7.4.12.4.3[FS]; 1.7.4.12.4.4[FS]; 1.7.4.12.4.2[FS]; 1.7.4.12.4.1[FS]**	**L.UVA.PD.SCI.PD,80.00,**
1.7.4.12.6	Certify DCS for production operations	10d	**18Sep08**	**01Oct08**	**1.7.4.12.5[FS]**	**L.UVA.PD.SCI.PD,80.00,**
1.7.4.12.7	Conduct DCS production readiness review	2d	**02Oct08**	**03Oct08**	**1.7.4.12.6[FS]**	**L.UVA.PD.SCI.PD,16.00,**
1.7.5	**Management - R&D Phase**	**752d**	**03Oct05**	**29Sep08**		
1.7.5.1	**FY06**	**250d**	**03Oct05**	**28Sep06**		
1.7.5.1.1	Labor	250d	**03Oct05**	**28Sep06**		**L.UMNTC.PD.SCI.PHY,100.00,**
1.7.5.1.2	Travel	250d	**03Oct05**	**28Sep06**		
1.7.5.1.3	Equipment	250d	**03Oct05**	**28Sep06**		
1.7.5.1.4	Materials and supplies	250d	**03Oct05**	**28Sep06**		
1.7.5.2	**FY07**	**250d**	**02Oct06**	**28Sep07**		
1.7.5.2.1	**H1FY07**	**123d**	**02Oct06**	**30Mar07**		
1.7.5.2.1.1	Labor	123d	**02Oct06**	**30Mar07**	**1.7.5.1.1[FS]**	**L.UMNTC.PD.SCI.PHY,50.00,**
1.7.5.2.1.2	Travel	123d	**02Oct06**	**30Mar07**	**1.7.5.1.2[FS]**	
1.7.5.2.1.3	Equipment	123d	**02Oct06**	**30Mar07**	**1.7.5.1.3[FS]**	
1.7.5.2.1.4	Materials and supplies	123d	**02Oct06**	**30Mar07**	**1.7.5.1.4[FS]**	
1.7.5.2.2	**H2FY07**	**127d**	**02Apr07**	**28Sep07**		
1.7.5.2.2.1	Labor	127d	**02Apr07**	**28Sep07**	**1.7.5.2.1.1[FS]**	**L.UMNTC.PD.SCI.PHY,50.00,**
1.7.5.2.2.2	Travel	127d	**02Apr07**	**28Sep07**	**1.7.5.2.1.2[FS]**	
1.7.5.2.2.3	Equipment	127d	**02Apr07**	**28Sep07**	**1.7.5.2.1.3[FS]**	
1.7.5.2.2.4	Materials and supplies	127d	**02Apr07**	**28Sep07**	**1.7.5.2.1.4[FS]**	
1.7.5.3	**FY08**	**251d**	**01Oct07**	**29Sep08**		
1.7.5.3.1	Labor	251d	**01Oct07**	**29Sep08**	**1.7.5.2.2.1[FS]**	



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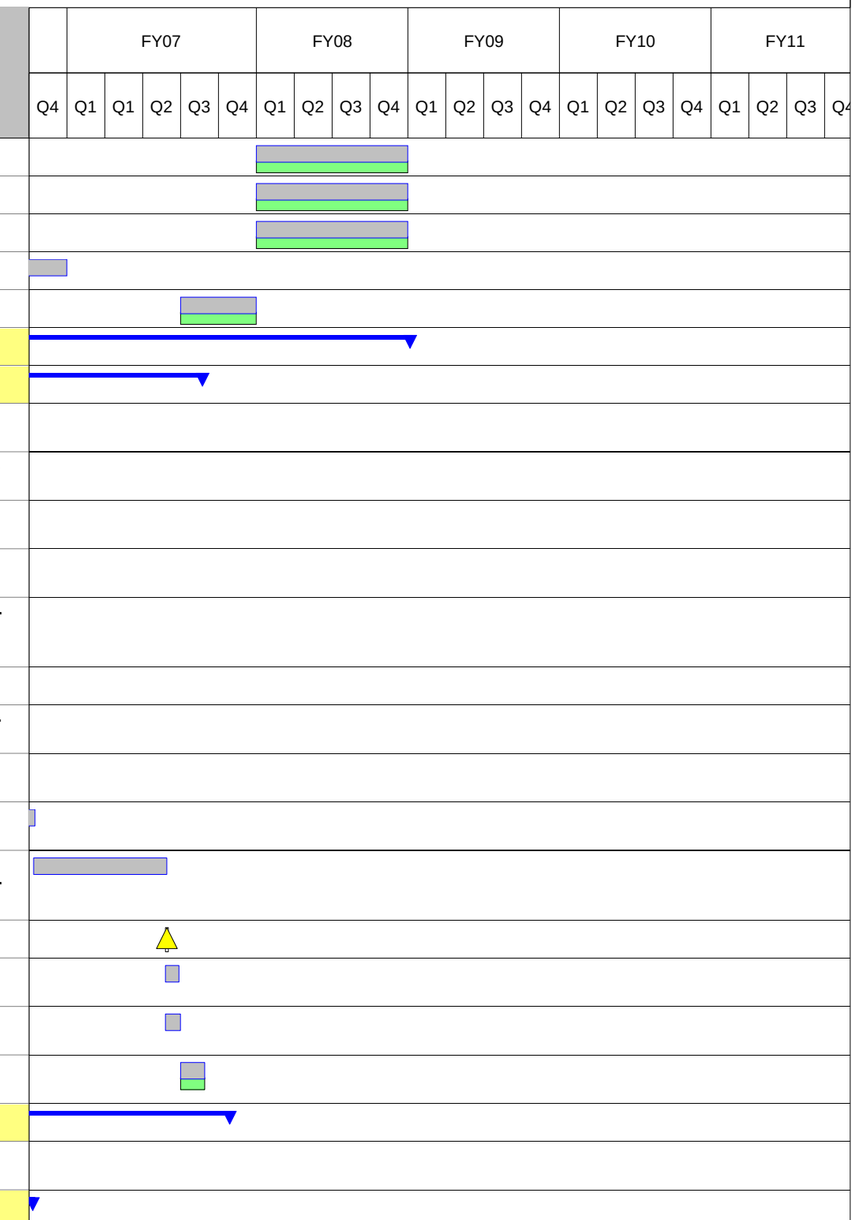
1.7.5.3.2	Travel	251d	01Oct07	29Sep08	1.7.5.2.2.2[FS]	
1.7.5.3.3	Equipment	251d	01Oct07	29Sep08	1.7.5.2.2.3[FS]	
1.7.5.3.4	Materials and supplies	251d	01Oct07	29Sep08	1.7.5.2.2.4[FS]	
1.7.5.4	FY06 DAQ R&D	250d	03Oct05	28Sep06		
1.7.5.5	FY07 DAQ R&D	127d	02Apr07	28Sep07		
1.8	**Detector Assembly R&D**	**761d**	**03Oct05**	**10Oct08**		
1.8.1	**Plane Assembly Adhesive R&D**	**414d**	**03Oct05**	**25May07**		
1.8.1.1	Develop requirements document	120d	03Oct05	27Mar06		L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,32.00,
1.8.1.2	Develop plane assembly adhesive test procedures	120d	03Oct05	27Mar06	1.8.1.1[SS]	L.ANL.PD2.ENG.ME,40.00,;L.ANL.PD2.ENG.EA,40.00,
1.8.1.3	Procure sample adhesives and other test materials	120d	03Oct05	27Mar06	1.8.1.1[SS]	M.FNAL.PPD.MANDS,5000.00,;L.ANL.PD2.ENG.EA,80.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.1.4	Develop test jigs	120d	03Oct05	27Mar06	1.8.1.1[SS]	L.ANL.PD2.TECH.MT_W,80.00,;L.ANL.PD2.ENG.ME,40.00,;L.ANL.PD2.ENG.EA,80.00,
1.8.1.5	Perform plane assembly adhesive tests	145d	03Oct05	01May06	1.8.1.1[SS]	L.ANL.PD2.TECH.MT_W,150.00,;L.FNAL.PPD.ENG.EP,80.00,;L.ANL.PD2.ENG.EA,40.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.1.6	Baseline plane assembly adhesive selected	0	27Mar06	27Mar06	1.8.1.5[SS+120d]	
1.8.1.7	Develop plane assembly adhesive QA procedures	145d	03Oct05	01May06	1.8.1.1[SS]	L.ANL.PD2.ENG.ME,30.00,;L.ANL.PD2.SCI.PHY,16.00,;L.ANL.PD2.ENG.EA,60.00,
1.8.1.8	Document and review test results and procedures	25d	28Mar06	01May06	1.8.1.1[FS]	L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,40.00,
1.8.1.9	Review and validate plane baseline adhesive selection	50d	02May06	12Jul06	1.8.1.8[FS]	L.FNAL.PPD.ENG.ME,4.00,;L.ANL.PD2.SCI.PHY,4.00,;L.ANL.PD2.ENG.ME,4.00,
1.8.1.10	Value engineering of alternative bonding methods	155d	13Jul06	26Feb07	1.8.1.9[FS]	L.ANL.PD2.TECH.MT_W,96.00,;L.ANL.PD2.ENG.ME,24.00,;L.ANL.PD2.ENG.EA,24.00,;M.FNAL.PPD.MANDS,10000.00,
1.8.1.11	Baseline adhesive changed to Devcon 60	0	26Feb07	26Feb07	1.8.1.10[FS]	
1.8.1.12	Prepare final specifications for plane assembly adhesive	20d	27Feb07	26Mar07	1.8.1.11[FS]; 1.8.2.3.1.6[FF]	L.ANL.PD2.ENG.ME,30.00,
1.8.1.13	Optimize Devcon 60 application procedures - 1	24d	27Feb07	30Mar07	1.8.1.12[SS]	L.ANL.PD2.ENG.EA,16.00,;M.FNAL.PPD.MANDS,9375.00,;L.ANL.PD2.TECH.MT_W,60.00,
1.8.1.14	Optimize Devcon 60 application procedures - 2	40d	02Apr07	25May07	1.8.1.13[FS]	L.ANL.PD2.TECH.MT_W,100.00,;M.FNAL.PPD.MANDS,15625.00,;L.ANL.PD2.ENG.EA,24.00,
1.8.2	**Structural Design and Validation**	**459d**	**03Oct05**	**31Jul07**		
1.8.2.1	Develop requirements document	120d	03Oct05	27Mar06		L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,20.00,
1.8.2.2	**Conceptual and Engineering Designs**	**195d**	**03Oct05**	**12Jul06**		



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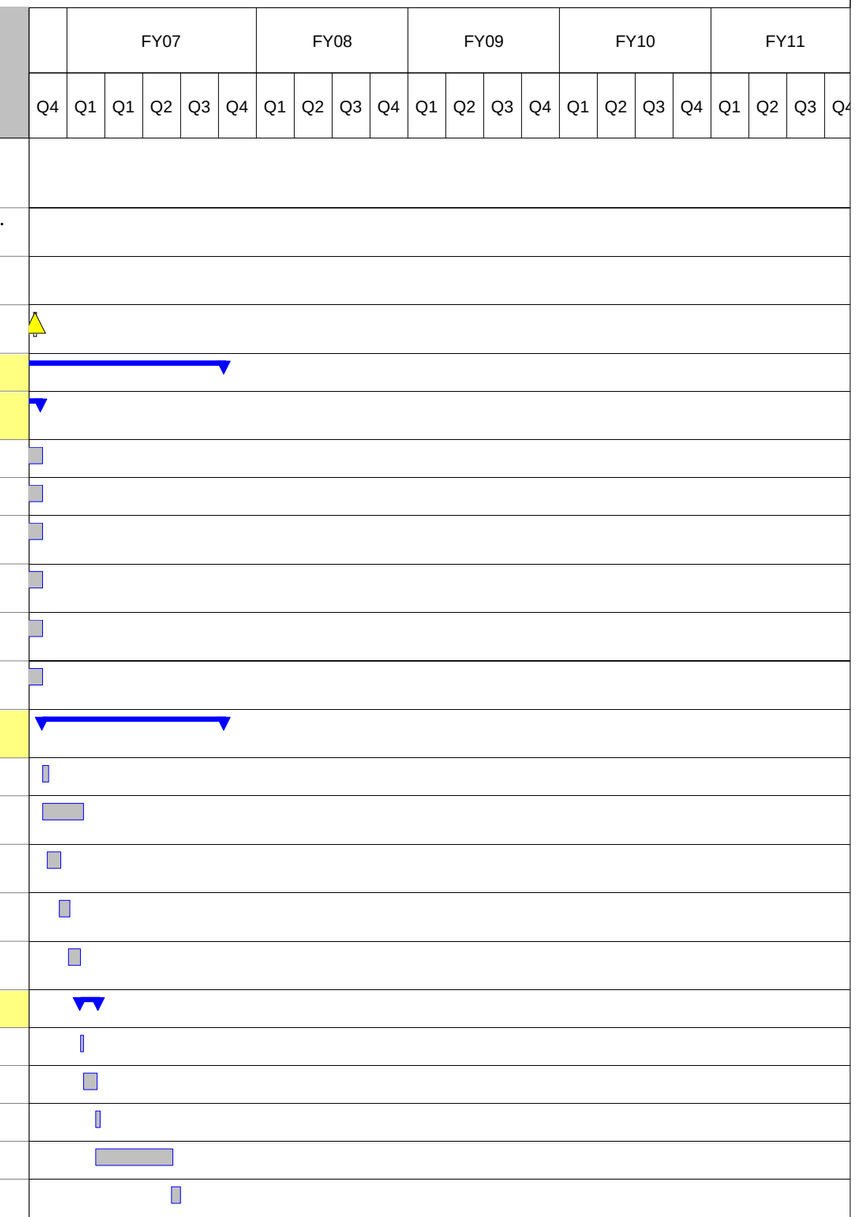
1.8.2.2.1	Develop designs for far detector blocks	120d	03Oct05	27Mar06	1.8.2.1[SS]	L.FNAL.PPD.ENG.DES,16.00,;L.ANL.PD2.ENG.ME,40.00,;L.FNAL.PPD.ENG.ME,960.00,;L.ANL.PD2.SCI.PHY,8.00,
1.8.2.2.2	Develop designs for far detector block spacers	120d	03Oct05	27Mar06	1.8.2.2.1[SS]	L.ANL.PD2.SCI.PHY,8.00,;L.FNAL.PPD.ENG.DES,8.00,;L.ANL.PD2.ENG.ME,20.00,
1.8.2.2.3	Develop designs for near detector segments	120d	03Oct05	27Mar06	1.8.2.1[SS]	L.ANL.PD2.ENG.ME,20.00,;L.ANL.PD2.SCI.PHY,8.00,;L.FNAL.PPD.ENG.DES,8.00,
1.8.2.2.4	Far detector structural concept selected	0	12Jul06	12Jul06	1.8.1.9[FS]; 1.8.2.2.2[FS]; 1.8.2.2.1[FS]	
1.8.2.3	**Small Structure Prototypes**	**449d**	**03Oct05**	**17Jul07**		
1.8.2.3.1	**Small Prototypes with Commercial Materials**	**210d**	**03Oct05**	**02Aug06**		
1.8.2.3.1.1	Design prototypes	210d	03Oct05	02Aug06	1.8.2.1[SS]	L.ANL.PD2.ENG.ME,20.00,
1.8.2.3.1.2	Develop test procedures	210d	03Oct05	02Aug06	1.8.2.1[SS]	L.ANL.PD2.ENG.ME,20.00,
1.8.2.3.1.3	Procure materials and components	210d	03Oct05	02Aug06	1.8.2.1[SS]	L.ANL.PD2.ENG.ME,10.00,;M.ANL.PD.MANDS,3000.00,;L.ANL.PD2.ENG.EA,10.00,
1.8.2.3.1.4	Fabricate prototypes	210d	03Oct05	02Aug06	1.8.2.3.1.3[SS]	L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.TECH.MT_W,20.00,;L.ANL.PD2.ENG.EA,10.00,
1.8.2.3.1.5	Test prototypes	210d	03Oct05	02Aug06	1.8.2.3.1.4[SS]	L.ANL.PD2.ENG.EA,10.00,;L.ANL.PD2.TECH.MT_W,20.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.2.3.1.6	Document results	210d	03Oct05	02Aug06	1.8.2.3.1.5[SS]	L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.SCI.PHY,8.00,
1.8.2.3.2	**Small Prototypes with Nova 16-cell Extrusions**	**239d**	**03Aug06**	**17Jul07**		
1.8.2.3.2.1	Final design of structures	10d	03Aug06	16Aug06	1.8.2.3.1.6[FS]	L.ANL.PD2.ENG.ME,40.00,
1.8.2.3.2.2	Perform and document FEA of prototype structures	70d	03Aug06	09Nov06	1.8.2.3.2.1[SS]	L.FNAL.PPD.ENG.ME,112.00,
1.8.2.3.2.3	Fabricate end seals	20d	17Aug06	14Sep06	1.8.2.3.2.1[FS]	L.FNAL.PPD.TECH.MT_W,160.00,;L.FNAL.PPD.TECH.LDR,32.00,
1.8.2.3.2.4	Install end seals	15d	15Sep06	05Oct06	1.8.2.3.2.3[FS]	L.ANL.PD2.TECH.MT_W,120.00,;L.FNAL.PPD.TECH.MT_W,60.00,
1.8.2.3.2.5	Assemble 3x3 extrusion structure	20d	06Oct06	02Nov06	1.8.2.3.2.4[FS]	L.ANL.PD2.TECH.MT_W,160.00,;L.FNAL.PPD.TECH.MT_W,160.00,
1.8.2.3.2.6	**3x3 Extrusion Structure Testing**	**30d**	**03Nov06**	**18Dec06**		
1.8.2.3.2.6.1	Intiial pressure test at 20 psi	5d	03Nov06	09Nov06	1.8.2.3.2.5[FS]	L.ANL.PD2.ENG.EA,8.00,
1.8.2.3.2.6.2	Test with pressure and weight	20d	10Nov06	11Dec06	1.8.2.3.2.6.1[FS]	L.ANL.PD2.ENG.EA,24.00,
1.8.2.3.2.6.3	Pressure test to failure	5d	12Dec06	18Dec06	1.8.2.3.2.6.2[FS]	L.ANL.PD2.ENG.EA,8.00,
1.8.2.3.2.7	Assemble large prototype structures	60d	12Dec06	12Mar07	1.8.2.3.2.6.2[FS]	L.ANL.PD2.TECH.MT_W,96.00,
1.8.2.3.2.8	Test large prototype structures - 1	14d	13Mar07	30Mar07	1.8.2.3.2.7[FS]	L.ANL.PD2.ENG.EA,36.00,;L.ANL.PD2.ENG.ME,12.00,;L.ANL.PD2.TECH.MT_W,60.00,



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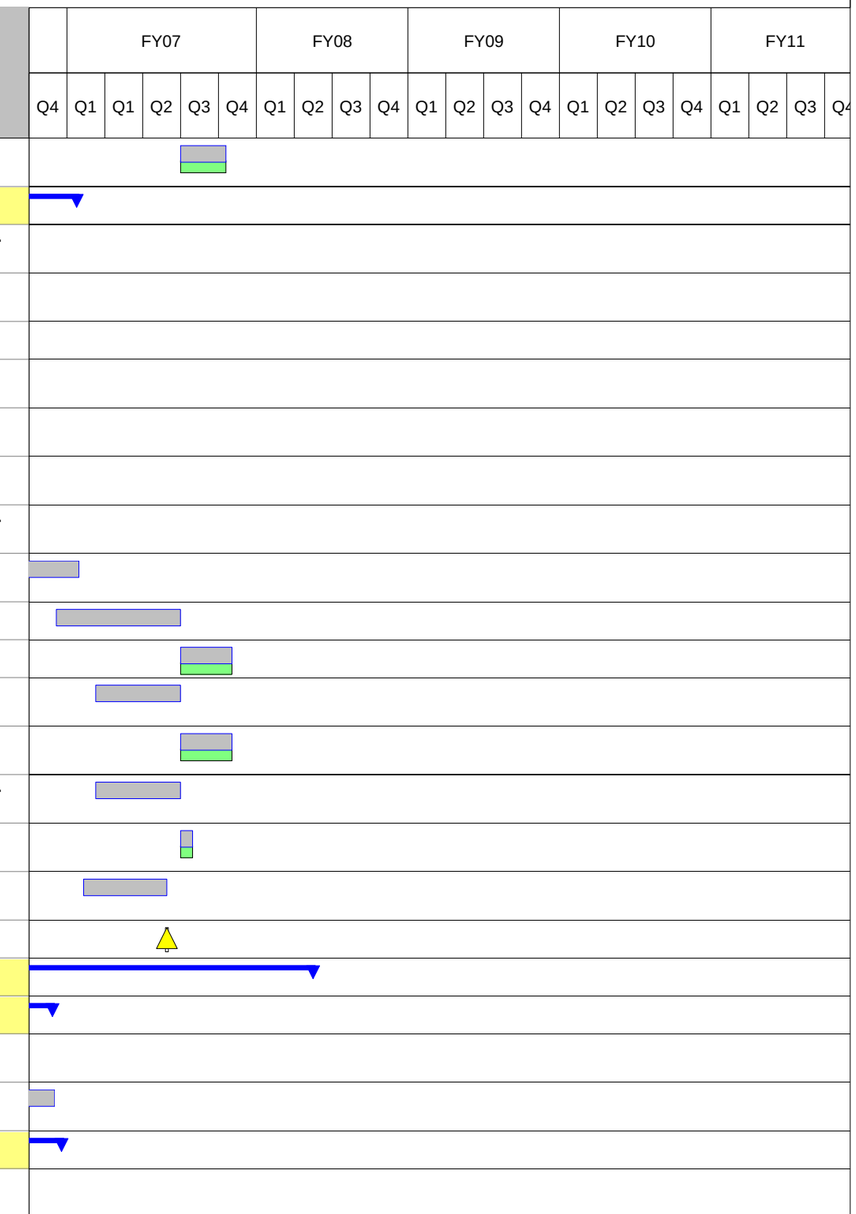
1.8.2.3.2.9	Test large prototype structures - 2	75d	02Apr07	17Jul07	1.8.2.3.2.8[FS]	L.ANL.PD2.ENG.EA,180.00,;L.ANL.PD2.TECH.MT_W,300.00,;L.ANL.PD2.ENG.ME,60.00,
1.8.2.4	**Half-scale Far Detector Prototype**	**270d**	**03Oct05**	**26Oct06**		
1.8.2.4.1	Design prototype	50d	03Oct05	13Dec05	1.8.2.1[SS]	L.ANL.PD2.SCI.PHY,16.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.2.4.2	Develop test procedures	50d	03Oct05	13Dec05	1.8.2.4.1[SS]	L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.2.4.3	Develop fixtures and tooling	50d	03Oct05	13Dec05	1.8.2.4.1[SS]	L.ANL.PD2.ENG.ME,10.00,
1.8.2.4.4	Procure materials	50d	03Oct05	13Dec05	1.8.2.4.1[SS]	L.ANL.PD2.ENG.ME,10.00,;M.ANL.PD.MANDS,2000.00,;L.ANL.PD2.ENG.EA,10.00,
1.8.2.4.5	Fabricate components	50d	03Oct05	13Dec05	1.8.2.4.1[SS]	L.ANL.PD2.TECH.MT_W,20.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.2.4.6	Assemble components	30d	14Dec05	30Jan06	1.8.2.4.5[FS]	L.ANL.PD2.TECH.MT_W,20.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.2.4.7	Test prototype	65d	31Jan06	01May06	1.8.2.4.6[FS]	L.ANL.PD2.SCI.PHY,16.00,;L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.TECH.MT_W,20.00,
1.8.2.4.8	Document lessons learned	125d	02May06	26Oct06	1.8.2.4.7[FS]	L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.SCI.PHY,8.00,
1.8.2.5	Perform FEA of prototype structures - 1	139d	08Sep06	30Mar07	1.8.2.3.2.2[SS+25d]	L.FNAL.PPD.ENG.ME,224.00,
1.8.2.6	Perform FEA of prototype structures - 2	85d	02Apr07	31Jul07	1.8.2.5[FS]	L.FNAL.PPD.ENG.ME,136.00,
1.8.2.7	Build and test IPND prototype structures - 1	74d	12Dec06	30Mar07	1.8.2.5[SS+65d]	L.ANL.PD2.TECH.MT_W,120.00,;M.FNAL.PPD.MANDS,2500.00,;L.ANL.PD2.ENG.EA,40.00,
1.8.2.8	Build and test IPND prototype structures - 2	85d	02Apr07	31Jul07	1.8.2.7[FS]	L.ANL.PD2.TECH.MT_W,120.00,;M.FNAL.PPD.MANDS,2500.00,;L.ANL.PD2.ENG.EA,40.00,
1.8.2.9	Develop environmental requirements for far detector assembly - 1	74d	12Dec06	30Mar07	1.8.2.7[SS]	L.ANL.PD2.SCI.PHY,12.00,;L.ANL.PD2.ENG.ME,36.00,
1.8.2.10	Develop environmental requirements for far detector assembly - 2	20d	02Apr07	27Apr07	1.8.2.9[FS]	L.ANL.PD2.SCI.PHY,4.00,;L.ANL.PD2.ENG.ME,4.00,
1.8.2.11	Review and validate far detector structural design	70d	10Nov06	26Feb07	1.8.2.4.8[FS]; 1.8.2.3.2.2[FS]; 1.8.2.3.1.6[FS]	L.ANL.PD2.ENG.ME,40.00,;L.FNAL.PPD.ENG.ME,40.00,;L.ANL.PD2.SCI.PHY,40.00,
1.8.2.12	Structural design validated	0	26Feb07	26Feb07	1.8.2.11[FS]	
1.8.3	**Liquid Scintillator Filling & Handling R&D**	**596d**	**03Oct05**	**19Feb08**		
1.8.3.1	**Near Detector Scintillator Supply and Filling**	**230d**	**03Oct05**	**30Aug06**		
1.8.3.1.1	Develop ND scintillator supply and filling requirements document	120d	03Oct05	27Mar06		L.IU.PD.SCI.PHY,16.00,;L.IU.PD.ENG.ME,20.00,;L.FNAL.PPD.ENG.ME,20.00,
1.8.3.1.2	Develop engineering design of ND scintillator system	110d	28Mar06	30Aug06	1.8.3.1.1[FS]	L.FNAL.PPD.ENG.ME,80.00,;L.IU.PD.ENG.ME,80.00,
1.8.3.2	**Far Detector Scintillator Supply System**	**245d**	**03Oct05**	**21Sep06**		
1.8.3.2.1	Develop FD scintillator supply requirements document	120d	03Oct05	27Mar06		L.IU.PD.SCI.PHY,40.00,



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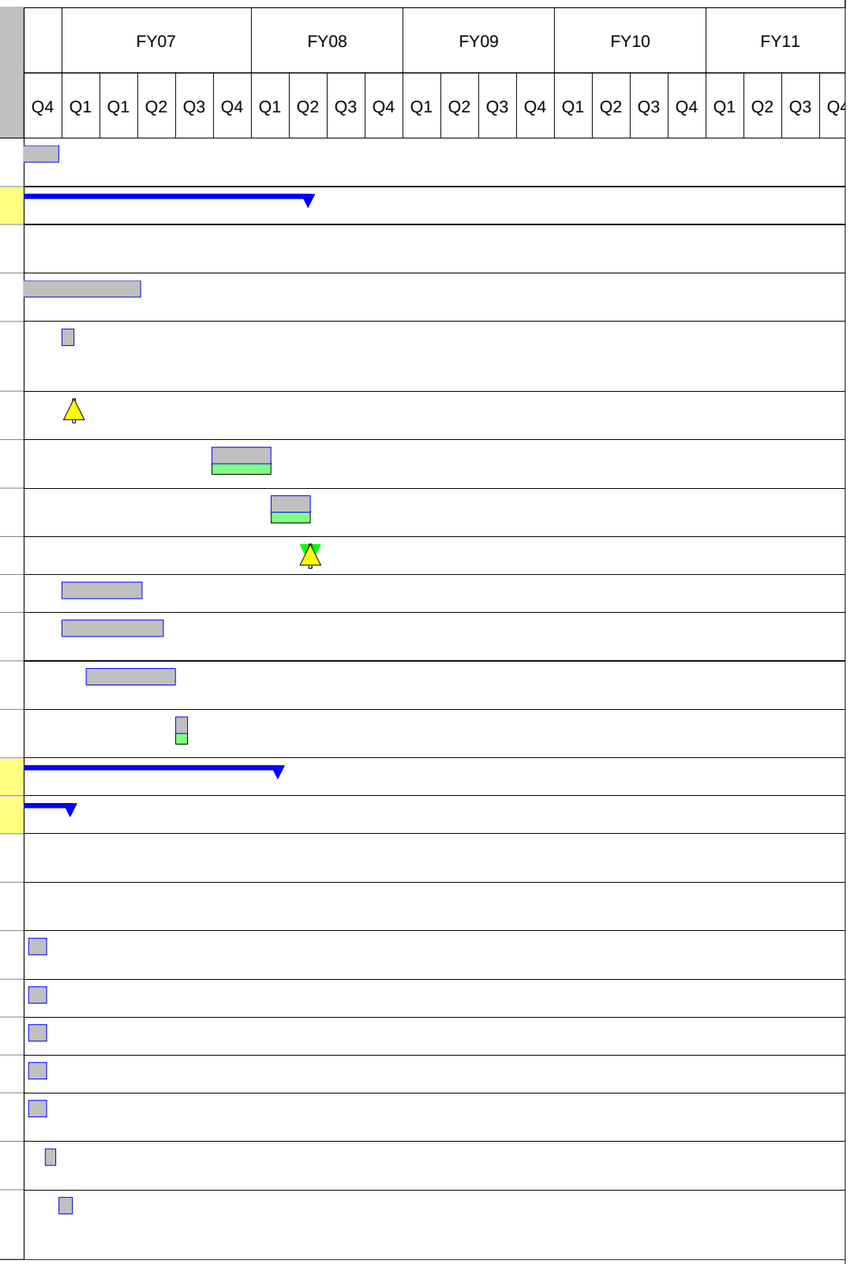
1.8.3.2.2	Develop design of FD scintillator supply system (with WBS 1.1)	125d	28Mar06	21Sep06	1.8.3.2.1[FS]	L.IU.PD.SCI.PHY,16.00,;L.IU.PD.ENG.ME,40.00,;L.FNAL.PPD.ENG.ME,40.00,
1.8.3.3	**Far Detector Filling Machine**	**596d**	**03Oct05**	**19Feb08**		
1.8.3.3.1	Develop FD filling machine requirements document	120d	03Oct05	27Mar06		L.IU.PD.ENG.ME,20.00,;L.IU.PD.SCI.PHY,16.00,;L.FNAL.PPD.ENG.ME,20.00,
1.8.3.3.2	Develop conceptual and engineering designs	315d	03Oct05	05Jan07	1.8.3.3.1[SS]	L.FNAL.PPD.ENG.ME,80.00,;L.IU.PD.ENG.ME,80.00,
1.8.3.3.3	Perform safety review of far detector scintillator handling techniques	20d	02Oct06	27Oct06	1.8.3.3.2[SS+250d]	L.ANL.PD2.SCI.PHY,8.00,;L.FNAL.PPD.ENG.ME,8.00,;L.IU.PD.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,8.00,
1.8.3.3.4	Safety review of far detector scintillator handling techniques completed	0	27Oct06	27Oct06	1.8.3.3.3[FS]	
1.8.3.3.5	Develop operating procedures	100d	28Jun07	16Nov07	1.8.3.3.2[FS]; 1.8.5.2.10.7[FS]; 1.8.3.3.4[FS]	L.IU.PD.ENG.ME,80.00,;L.FNAL.PPD.ENG.ME,80.00,
1.8.3.3.6	Document final FD filling machine design	60d	19Nov07	19Feb08	1.8.3.3.5[FS]	L.FNAL.PPD.ENG.ME,80.00,;L.IU.PD.SCI.PHY,16.00,;L.IU.PD.ENG.ME,80.00,
1.8.3.3.7	FD filling machine design completed	0	19Feb08	19Feb08	1.8.3.3.6[FS]	
1.8.3.4	Design far detector horizontal module overflow tanks	65d	02Oct06	08Jan07	1.8.3.3.3[SS]	
1.8.3.5	Measure liquid scintillator minimum ignition energy (outside contractor)	100d	02Oct06	27Feb07	1.8.3.3.3[SS]	M.FNAL.PPD.MANDS,5425.00,
1.8.3.6	Build and operate vertical module splash-fill prototype - 1	81d	01Dec06	30Mar07	1.8.3.3.3[SS+42d]	L.IU.PD.ENG.ME,64.00,
1.8.3.7	Build and operate vertical module splash-fill prototype - 2	20d	02Apr07	27Apr07	1.8.3.6[FS]	L.IU.PD.ENG.ME,16.00,
1.8.4	**Near Detector Assembly R&D**	**549d**	**03Oct05**	**07Dec07**		
1.8.4.1	**Mechanical Systems Development**	**267d**	**03Oct05**	**23Oct06**		
1.8.4.1.1	Develop requirements documents	120d	03Oct05	27Mar06		L.ANL.PD2.ENG.ME,10.00,;L.FNAL.PPD.SCI.PHY,16.00,;L.FNAL.PPD.TECH.LDR,250.00,
1.8.4.1.2	Determine ND dimensions using as-built tunnel measurements	120d	03Oct05	27Mar06	1.8.4.1.1[SS]	L.FNAL.PPD.SCI.PHY,8.00,;L.FNAL.PPD.ENG.ME,90.00,
1.8.4.1.3	Develop designs for modular detector structure	30d	13Jul06	23Aug06	1.8.2.2.4[FS]; 1.8.4.1.2[FS]; 1.8.2.2.3[FS]	L.ANL.PD2.ENG.ME,40.00,;L.FNAL.PPD.SCI.PHY,16.00,
1.8.4.1.4	Develop designs for muon catcher section	30d	13Jul06	23Aug06	1.8.4.1.3[SS]	L.ANL.PD2.ENG.ME,20.00,
1.8.4.1.5	Develop designs for detector support structure	30d	13Jul06	23Aug06	1.8.4.1.3[SS]	L.ANL.PD2.ENG.ME,10.00,
1.8.4.1.6	Develop designs for detector moving system	30d	13Jul06	23Aug06	1.8.4.1.3[SS]	L.ANL.PD2.ENG.ME,10.00,
1.8.4.1.7	Develop fixture designs for moving components underground	30d	13Jul06	23Aug06	1.8.4.1.3[SS]	L.ANL.PD2.ENG.ME,20.00,
1.8.4.1.8	Document mechanical systems designs	15d	24Aug06	14Sep06	1.8.4.1.7[FS]; 1.8.4.1.5[FS]; 1.8.4.1.3[FS]; 1.8.4.1.6[FS]	L.FNAL.PPD.SCI.PHY,24.00,;L.ANL.PD2.ENG.ME,20.00,
1.8.4.1.9	Review conceptual design of near detector mechanical systems	20d	26Sep06	23Oct06	1.8.4.1.8[FS]	L.FNAL.PPD.ENG.ME,8.00,;L.FNAL.PPD.SCI.PHY,8.00,;L.ANL.PD2.SCI.PHY,8.00,;L.FNAL.PPD.TECH.LDR,8.00,;L.ANL.PD2.ENG.ME,8.00,



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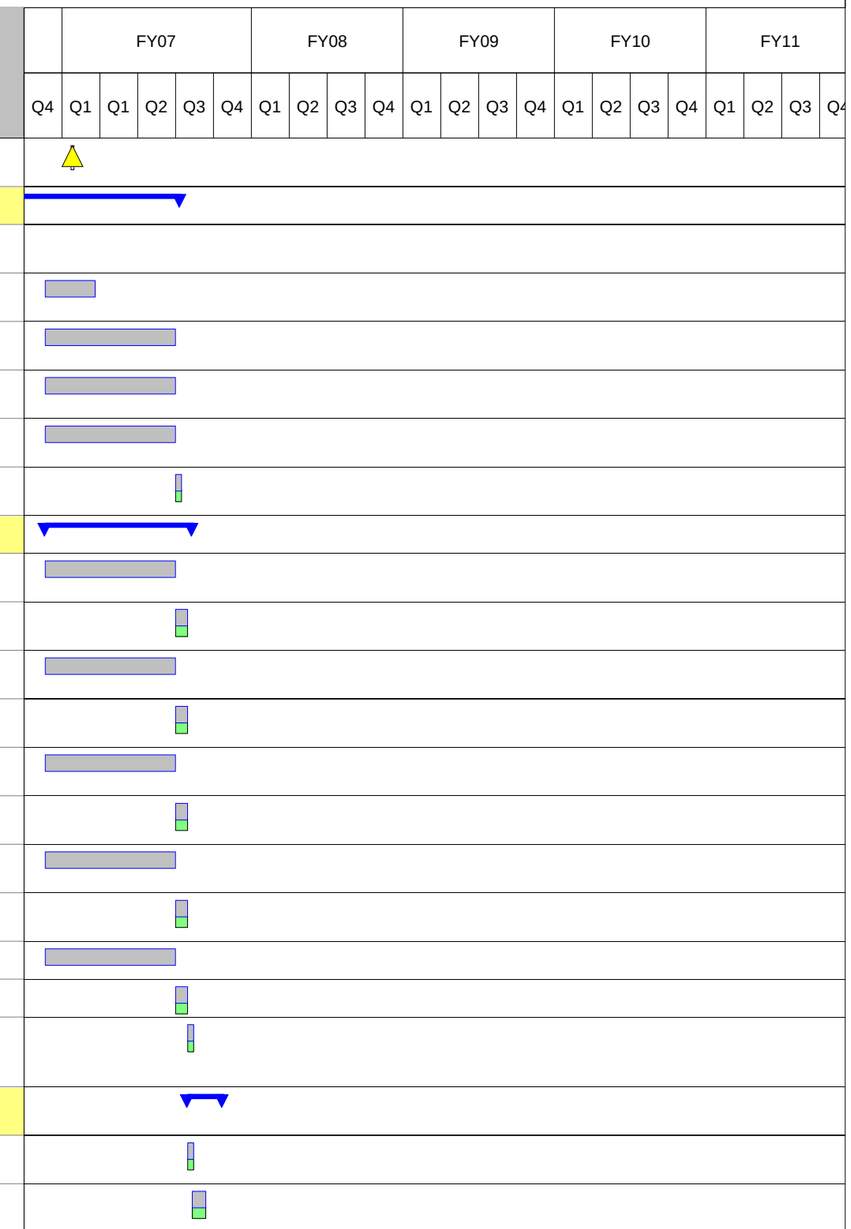
1.8.4.1.10	Conceptual design review of near detector mechanical systems completed	0	23Oct06	23Oct06	1.8.4.1.9[FS]	
1.8.4.2	**Assembly Fixtures and Tooling Development**	**384d**	**03Oct05**	**13Apr07**		
1.8.4.2.1	Develop requirements document	120d	03Oct05	27Mar06		L.ANL.PD2.ENG.ME,10.00,;L.FNAL.PPD.SCI.PHY,8.00,
1.8.4.2.2	Develop tooling designs for horizontal assembly of planes	80d	24Aug06	18Dec06	1.8.4.1.3[FS]; 1.8.4.2.1[FS]	L.ANL.PD2.ENG.EA,60.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.4.2.3	Develop tooling designs for installation of planes in blocks	149d	24Aug06	30Mar07	1.8.4.2.2[SS]	L.ANL.PD2.ENG.EA,20.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.4.2.4	Develop tooling designs for assembling muon steel block	149d	24Aug06	30Mar07	1.8.4.2.3[SS]; 1.8.4.1.3[FS]	L.ANL.PD2.ENG.ME,20.00,;L.ANL.PD2.ENG.EA,20.00,
1.8.4.2.5	Develop near detector assembly alignment procedures	149d	24Aug06	30Mar07	1.8.4.2.2[SS]	L.FNAL.PPD.SCI.PHY,16.00,;L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.ENG.EA,20.00,
1.8.4.2.6	Document assembly fixtures and tooling designs	10d	02Apr07	13Apr07	1.8.4.2.2[FS]; 1.8.4.2.5[FS]; 1.8.4.2.4[FS]; 1.8.4.2.3[FS]	L.ANL.PD2.ENG.ME,10.00,;L.FNAL.PPD.SCI.PHY,24.00,
1.8.4.3	**Near Detector Installation Procedures**	**179d**	**24Aug06**	**11May07**		
1.8.4.3.1	Develop materials handling procedures - 1	149d	24Aug06	30Mar07	1.8.4.1.7[FS]; 1.8.4.1.6[FS]	L.FNAL.PPD.ENG.ME,10.00,;L.FNAL.PPD.TECH.LDR,10.00,
1.8.4.3.2	Develop materials handling procedures - 2	20d	02Apr07	27Apr07	1.8.4.3.1[FS]	L.FNAL.PPD.ENG.ME,4.00,;L.FNAL.PPD.TECH.LDR,4.00,
1.8.4.3.3	Develop module handling procedures - 1	149d	24Aug06	30Mar07	1.8.4.3.1[SS]; 1.8.4.1.6[FS]; 1.8.4.1.7[FS]	L.FNAL.PPD.ENG.ME,10.00,;L.FNAL.PPD.TECH.LDR,10.00,
1.8.4.3.4	Develop module handling procedures - 2	20d	02Apr07	27Apr07	1.8.4.3.3[FS]	L.FNAL.PPD.ENG.ME,4.00,;L.FNAL.PPD.TECH.LDR,4.00,
1.8.4.3.5	Develop detector assembly procedures - 1	149d	24Aug06	30Mar07	1.8.4.3.3[SS]	L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.ENG.ME,10.00,
1.8.4.3.6	Develop detector assembly procedures - 2	20d	02Apr07	27Apr07	1.8.4.3.5[FS]	L.FNAL.PPD.TECH.LDR,4.00,;L.FNAL.PPD.ENG.ME,4.00,
1.8.4.3.7	Develop alignment procedures - 1	149d	24Aug06	30Mar07	1.8.4.3.5[SS]	L.FNAL.PPD.ENG.ME,10.00,;L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.SCI.PHY,16.00,
1.8.4.3.8	Develop alignment procedures - 2	20d	02Apr07	27Apr07	1.8.4.3.7[FS]	L.FNAL.PPD.SCI.PHY,8.00,;L.FNAL.PPD.ENG.ME,4.00,;L.FNAL.PPD.TECH.LDR,4.00,
1.8.4.3.9	Develop QA procedures - 1	149d	24Aug06	30Mar07	1.8.4.3.5[SS]	L.FNAL.PPD.TECH.LDR,10.00,
1.8.4.3.10	Develop QA procedures - 1	20d	02Apr07	27Apr07	1.8.4.3.9[FS]	L.FNAL.PPD.TECH.LDR,4.00,
1.8.4.3.11	Document ND installation procedures	10d	30Apr07	11May07	1.8.4.3.10[FS]; 1.8.4.3.4[FS]; 1.8.4.3.8[FS]; 1.8.4.3.2[FS]; 1.8.4.3.6[FS]	L.FNAL.PPD.SCI.PHY,10.00,;L.FNAL.PPD.TECH.LDR,10.00,
1.8.4.4	**Near Detector Underground Infrastructure Design**	**60d**	**30Apr07**	**24Jul07**		
1.8.4.4.1	Develop requirements document	10d	30Apr07	11May07	1.8.4.1.8[SS]; 1.8.4.3.11[SS]	L.ANL.PD2.ENG.ME,10.00,;L.FNAL.PPD.SCI.PHY,16.00,
1.8.4.4.2	Develop near detector tunnel excavation plan	20d	14May07	11Jun07	1.8.4.4.1[FS]	L.FNAL.PPD.TECH.LDR,40.00,;L.FNAL.PPD.SCI.PHY,80.00,



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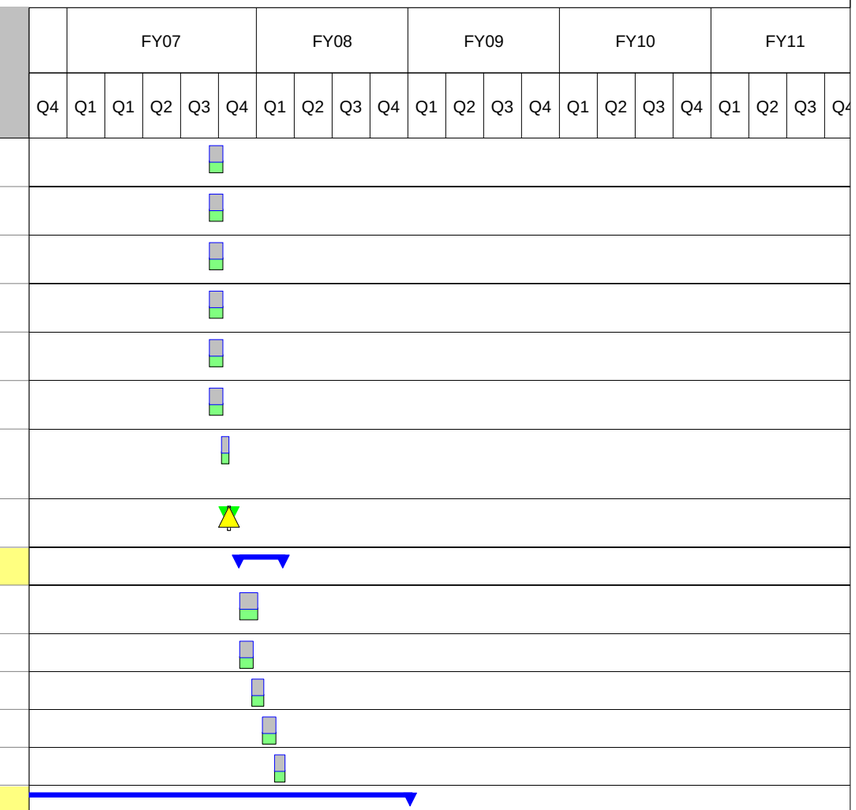
1.8.4.4.3	Develop lighting design	20d	12Jun07	10Jul07	1.8.4.4.2[FS]	L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.ENG.ME,10.00,
1.8.4.4.4	Develop HVAC design	20d	12Jun07	10Jul07	1.8.4.4.2[FS]	L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.ENG.ME,10.00,
1.8.4.4.5	Develop electrical power design	20d	12Jun07	10Jul07	1.8.4.4.2[FS]	L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.ENG.ME,10.00,
1.8.4.4.6	Develop fire protection design	20d	12Jun07	10Jul07	1.8.4.4.2[FS]	L.FNAL.PPD.ENG.ME,10.00,;L.FNAL.PPD.TECH.LDR,10.00,
1.8.4.4.7	Develop chilled water design	20d	12Jun07	10Jul07	1.8.4.4.2[FS]	L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.ENG.ME,10.00,
1.8.4.4.8	Develop computer networks	20d	12Jun07	10Jul07	1.8.4.4.2[FS]	L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.CD.CP.NA,10.00,
1.8.4.4.9	Document infrastructure designs	10d	11Jul07	24Jul07	1.8.4.4.8[FS]; 1.8.4.4.3[FS]; 1.8.4.4.4[FS]; 1.8.4.4.6[FS]; 1.8.4.4.5[FS]; 1.8.4.4.7[FS]	L.FNAL.PPD.SCI.PHY,10.00,;L.FNAL.PPD.TECH.LDR,10.00,
1.8.4.5	Near detector assembly CD-2 design completed	0	24Jul07	24Jul07	1.8.4.3.11[FS]; 1.8.4.4.9[FS]; 1.8.4.2.6[FS]; 1.8.4.1.9[FS]	
1.8.4.6	**Near Detector Preconstruction Design**	**75d**	**22Aug07**	**07Dec07**		
1.8.4.6.1	Design near detector tunnel excavation	30d	22Aug07	03Oct07	1.8.4.5[FS+20d]	L.FNAL.PPD.SCI.PHY,40.00,;M.FNAL.PPD.MANDS,50000.00,
1.8.4.6.2	Update existing near detector layout	20d	22Aug07	19Sep07	1.8.4.6.1[SS]; 1.8.4.4.2[FS]	L.FNAL.PPD.ENG.DES,80.00,
1.8.4.6.3	Design near detector cooling layout	20d	20Sep07	17Oct07	1.8.4.6.2[FS]	L.FNAL.PPD.ENG.DES,160.00,
1.8.4.6.4	Design near detector scintillator supply layout	20d	18Oct07	14Nov07	1.8.4.6.3[FS]	L.FNAL.PPD.ENG.DES,160.00,
1.8.4.6.5	Specify near detector cooling system	15d	15Nov07	07Dec07	1.8.4.6.4[FS]	L.FNAL.PPD.ENG.ME,120.00,
1.8.5	**Integration Prototype Near Detector (IPND)**	**661d**	**28Feb06**	**10Oct08**		
1.8.5.1	**Requirements Documents**	**20d**	**28Feb06**	**27Mar06**		
1.8.5.1.1	Develop requirements document for IPND	15d	07Mar06	27Mar06	1.8.4.1.2[FF]	L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.SCI.PHY,16.00,;L.ANL.PD2.ENG.ME,5.00,
1.8.5.1.2	Develop requirements document for IPND segment assembly facility	15d	07Mar06	27Mar06	1.8.5.1.1[SS]	L.ANL.PD2.ENG.ME,5.00,;L.FNAL.PPD.SCI.PHY,8.00,;L.FNAL.PPD.TECH.LDR,10.00,
1.8.5.1.3	Develop requirements document for IPND infrastructure in MINOS surface building	15d	07Mar06	27Mar06	1.8.5.1.1[SS]	L.ANL.PD2.ENG.ME,5.00,;L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.SCI.PHY,16.00,
1.8.5.1.4	**Requirements Documents for Associated ND Systems**	**20d**	**28Feb06**	**27Mar06**		
1.8.5.1.4.1	Lifting fixture for moving down shaft - Reqs	20d	28Feb06	27Mar06	1.8.4.1.2[FF]	L.ANL.PD2.ENG.ME,5.00,
1.8.5.1.4.2	Segment support structure - Reqs	20d	28Feb06	27Mar06	1.8.4.1.2[FF]	L.FNAL.PPD.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.5.1.4.3	ND moving system - Reqs	20d	28Feb06	27Mar06	1.8.4.1.2[FF]	L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,10.00,
1.8.5.1.4.4	ND segment assembly tooling - Reqs	20d	28Feb06	27Mar06	1.8.4.1.2[FF]	L.ANL.PD2.ENG.ME,10.00,;L.FNAL.PPD.TECH.LDR,10.00,;L.FNAL.PPD.SCI.PHY,8.00,



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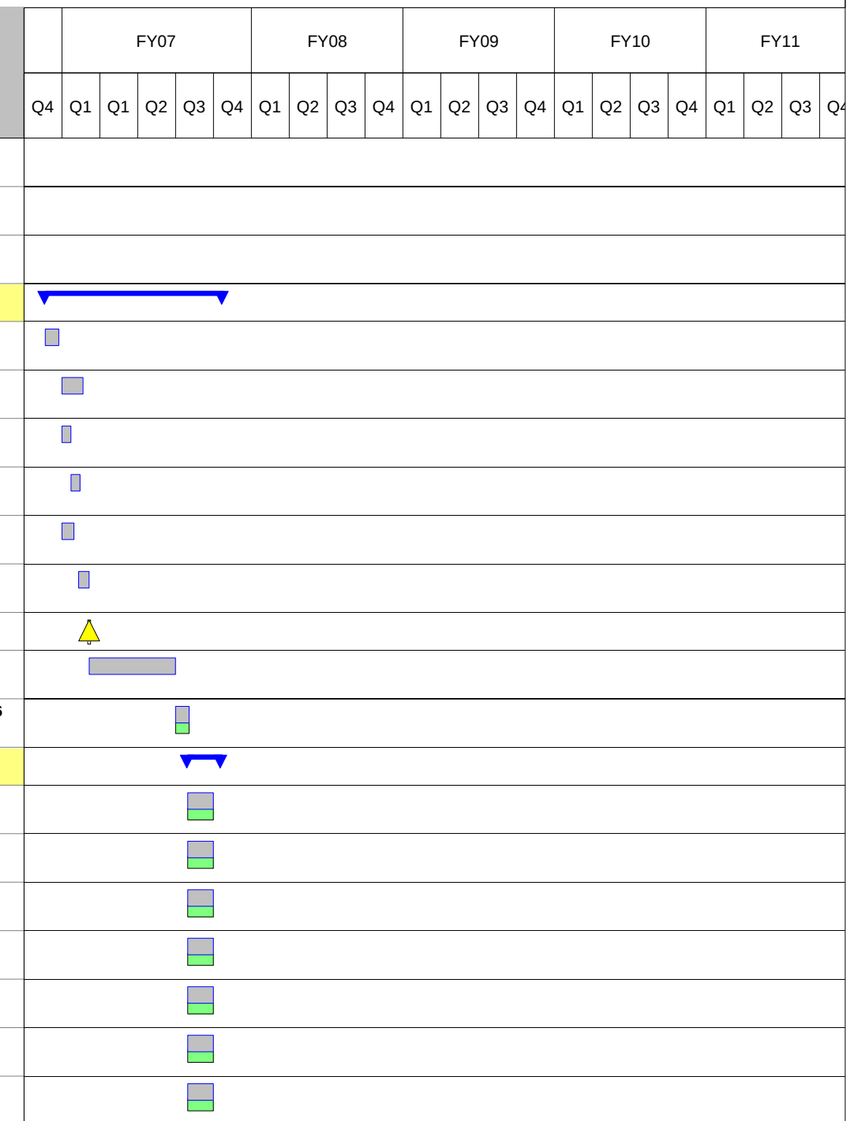
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.8.5.1.4.5	ND adhesive application system - Reqs	20d	28Feb06	27Mar06	1.8.4.1.2[FF]	L.FNAL.PPD.TECH.LDR,10.00,;L.ANL.PD2.ENG.ME,10.00,;L.FNAL.PPD.SCI.PHY,8.00,
1.8.5.1.4.6	ND scintillator supply and filling systems - Reqs	20d	28Feb06	27Mar06	1.8.4.1.2[FF]	L.ANL.PD2.ENG.ME,10.00,;L.FNAL.PPD.SCI.PHY,8.00,;L.FNAL.PPD.TECH.LDR,10.00,
1.8.5.1.5	IPND requirements documents completed	0	27Mar06	27Mar06	1.8.5.1.2[FS]; 1.8.5.1.4[FS]; 1.8.5.1.1[FS]; 1.8.5.1.3[FS]	
1.8.5.2	**IPND Systems Design**	**228d**	**24Aug06**	**23Jul07**		
1.8.5.2.1	Preliminary design of IPND block structure	20d	24Aug06	21Sep06	1.8.5.1.5[FS]; 1.8.4.1.3[FS]	L.FNAL.PPD.TECH.LDR,24.00,;L.ANL.PD2.ENG.ME,60.00,;L.FNAL.PPD.ENG.DES,240.00,
1.8.5.2.2	Final design of IPND block structure	35d	02Oct06	17Nov06	1.8.5.2.1[FS]	L.FNAL.PPD.ENG.DES,280.00,;L.FNAL.PPD.TECH.LDR,28.00,;L.ANL.PD2.ENG.ME,28.00,
1.8.5.2.3	Design block support frame and lifting fixtures	15d	02Oct06	20Oct06	1.8.5.2.1[FS]	L.FNAL.PPD.ENG.DES,120.00,;L.FNAL.PPD.TECH.LDR,12.00,;L.ANL.PD2.ENG.ME,12.00,
1.8.5.2.4	Design detector support structure	15d	23Oct06	10Nov06	1.8.5.2.3[FS]	L.FNAL.PPD.TECH.LDR,12.00,;L.FNAL.PPD.ENG.DES,120.00,;L.ANL.PD2.ENG.ME,30.00,
1.8.5.2.5	Design IPND block assembly table and fixtures	20d	02Oct06	27Oct06	1.8.5.2.1[FS]	L.ANL.PD2.ENG.ME,40.00,;L.FNAL.PPD.TECH.LDR,16.00,;L.FNAL.PPD.ENG.DES,160.00,
1.8.5.2.6	Review IPND systems design	15d	13Nov06	05Dec06	1.8.5.2.4[FS]; 1.8.5.2.5[FS]; 1.8.5.2.3[FS]	L.FNAL.PPD.ENG.DES,80.00,;L.FNAL.PPD.TECH.LDR,8.00,;L.ANL.PD2.ENG.ME,20.00,
1.8.5.2.7	IPND systems review completed	0	05Dec06	05Dec06	1.8.5.2.6[FS]	
1.8.5.2.8	Design IPND block assembly facility - 1	78d	06Dec06	30Mar07	1.8.5.2.2[FS]; 1.8.5.2.3[FS]; 1.8.5.2.7[FS]	L.FNAL.PPD.ENG.DES,64.00,;L.ANL.PD2.ENG.ME,16.00,
1.8.5.2.9	Design IPND block assembly facility - 2	22d	02Apr07	01May07	1.8.5.2.8[FS]	L.ANL.PD2.ENG.ME,4.00,;L.FNAL.PPD.ENG.DES,16.00,
1.8.5.2.10	**MINOS Service Building Infrastructure**	**55d**	**02May07**	**19Jul07**		
1.8.5.2.10.1	Design electrical system	40d	02May07	27Jun07	1.8.5.2.9[FS]	L.FNAL.PPD.ENG.ME,80.00,;L.FNAL.PPD.TECH.LDR,80.00,;L.FNAL.PPD.ENG.DES,80.00,
1.8.5.2.10.2	Design APD cooling system	40d	02May07	27Jun07	1.8.5.2.10.1[SS]	L.FNAL.PPD.ENG.ME,80.00,;L.FNAL.PPD.ENG.DES,80.00,;L.FNAL.PPD.TECH.LDR,80.00,
1.8.5.2.10.3	Design detector enclosure	40d	02May07	27Jun07	1.8.5.2.10.1[SS]	L.FNAL.PPD.ENG.DES,80.00,;L.FNAL.PPD.TECH.LDR,80.00,;L.FNAL.PPD.ENG.ME,80.00,
1.8.5.2.10.4	Design detector room base (floor load)	40d	02May07	27Jun07	1.8.5.2.10.1[SS]	L.FNAL.PPD.ENG.ME,80.00,;L.FNAL.PPD.ENG.DES,80.00,;L.FNAL.PPD.TECH.LDR,80.00,
1.8.5.2.10.5	Design scintillator containment	40d	02May07	27Jun07	1.8.5.2.10.1[SS]	L.FNAL.PPD.ENG.DES,80.00,;L.FNAL.PPD.ENG.ME,80.00,;L.FNAL.PPD.TECH.LDR,80.00,
1.8.5.2.10.6	Design fire protection system	40d	02May07	27Jun07	1.8.5.2.10.1[SS]	L.FNAL.PPD.TECH.LDR,80.00,;L.FNAL.PPD.ENG.DES,80.00,;L.FNAL.PPD.ENG.ME,80.00,
1.8.5.2.10.7	Design IPND scintillator supply and filling equipment	40d	02May07	27Jun07	1.8.5.2.10.1[SS]	L.FNAL.PPD.ENG.DES,32.00,;L.FNAL.PPD.ENG.ME,32.00,



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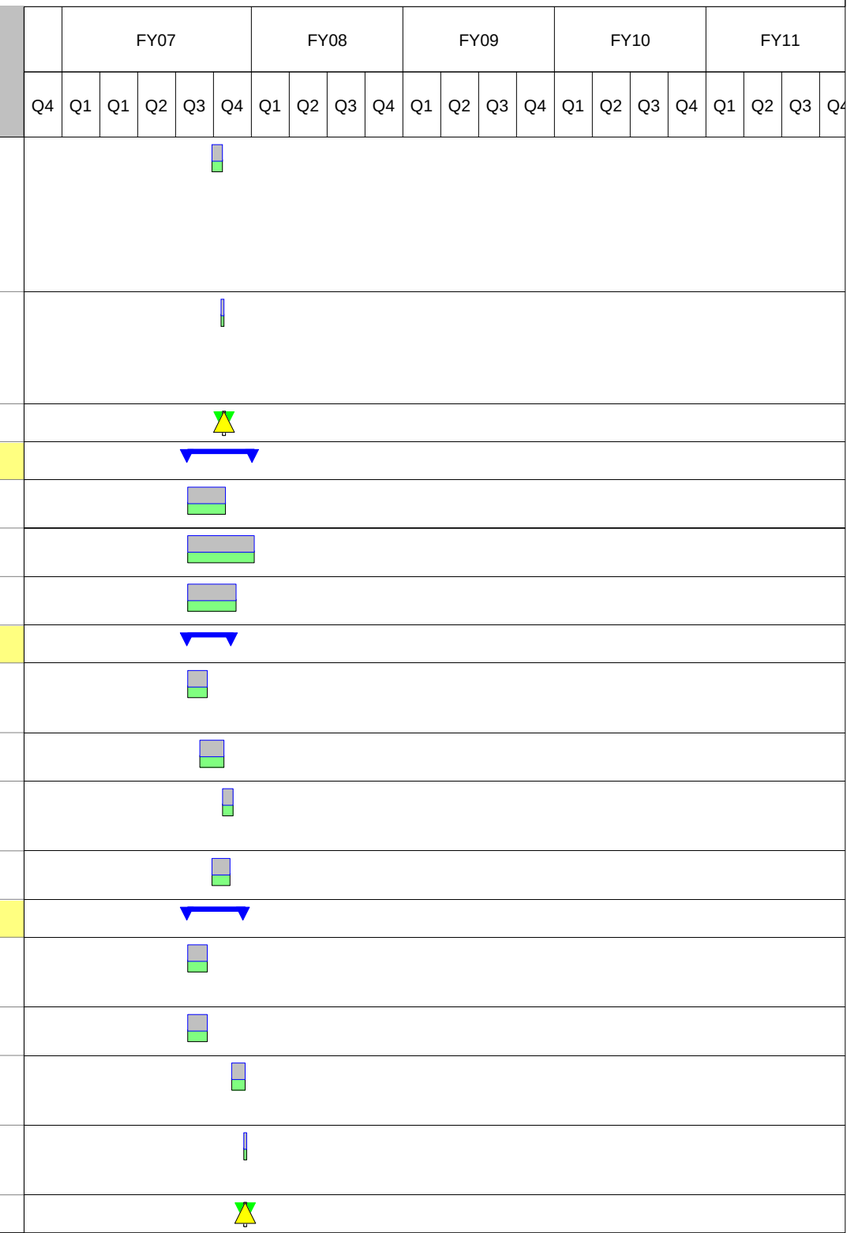
1.8.5.2.10.8	Document MSB infrastructure design	15d	28Jun07	19Jul07	1.8.5.2.10.6[FS]; 1.8.5.2.10.4[FS]; 1.8.5.2.10.2[FS]; 1.8.5.2.10.7[FS]; 1.8.5.2.10.5[FS]; 1.8.5.2.10.3[FS]; 1.8.5.2.10.1[FS]	L.FNAL.PPD.ENG.ME,120.00,;L.FNAL.PPD.ENG. DES,120.00,
1.8.5.2.11	Review IPND systems final designs	2d	20Jul07	23Jul07	1.8.5.2.3[FS]; 1.8.5.2.9[FS]; 1.8.5.2.4[FS]; 1.8.5.2.10[FS]; 1.8.5.2.1[FS]; 1.8.5.2.10.7[FS]; 1.8.5.2.6[FS]; 1.8.5.2.5[FS]; 1.8.5.2.7[FS]	L.FNAL.PPD.SCI.PHY,8.00,;L.FNAL.PPD.TECH. LDR,8.00,;L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2. ENG.ME,8.00,;L.FNAL.PPD.ENG.ME,8.00,
1.8.5.2.12	IPND systems designs completed	0	23Jul07	23Jul07	1.8.5.2.9[FS]; 1.8.5.2.11[FS]	
1.8.5.3	**IPND Equipment**	**110d**	**02May07**	**05Oct07**		
1.8.5.3.1	Fabricate block support carriages	60d	02May07	26Jul07	1.8.5.2.3[FS]; 1.8.5.2.9[FS]	M.FNAL.PPD.MANDS,7000.00,;L.ANL.PD2.ENG. ME,48.00,
1.8.5.3.2	Fabricate lifting fixtures	110d	02May07	05Oct07	1.8.5.2.3[FS]; 1.8.5.2.9[FS]	L.ANL.PD2.ENG.ME,88.00,;M.FNAL.PPD. MANDS,10000.00,
1.8.5.3.3	Fabricate detector support structure	80d	02May07	23Aug07	1.8.5.2.4[FS]; 1.8.5.2.9[FS]	M.FNAL.PPD.MANDS,15000.00,;L.ANL.PD2.ENG. ME,64.00,
1.8.5.3.4	**IPND Block Assembly Tooling**	**73d**	**02May07**	**14Aug07**		
1.8.5.3.4.1	Fabricate block assembly table	30d	02May07	13Jun07	1.8.5.2.5[FS+20d]; 1.8.5.2.9[FS]	L.ANL.PD2.TECH.MT_W,120.00,;L.ANL.PD2.ENG. EA,120.00,;M.FNAL.PPD.MANDS,30000.00,;L.ANL. PD2.ENG.ME,24.00,
1.8.5.3.4.2	Procure glue machine	40d	29May07	24Jul07	1.8.1.14[FS]; 1.8.5.2.9[FS]; 1.8.5.2.7[FS]	L.ANL.PD2.ENG.ME,32.00,;M.FNAL.PPD. MANDS,30000.00,
1.8.5.3.4.3	Assemble glue machine	15d	25Jul07	14Aug07	1.8.5.2.9[FS]; 1.8.5.3.4.2[FS]	L.ANL.PD2.ENG.ME,12.00,;L.ANL.PD2.TECH. MT_W,60.00,;L.ANL.PD2.ENG.EA,60.00,;M.FNAL. PPD.MANDS,10000.00,
1.8.5.3.5	Fabricate IPND scintillator supply and filling equipment	30d	28Jun07	09Aug07	1.8.3.7[FS]; 1.8.5.2.10.7[FS]; 1.8.5.2.9[FS]; 1.8.3.5[FS]	M.IU.PD.MANDSPASS,16000.00,
1.8.5.4	**IPND Block Assembly Facility Setup**	**94d**	**02May07**	**13Sep07**		
1.8.5.4.1	Set up building infrastructure	30d	02May07	13Jun07	1.8.5.2.9[FS]	L.ANL.PD2.ENG.ME,24.00,;M.FNAL.PPD. MANDS,5000.00,;L.ANL.PD2.ENG.EA,48.00,;L.ANL .PD2.TECH.MT_W,60.00,
1.8.5.4.2	Install adhesive ventilation system	30d	02May07	13Jun07	1.8.5.4.1[SS]	L.ANL.PD2.ENG.EA,72.00,;M.FNAL.PPD. MANDS,5000.00,;L.ANL.PD2.ENG.ME,24.00,
1.8.5.4.3	Install IPND assembly equipment	20d	15Aug07	12Sep07	1.8.5.3.4[FS]; 1.8.5.3.1[FS]; 1.8.5.4.1[FS]	L.ANL.PD2.ENG.EA,32.00,;L.ANL.PD2.TECH. MT_W,160.00,;L.ANL.PD2.ENG.ME,16.00,;M.FNAL. PPD.MANDS,5000.00,
1.8.5.4.4	Review IPND assembly facility for operational readiness	1d	13Sep07	13Sep07	1.8.5.4.3[FS]	L.ANL.PD2.SCI.PHY,4.00,;L.FNAL.PPD.SCI.PHY,4. 00,;L.ANL.PD2.ENG.ME,4.00,;L.FNAL.PPD.TECH. LDR,4.00,
1.8.5.4.5	IPND block assembly facility completed	0	13Sep07	13Sep07	1.8.5.4.4[FS]	



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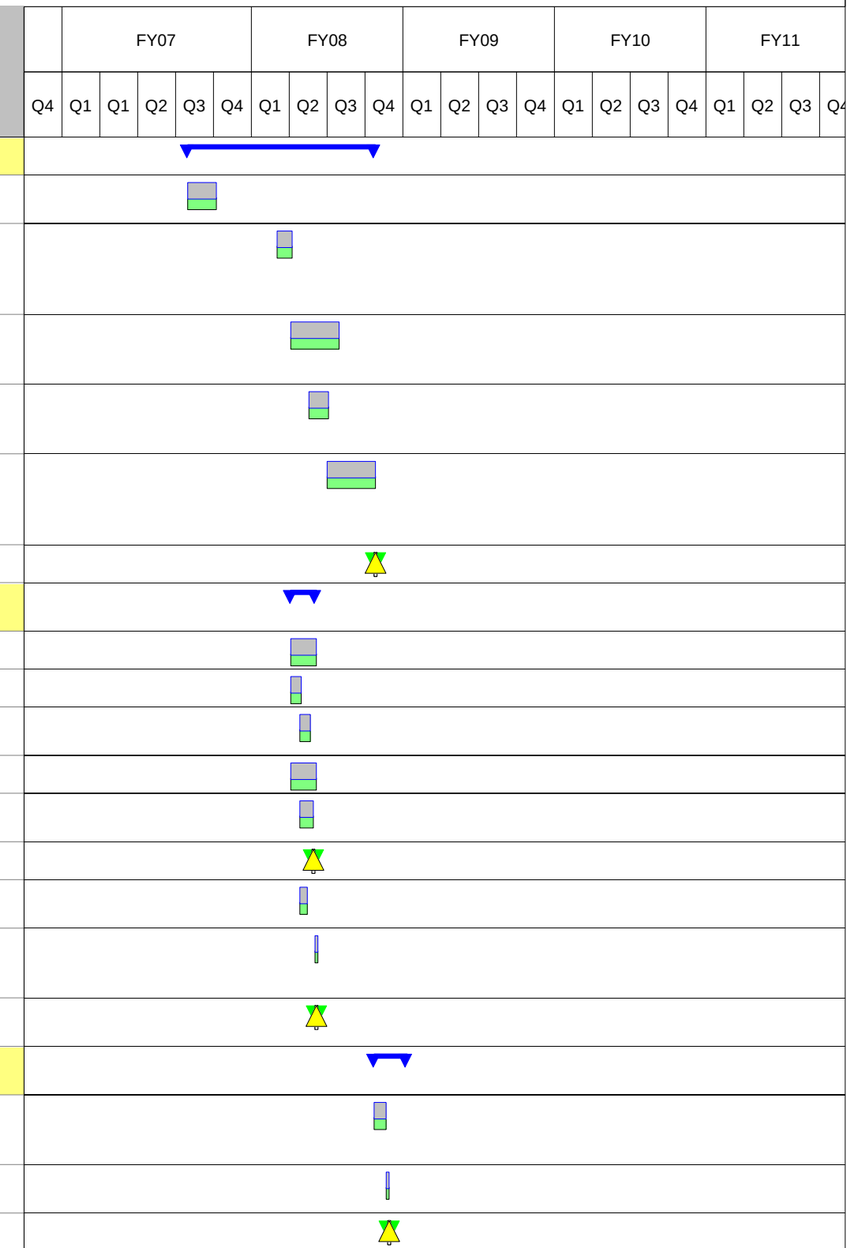
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.8.5.5	**IPND Block Fabrication**	**309d**	**02May07**	**23Jul08**		
1.8.5.5.1	Procure adhesive	45d	**02May07**	**05Jul07**	**1.8.5.4.2[SS]**	**M.FNAL.PPD.MANDS,10000.00,;L.ANL.PD2.ENG.ME,36.00,**
1.8.5.5.2	Fabricate prototype 8-plane block	20d	**04Dec07**	**04Jan08**	**1.5.7.3.6[SS+10d]; 1.8.5.4.5[FS]; 1.8.5.5.1[FS]**	**L.ANL.PD2.TECH.MT_W,320.00,;L.ANL.PD2.ENG.ME,80.00,;L.ANL.PD2.ENG.EA,160.00,;M.FNAL.PPD.MANDS,1000.00,;L.FNAL.PPD.TECH.LDR,160.00,**
1.8.5.5.3	Install and test prototype APD-electronics-readout hardware on prototype block	80d	**07Jan08**	**28Apr08**	**1.7.2.1.4.4[FS]; 1.8.5.5.2[FS]; 1.7.2.2.4.4[FS]; 1.6.1.1.3.7[FS]; 1.6.2.4.10[FS]**	**L.TF.PD.TECH.ET_W,160.00,;L.TF.PD.SCI.PHY,80.00,;L.HU.PD.SCI.PHY,80.00,;L.HU.PD.ENG.EE_SR,80.00,**
1.8.5.5.4	Fabricate IPND block 1	30d	**19Feb08**	**31Mar08**	**1.8.5.5.2[FS]; 1.5.7.3.6[SS+60d]**	**L.ANL.PD.ENG.ME,120.00,;L.FNAL.PPD.TECH.LDR,240.00,;L.ANL.PD.ENG.EA,240.00,;L.ANL.PD.TECH.MT_W,480.00,**
1.8.5.5.5	Fabricate remaining IPND blocks	80d	**01Apr08**	**23Jul08**	**1.8.5.5.4[FS]; 1.5.7.3.9[FF]; 1.5.7.3.6[FF]**	**L.FNAL.PPD.TECH.LDR,128.00,;L.ANL.PD.ENG.EA,128.00,;L.ANL.PD.TECH.MT_W,1280.00,;L.FNAL.PPD.TECH.MT_W,640.00,;L.ANL.PD.ENG.ME,320.00,**
1.8.5.5.6	IPND blocks completed	0	**23Jul08**	**23Jul08**	**1.8.5.5.5[FS]**	
1.8.5.6	**MINOS Service Building Infrastructure Installation**	**41d**	**07Jan08**	**04Mar08**		
1.8.5.6.1	Install IPND electrical supply system	40d	**07Jan08**	**03Mar08**	**1.8.5.5.2[FS]**	**L.FNAL.PPD.ENG.ME,32.00,**
1.8.5.6.2	Install IPND enclosure	15d	**07Jan08**	**28Jan08**	**1.8.5.5.2[FS]**	**L.FNAL.PPD.TECH.MT_W,240.00,**
1.8.5.6.3	Install IPND scintillator containment	15d	**29Jan08**	**18Feb08**	**1.8.5.6.2[FS]**	**L.FNAL.PPD.TECH.MT_W,240.00,;L.FNAL.PPD.TECH.LDR,24.00,**
1.8.5.6.4	Install IPND cooling system	40d	**07Jan08**	**03Mar08**	**1.8.5.5.2[FS]**	**L.FNAL.PPD.ENG.ME,64.00,**
1.8.5.6.5	Install detector support	20d	**29Jan08**	**25Feb08**	**1.8.5.6.2[FS]; 1.8.5.3.2[FS]; 1.8.5.3.3[FS]**	**L.FNAL.PPD.TECH.LDR,160.00,;L.FNAL.PPD.ENG.ME,32.00,;L.FNAL.PPD.TECH.MT_W,160.00,**
1.8.5.6.6	IPND detector support installed in MSB	0	**25Feb08**	**25Feb08**	**1.8.5.6.5[FS]**	
1.8.5.6.7	Install liquid scintillator storage and supply system	10d	**29Jan08**	**11Feb08**	**1.8.5.6.2[FS]; 1.8.5.3.5[FS]**	**L.FNAL.PPD.TECH.LDR,20.00,;L.FNAL.PPD.TECH.MT_W,80.00,**
1.8.5.6.8	Review MINOS service building infrastructure for operational readiness	1d	**04Mar08**	**04Mar08**	**1.8.5.6.4[FS]; 1.8.5.6.3[FS]; 1.8.5.6.1[FS]; 1.8.5.6.6[FS]; 1.8.5.6.7[FS]**	**L.FNAL.PPD.SCI.PHY,4.00,;L.FNAL.PPD.TECH.LDR,4.00,;L.ANL.PD2.ENG.ME,4.00,;L.ANL.PD2.SCI.PHY,4.00,;L.IU.PD.SCI.PHY,4.00,**
1.8.5.6.9	MINOS service building infrastructure installation completed	0	**04Mar08**	**04Mar08**	**1.8.5.6.8[FS]**	
1.8.5.7	**Installation, Commissioning and Operation In MINOS Service Building**	**56d**	**24Jul08**	**10Oct08**		
1.8.5.7.1	Assemble and install IPND blocks at MSB	20d	**24Jul08**	**20Aug08**	**1.8.5.6.9[FS]; 1.8.5.5.6[FS]**	**L.FNAL.PPD.TECH.LDR,80.00,;L.FNAL.PPD.TECH.MT_W,160.00,;M.FNAL.PPD.MANDS,2000.00,;L.FNAL.PPD.SCI.PHY,40.00,**
1.8.5.7.2	Fill IPND modules with liquid scintillator	5d	**21Aug08**	**27Aug08**	**1.8.5.7.1[FS]; 1.2.9.6.11[FS]; 1.8.5.3.5[FS]**	**L.FNAL.PPD.TECH.MT_W,40.00,;M.IU.PD.MANDSPASS,3000.00,;L.IU.PD.ENG.ME,40.00,**
1.8.5.7.3	IPND module filling completed	0	**27Aug08**	**27Aug08**	**1.8.5.7.2[FS]**	



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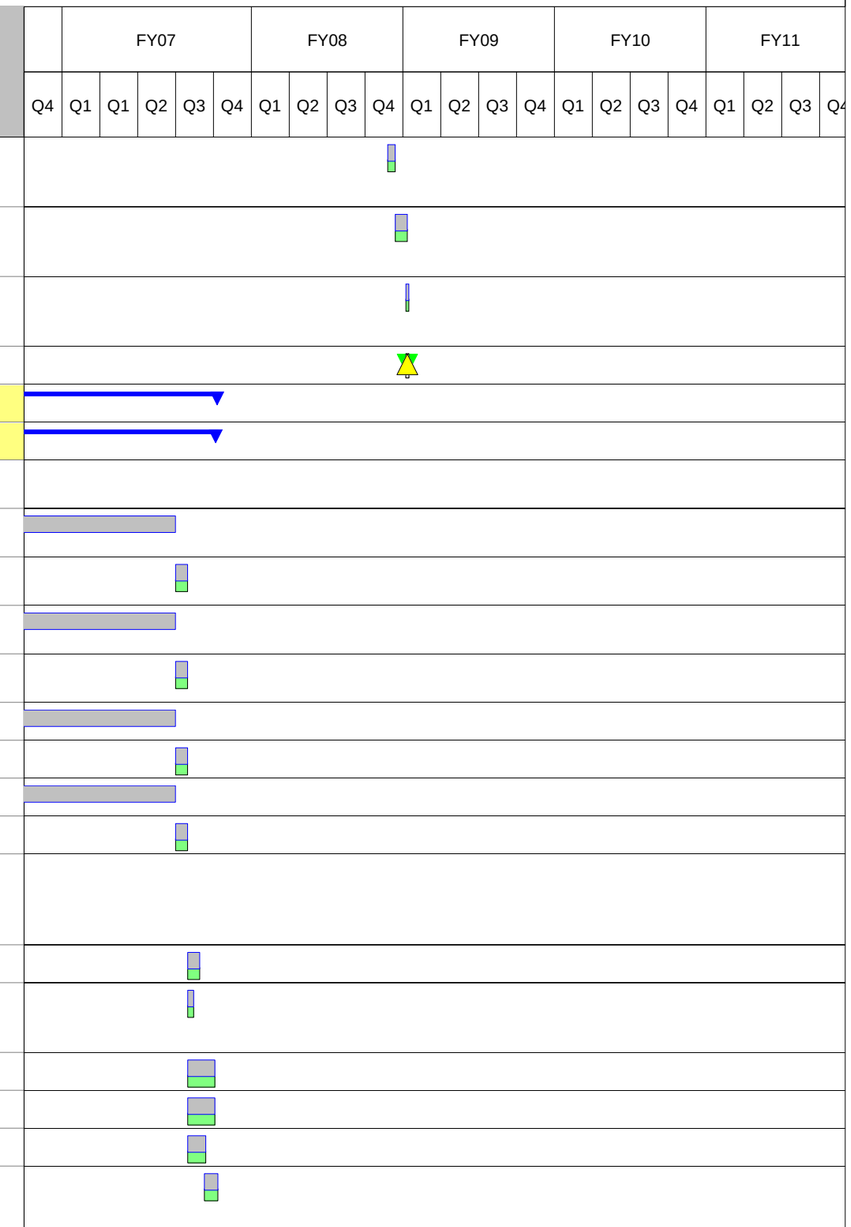
1.8.5.7.4	Install APD-electronics-readout hardware	10d	28Aug08	11Sep08	1.6.1.6.1.9[FS]; 1.6.1.2.10.2[FS]; 1.8.5.7.2[FS]; 1.7.2.2.4.4[FS]; 1.7.2.1.8[FS]; 1.6.2.5.13[FS]	L.HU.PD.SCI.PHY,40.00,;L.FNAL.PPD.SCI.PHY,40.00,;L.UMNTC.PD.SCI.PD,80.00,;L.UMNTC.PD.SCI.PHY,80.00,
1.8.5.7.5	Perform QA checks and commission Integration Prototype at MSB	20d	12Sep08	09Oct08	1.8.5.7.4[FS]; 1.8.5.7.2[FS]	L.FNAL.PPD.SCI.PHY,80.00,;L.FNAL.PPD.SCI.PD,80.00,;L.UNIV_N.PD.SCI.PD,160.00,;L.UNIV_N.PD.SCI.PHY,160.00,
1.8.5.7.6	Review IPND for operational readiness	1d	10Oct08	10Oct08	1.7.1.11[FS]; 1.8.5.7.5[FS]	L.FNAL.PPD.TECH.LDR,4.00,;L.ANL.PD2.SCI.PHY,4.00,;L.ANL.PD2.ENG.ME,4.00,;L.FNAL.PPD.SCI.PHY,4.00,;L.IU.PD.SCI.PHY,4.00,
1.8.5.7.7	IPND ready to take data	0	10Oct08	10Oct08	1.8.5.7.6[FS]	
1.8.6	**Far Detector Assembly Engineering**	**446d**	**03Oct05**	**12Jul07**		
1.8.6.1	**Far Detector Mechanical Systems**	**444d**	**03Oct05**	**10Jul07**		
1.8.6.1.1	Develop requirements documents	120d	03Oct05	27Mar06		L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.SCI.PHY,16.00,
1.8.6.1.2	Develop designs for detector block pallets - 1	254d	28Mar06	30Mar07	1.8.2.2.2[FS]; 1.8.2.2.1[FS]; 1.8.6.1.1[FS]; 1.8.1.6[FS]	L.ANL.PD2.ENG.ME,24.00,;L.FNAL.PPD.ENG.ME,1300.00,
1.8.6.1.3	Develop designs for detector block pallets - 2	20d	02Apr07	27Apr07	1.8.6.1.2[FS]	L.ANL.PD2.ENG.ME,4.00,;L.FNAL.PPD.ENG.ME,100.00,
1.8.6.1.4	Develop designs for cranes and moving equipment - 1	254d	28Mar06	30Mar07	1.8.6.1.2[SS]	L.ANL.PD2.ENG.ME,24.00,
1.8.6.1.5	Develop designs for cranes and moving equipment - 2	20d	02Apr07	27Apr07	1.8.6.1.4[FS]	L.ANL.PD2.ENG.ME,4.00,
1.8.6.1.6	Develop designs for fixtures - 1	254d	28Mar06	30Mar07	1.8.6.1.2[SS]	L.ANL.PD2.ENG.ME,24.00,
1.8.6.1.7	Develop designs for fixtures - 2	20d	02Apr07	27Apr07	1.8.6.1.6[FS]	L.ANL.PD2.ENG.ME,4.00,
1.8.6.1.8	Develop procedures for moving components - 1	254d	28Mar06	30Mar07	1.8.6.1.2[SS]	L.ANL.PD2.ENG.ME,24.00,
1.8.6.1.9	Develop procedures for moving components - 2	20d	02Apr07	27Apr07	1.8.6.1.8[FS]	L.ANL.PD2.ENG.ME,4.00,
1.8.6.1.10	Mechanical systems CD-1 design completed	0	30May06	30May06	1.8.6.1.6[SS+45d]; 1.8.6.1.4[SS+45d]; 1.8.6.1.8[SS+45d]; 1.8.6.1.2[SS+45d]	
1.8.6.1.11	Design cosmic ray shield wall	20d	30Apr07	25May07	1.8.6.1.9[FS]; 1.8.6.1.8[FS]	L.ANL.PD2.ENG.ME,24.00,
1.8.6.1.12	Update 3D integration CAD drawing	10d	30Apr07	11May07	1.8.6.1.3[FS]; 1.8.6.1.9[FS]; 1.8.6.1.5[FS]; 1.8.6.1.8[FS]; 1.8.6.1.7[FS]	L.FNAL.PPD.ENG.DES,80.00,
1.8.6.1.13	Design detector cooling line layouts	45d	30Apr07	02Jul07	1.8.6.1.12[SS]	L.FNAL.PPD.ENG.DES,360.00,
1.8.6.1.14	Design detector cabling layout	45d	30Apr07	02Jul07	1.8.6.1.12[SS]	L.FNAL.PPD.ENG.DES,360.00,
1.8.6.1.15	Design scintillator piping and overflow tank layout	30d	30Apr07	11Jun07	1.8.6.1.12[SS]	L.FNAL.PPD.ENG.ME,240.00,
1.8.6.1.16	Document mechanical system designs	20d	12Jun07	10Jul07	1.8.6.1.3[FS]; 1.8.6.1.9[FS]; 1.8.6.1.5[FS]; 1.8.6.1.7[FS]; 1.8.6.1.15[FS]; 1.8.6.1.8[FS]	L.ANL.PD2.SCI.PHY,16.00,;L.ANL.PD2.ENG.ME,20.00,



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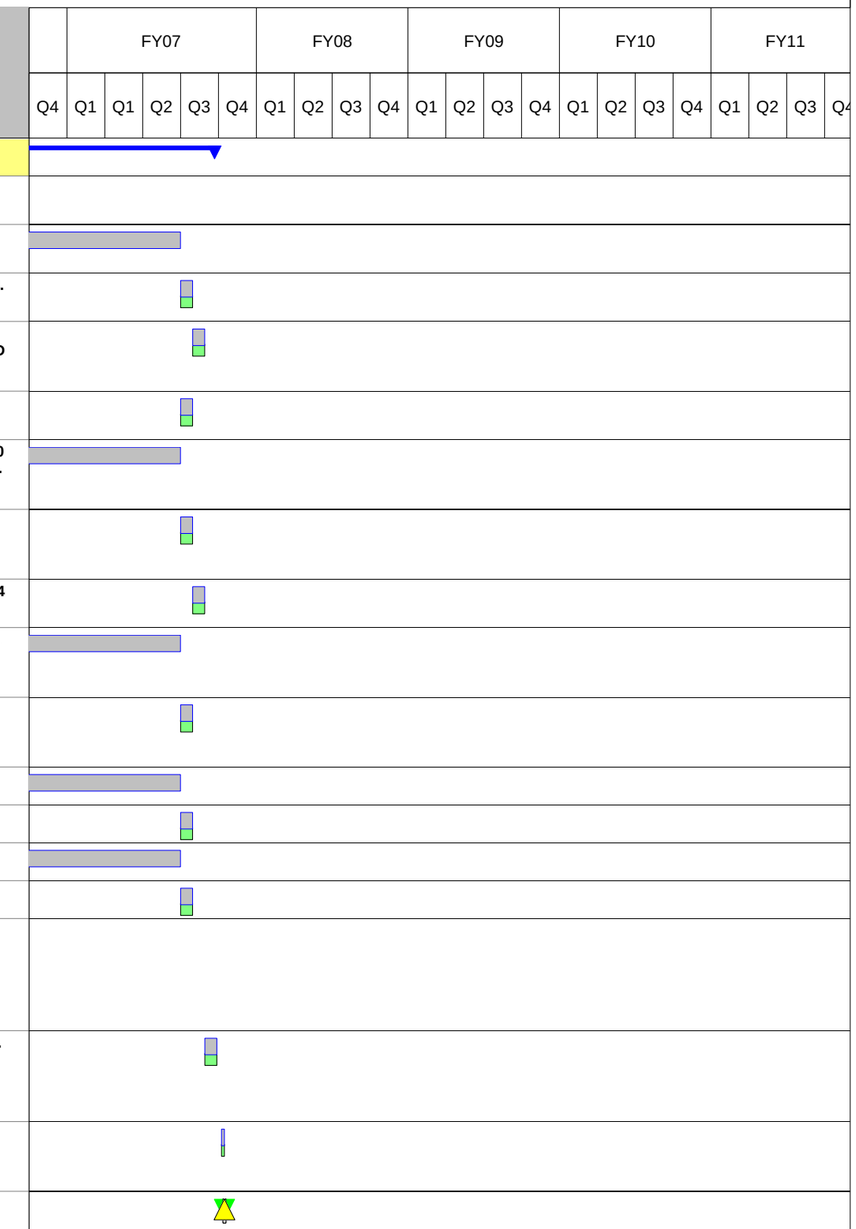
WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.8.6.2	**Far Detector Assembly Fixtures and Tooling**	**434d**	**03Oct05**	**25Jun07**		
1.8.6.2.1	Develop requirements documents	120d	**03Oct05**	**27Mar06**		**L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,10.00,**
1.8.6.2.2	Develop block pivoter design - 1	374d	**03Oct05**	**30Mar07**	**1.8.2.2.1[SS]; 1.8.6.2.1[SS]**	**L.FNAL.PPD.ENG.ME,1744.00,;L.ANL.PD2.SCI.PHY,36.00,**
1.8.6.2.3	Develop block pivoter design - 2	20d	**02Apr07**	**27Apr07**	**1.8.6.2.2[FS]**	**L.FNAL.PPD.ENG.ME,96.00,;L.ANL.PD2.SCI.PHY,4.00,**
1.8.6.2.4	Review CD-2 design of block pivoter	20d	**30Apr07**	**25May07**	**1.8.6.2.3[FS]**	**L.FNAL.PPD.SCI.PHY,16.00,;L.ANL.PD2.SCI.PHY,16.00,;L.ANL.PD2.ENG.ME,16.00,;L.FNAL.PPD.TECH.LDR,16.00,;L.FNAL.PPD.ENG.ME,16.00,**
1.8.6.2.5	Develop block assembly platform design	20d	**02Apr07**	**27Apr07**	**1.8.6.2.10[FF]**	**L.FNAL.PPD.ENG.ME,24.00,;L.FNAL.PPD.ENG.DES,64.00,**
1.8.6.2.6	Develop glue machine design - 1	254d	**28Mar06**	**30Mar07**	**1.8.6.2.2[SS]; 1.8.1.6[FS]**	**L.ANL.PD2.ENG.EA,144.00,;L.ANL.PD2.SCI.PHY,20.00,;L.ANL.PD2.ENG.ME,144.00,;L.FNAL.PPD.ENG.DES,144.00,**
1.8.6.2.7	Develop glue machine design - 2	20d	**02Apr07**	**27Apr07**	**1.8.6.2.6[FS]**	**L.ANL.PD2.ENG.ME,16.00,;L.FNAL.PPD.ENG.DES,16.00,;L.ANL.PD2.SCI.PHY,4.00,;L.ANL.PD2.ENG.EA,16.00,**
1.8.6.2.8	Develop module flipping station design	20d	**30Apr07**	**25May07**	**1.8.6.2.7[FS]**	**L.ANL.PD2.ENG.ME,64.00,;L.ANL.PD2.ENG.DES,64.00,**
1.8.6.2.9	Develop fixtures and procedures for block assembly - 1	374d	**03Oct05**	**30Mar07**	**1.8.6.2.2[SS]**	**L.ANL.PD2.ENG.EA,92.00,;L.ANL.PD2.SCI.PHY,20.00,;L.ANL.PD2.ENG.ME,92.00,;L.ANL.PD2.ENG.DES,112.00,**
1.8.6.2.10	Develop fixtures and procedures for block assembly - 2	20d	**02Apr07**	**27Apr07**	**1.8.6.2.9[FS]**	**L.ANL.PD2.ENG.EA,8.00,;L.ANL.PD2.SCI.PHY,4.00,;L.ANL.PD2.ENG.ME,8.00,;L.ANL.PD2.ENG.DES,8.00,**
1.8.6.2.11	Develop tooling for block installation - 1	374d	**03Oct05**	**30Mar07**	**1.8.6.2.2[SS]**	**L.ANL.PD2.ENG.ME,42.00,**
1.8.6.2.12	Develop tooling for block installation - 2	20d	**02Apr07**	**27Apr07**	**1.8.6.2.11[FS]**	**L.ANL.PD2.ENG.ME,8.00,**
1.8.6.2.13	Develop tooling for FD block alignment - 1	374d	**03Oct05**	**30Mar07**	**1.8.6.2.2[SS]**	**L.ANL.PD2.ENG.ME,22.00,**
1.8.6.2.14	Develop tooling for FD block alignment - 2	20d	**02Apr07**	**27Apr07**	**1.8.6.2.13[FS]**	**L.ANL.PD2.ENG.ME,8.00,**
1.8.6.2.15	Assembly fixtures CD-1 design completed	0	**30May06**	**30May06**	**1.8.6.2.13[SS+45d]; 1.8.6.2.11[SS+45d]; 1.8.6.2.6[SS+45d]; 1.8.6.2.9[SS+45d]; 1.8.6.2.2[SS+45d]**	
1.8.6.2.16	Document FD tooling designs	20d	**29May07**	**25Jun07**	**1.8.6.2.8[FS]; 1.8.6.2.3[FS]; 1.8.6.2.12[FS]; 1.8.6.2.7[FS]; 1.8.6.2.10[FS]; 1.8.6.2.14[FS]; 1.8.6.2.1[FS]**	**L.ANL.PD2.SCI.PHY,16.00,;L.ANL.PD2.ENG.ME,20.00,**
1.8.6.3	Review far detector mechnical systems and tooling designs	2d	**11Jul07**	**12Jul07**	**1.8.6.2.16[FS]; 1.8.6.1.16[FS]**	**L.ANL.PD2.SCI.PHY,16.00,;L.UMNTC.PD.MNG.IM,16.00,;L.FNAL.PPD.ENG.ME,16.00,;L.ANL.PD2.ENG.ME,16.00,;L.FNAL.PPD.SCI.PHY,16.00,**
1.8.6.4	FD mechanical system and tooling CD-2 designs completed	0	**12Jul07**	**12Jul07**	**1.8.6.3[FS]**	



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1.8.7	**Far Detector Installation Procedures**	**394d**	**03Oct05**	**27Apr07**		
1.8.7.1	Develop requirements document	120d	**03Oct05**	**27Mar06**		**L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.SCI.PHY,16.00,**
1.8.7.2	Develop block assembly procedures - 1	209d	**31May06**	**30Mar07**	**1.8.7.1[FS]; 1.8.6.2.15[FS]; 1.8.6.1.10[FS]**	**L.UMNTC.PD.MNG.IM,36.00,;L.ANL.PD2.SCI.PHY,12.00,;L.FNAL.PPD.ENG.ME,544.00,;L.ANL.PD2.ENG.ME,24.00,**
1.8.7.3	Develop block assembly procedures - 2	20d	**02Apr07**	**27Apr07**	**1.8.7.2[FS]**	**L.FNAL.PPD.ENG.ME,56.00,;L.ANL.PD2.SCI.PHY,4.00,;L.ANL.PD2.ENG.ME,4.00,;L.UMNTC.PD.MNG.IM,4.00,**
1.8.7.4	Develop block assembly QA procedures - 1	209d	**31May06**	**30Mar07**	**1.8.7.2[SS]**	**L.ANL.PD2.ENG.ME,16.00,;L.UMNTC.PD.MNG.IM,32.00,;L.ANL.PD2.SCI.PHY,12.00,**
1.8.7.5	Develop block assembly QA procedures - 2	20d	**02Apr07**	**27Apr07**	**1.8.7.4[FS]**	**L.ANL.PD2.ENG.ME,4.00,;L.UMNTC.PD.MNG.IM,8.00,;L.ANL.PD2.SCI.PHY,4.00,**
1.8.7.6	Develop alignment and QA procedures - 1	209d	**31May06**	**30Mar07**	**1.8.7.2[SS]**	**L.ANL.PD2.SCI.PHY,8.00,;L.ANL.PD2.ENG.ME,8.00,;L.UMNTC.PD.MNG.IM,16.00,**
1.8.7.7	Develop alignment and QA procedures - 2	20d	**02Apr07**	**27Apr07**	**1.8.7.6[FS]**	**L.UMNTC.PD.MNG.IM,8.00,;L.ANL.PD2.SCI.PHY,4.00,;L.ANL.PD2.ENG.ME,4.00,**
1.8.7.8	Review design of installation procedures	20d	**06Oct06**	**02Nov06**	**1.8.7.1[SS+90d]; 1.8.7.4[SS+90d]; 1.8.7.2[SS+90d]; 1.8.7.6[SS+90d]**	**L.ANL.PD2.ENG.ME,8.00,;L.ANL.PD2.SCI.PHY,8.00,;L.FNAL.PPD.ENG.ME,8.00,;L.UMNTC.PD.MNG.IM,8.00,**
1.8.7.9	Far detector installation procedures completed	0	**02Nov06**	**02Nov06**	**1.8.7.8[FS]**	
1.8.7.10	FD installation procedure value engineering completed	0	**27Apr07**	**27Apr07**	**1.8.7.7[FS]; 1.8.7.5[FS]; 1.8.7.6[FS]; 1.8.7.3[FS]**	
1.8.8	**Far Detector Prototypes**	**434d**	**03Nov06**	**29Jul08**		
1.8.8.1	**Full-scale Block Assembly Prototype (FSAP)**	**185d**	**30Apr07**	**25Jan08**		
1.8.8.1.1	Develop specifications documents	15d	**30Apr07**	**18May07**	**1.8.6.2.3[FS]**	**L.ANL.PD2.ENG.ME,16.00,;L.ANL.PD2.SCI.PHY,8.00,;L.FNAL.PPD.TECH.LDR,24.00,**
1.8.8.1.2	Select site for prototype assembly	5d	**30Apr07**	**04May07**	**1.8.8.1.1[SS]**	**L.FNAL.PPD.TECH.LDR,40.00,**
1.8.8.1.3	Design assembly table, fixtures, and tooling for prototype	20d	**21May07**	**18Jun07**	**1.8.8.1.1[FS]**	**L.ANL.PD2.ENG.DES,20.00,;L.ANL.PD2.ENG.ME,120.00,;L.ANL.PD2.ENG.EA,80.00,**
1.8.8.1.4	Design glue machine for prototype	30d	**21May07**	**02Jul07**	**1.8.8.1.1[FS]**	**L.ANL.PD2.ENG.EA,80.00,;L.ANL.PD2.ENG.ME,40.00,**
1.8.8.1.5	Review full-scale block assembly prototype design	15d	**03Jul07**	**24Jul07**	**1.8.8.1.4[FS]; 1.8.8.1.3[FS]; 1.8.8.1.2[FS]**	**L.FNAL.PPD.SCI.PHY,4.00,;L.ANL.PD2.ENG.ME,4.00,;L.FNAL.PPD.ENG.ME,4.00,;L.ANL.PD2.SCI.PHY,4.00,**
1.8.8.1.6	Prepare site infrastructure	20d	**25Jul07**	**21Aug07**	**1.8.8.1.5[FS]**	**M.FNAL.PPD.MANDS,20000.00,;L.FNAL.PPD.TECH.MT_W,120.00,;L.FNAL.PPD.TECH.LDR,120.00,**
1.8.8.1.7	Fabricate assembly table, fixtures, and tooling for prototype	30d	**25Jul07**	**05Sep07**	**1.8.8.1.5[FS]**	**L.ANL.PD2.ENG.EA,80.00,;M.FNAL.PPD.MANDS,40000.00,**
1.8.8.1.8	Install assembly table for prototype	10d	**06Sep07**	**19Sep07**	**1.8.8.1.6[FS]; 1.8.8.1.7[FS]**	**L.FNAL.PPD.TECH.MT_W,80.00,;L.FNAL.PPD.TECH.LDR,40.00,**

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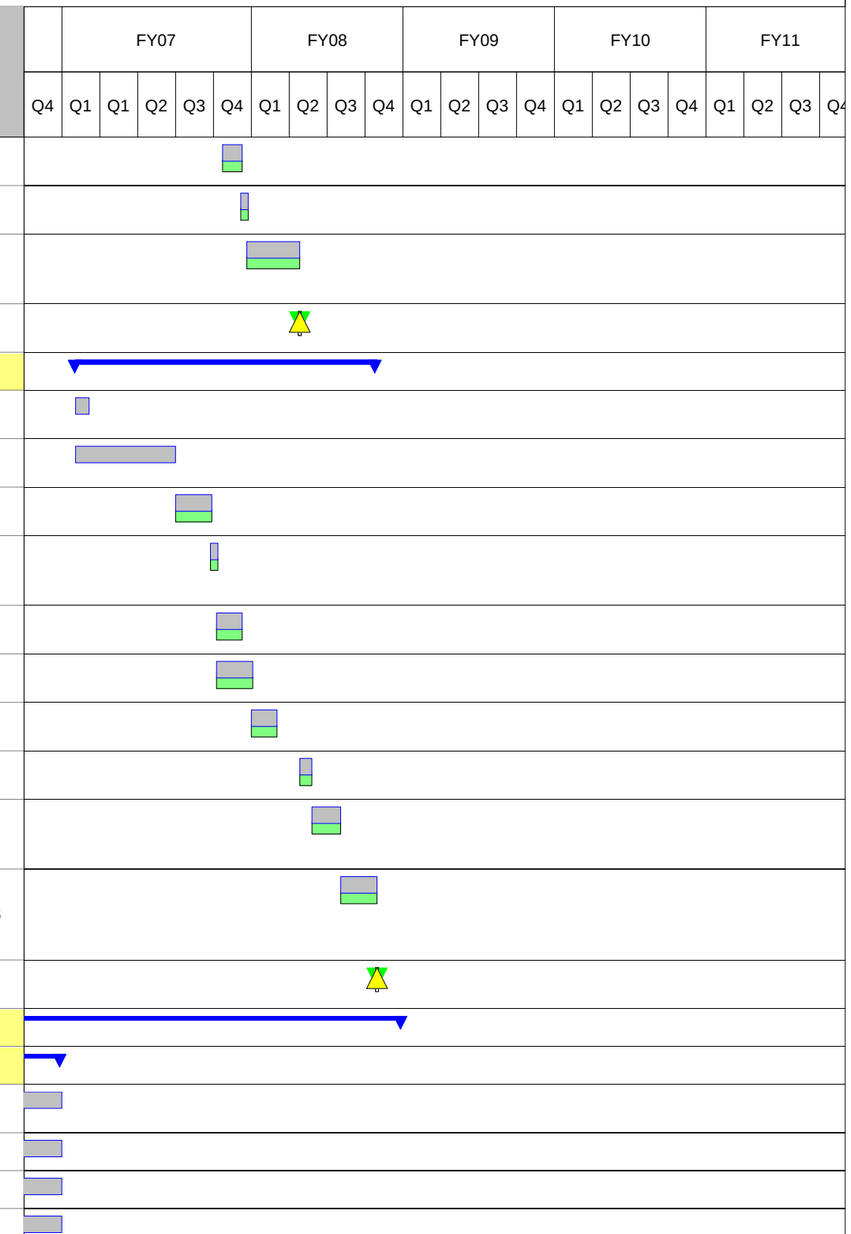
1.8.8.1.9	Fabricate glue machine for prototype	30d	25Jul07	05Sep07	1.8.8.1.5[FS]	M.FNAL.PPD.MANDS,20000.00,;L.ANL.PD2.ENG.EA,40.00,
1.8.8.1.10	Install adhesive dispensing system for prototype	10d	06Sep07	19Sep07	1.8.8.1.6[FS]; 1.8.8.1.9[FS]	L.ANL.PD2.ENG.EA,40.00,;L.FNAL.PPD.TECH.MT_W,80.00,
1.8.8.1.11	Perform assembly prototype studies	85d	20Sep07	25Jan08	1.8.8.1.10[FS]; 1.8.8.1.6[FS]; 1.8.8.1.8[FS]	L.ANL.PD2.ENG.EA,40.00,;L.ANL.PD2.ENG.ME,40.00,;L.FNAL.PPD.TECH.MT_W,160.00,;M.FNAL.PPD.MANDS,15000.00,
1.8.8.1.13	Full-scale block assembly prototype testing completed	0	25Jan08	25Jan08	1.8.8.1.11[FS]	
1.8.8.2	**Full-height Engineering Prototype (FHEP)**	**434d**	**03Nov06**	**29Jul08**		
1.8.8.2.1	Develop specifications document	20d	03Nov06	04Dec06	1.8.7.9[FS]	L.ANL.PD2.ENG.ME,10.00,;L.ANL.PD2.SCI.PHY,8.00,;L.FNAL.PPD.TECH.LDR,16.00,
1.8.8.2.2	Select site for prototype assembly	99d	03Nov06	30Mar07	1.8.8.2.1[SS]	L.FNAL.PPD.ENG.ME,80.00,;L.FNAL.PPD.TECH.LDR,80.00,
1.8.8.2.3	Design FHEP block raiser, fixtures, and tooling	60d	02Apr07	25Jun07	1.8.8.2.2[FS]	L.ANL.PD2.ENG.ME,80.00,;L.ANL.PD2.ENG.DES,120.00,
1.8.8.2.4	Review full-height engineering prototype design	10d	26Jun07	10Jul07	1.8.8.2.3[FS]; 1.8.8.2.2[FS]	L.ANL.PD2.ENG.ME,4.00,;L.FNAL.PPD.ENG.ME,4.00,;L.FNAL.PPD.SCI.PHY,4.00,;L.ANL.PD2.SCI.PHY,4.00,
1.8.8.2.5	Prepare site infrastructure	40d	11Jul07	05Sep07	1.8.8.2.4[FS]	M.FNAL.PPD.MANDS,10000.00,;L.FNAL.PPD.TECH.LDR,40.00,
1.8.8.2.6	Fabricate FHEP block raiser, fixtures, and tooling	60d	11Jul07	03Oct07	1.8.8.2.4[FS]	L.ANL.PD2.ENG.ME,40.00,;M.FNAL.PPD.MANDS,60000.00,
1.8.8.2.7	Install FHEP block raiser	40d	04Oct07	30Nov07	1.8.8.2.5[FS]; 1.8.8.2.6[FS]	L.FNAL.PPD.TECH.LDR,40.00,;L.ANL.PD2.ENG.ME,24.00,;L.FNAL.PPD.TECH.MT_W,120.00,
1.8.8.2.8	Move glue machine system from FSAP	20d	28Jan08	22Feb08	1.8.8.2.7[FS]; 1.8.8.2.5[FS]; 1.8.8.1.11[FS]	L.FNAL.PPD.TECH.MT_W,160.00,
1.8.8.2.9	Assemble and fill FHEP	50d	25Feb08	02May08	1.8.8.2.8[FS]; 1.8.8.2.5[FS]; 1.8.8.2.7[FS]	M.FNAL.PPD.MANDS,10000.00,;L.FNAL.PPD.TECH.LDR,80.00,;L.FNAL.PPD.TECH.MT_W,480.00,
1.8.8.2.10	Test FHEP	60d	05May08	29Jul08	1.8.8.2.9[FS]	L.FNAL.PPD.TECH.LDR,80.00,;L.ANL.PD.SCI.PHY,16.00,;L.FNAL.PPD.TECH.MT_W,240.00,;L.FNAL.PPD.ENG.ME,40.00,;L.FNAL.PPD.SCI.PHY,16.00,;L.ANL.PD.ENG.ME,80.00,
1.8.8.2.11	Full-height engineering prototype testing completed	0	29Jul08	29Jul08	1.8.8.2.10[FS]	
1.8.9	**Management - R&D Phase**	**752d**	**03Oct05**	**29Sep08**		
1.8.9.1	**FY06**	**250d**	**03Oct05**	**28Sep06**		
1.8.9.1.1	Labor	250d	03Oct05	28Sep06		L.FNAL.PPD.TECH.LDR,250.00,;L.ANL.PD2.SCI.PHY,200.00,;L.ANL.PD2.ENG.ME,250.00,
1.8.9.1.2	Travel	250d	03Oct05	28Sep06		M.FNAL.PPD.MANDS,2000.00,
1.8.9.1.3	Equipment	250d	03Oct05	28Sep06		
1.8.9.1.4	Materials and supplies	250d	03Oct05	28Sep06		



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1.8.9.2	**FY07**	**250d**	**02Oct06**	**28Sep07**		
1.8.9.2.1	**H1FY07**	**123d**	**02Oct06**	**30Mar07**		
1.8.9.2.1.1	Labor	123d	02Oct06	30Mar07	1.8.9.1.1[FS]	L.ANL.PD2.ENG.ME,125.00,;L.FNAL.PPD.TECH.LDR,125.00,;L.ANL.PD2.SCI.PHY,100.00,;L.UMNTC.PD.MNG.IM,350.00,
1.8.9.2.1.2	Travel	123d	02Oct06	30Mar07	1.8.9.1.2[FS]	M.FNAL.PPD.MANDS,1000.00,;M.UMNTC.PD.MANDSPASS,6552.00,
1.8.9.2.1.3	Equipment	123d	02Oct06	30Mar07	1.8.9.1.3[FS]	
1.8.9.2.1.4	Materials and supplies	123d	02Oct06	30Mar07	1.8.9.1.4[FS]	
1.8.9.2.2	**H2FY07**	**127d**	**02Apr07**	**28Sep07**		
1.8.9.2.2.1	Labor	127d	02Apr07	28Sep07	1.8.9.2.1.1[FS]	L.UMNTC.PD.MNG.IM,350.00,;L.FNAL.PPD.TECH.LDR,125.00,;L.ANL.PD2.SCI.PHY,100.00,;L.ANL.PD2.ENG.ME,125.00,
1.8.9.2.2.2	Travel	127d	02Apr07	28Sep07	1.8.9.2.1.2[FS]	M.FNAL.PPD.MANDS,1000.00,;M.UMNTC.PD.MANDSPASS,6552.00,
1.8.9.2.2.3	Equipment	127d	02Apr07	28Sep07	1.8.9.2.1.3[FS]	
1.8.9.2.2.4	Materials and supplies	127d	02Apr07	28Sep07	1.8.9.2.1.4[FS]	
1.8.9.3	**FY08**	**251d**	**01Oct07**	**29Sep08**		
1.8.9.3.1	Labor	251d	01Oct07	29Sep08	1.8.9.2.2.1[FS]	L.ANL.PD.ENG.ME,250.00,;L.UMNTC.PD.MNG.LS,1000.00,;L.FNAL.PPD.TECH.LDR,250.00,
1.8.9.3.2	Travel	251d	01Oct07	29Sep08	1.8.9.2.2.2[FS]	M.FNAL.PPD.MANDS,2000.00,;M.UMNTC.PD.MANDSPASS,16506.00,
1.8.9.3.3	Equipment	251d	01Oct07	29Sep08	1.8.9.2.2.3[FS]	
1.8.9.3.4	Materials and supplies	251d	01Oct07	29Sep08	1.8.9.2.2.4[FS]	
1.8.9.4	FY06 Detector Assembly R&D	250d	03Oct05	28Sep06		
1.8.9.5	FY07 Detector Assembly R&D	127d	02Apr07	28Sep07		
1.9	**Project Management - R&D**	**752d**	**03Oct05**	**29Sep08**		
1.9.1	**FY06**	**250d**	**03Oct05**	**28Sep06**		
1.9.1.1	**FNAL Management 06**	**250d**	**03Oct05**	**28Sep06**		
1.9.1.1.1	Labor	250d	03Oct05	28Sep06		L.FNAL.PPD.MNG.PE,1326.00,;L.FNAL.PPD.MNG.BUD,1768.00,;L.FNAL.PPD.MNG.PM,1768.00,;L.FNAL.PPD.MNG.AS_W,884.00,;L.FNAL.PPD.MNG.ESH,884.00,;L.FNAL.PPD.MNG.DPM,1768.00,;L.FNAL.PPD.MNG.PC,884.00,;L.FNAL.PPD.MNG.SCHED,2652.00,
1.9.1.1.2	Travel	250d	03Oct05	28Sep06		M.FNAL.PPD.MANDS,19000.00,
1.9.1.1.3	Equipment	250d	03Oct05	28Sep06		M.FNAL.PPD.MANDS,17000.00,

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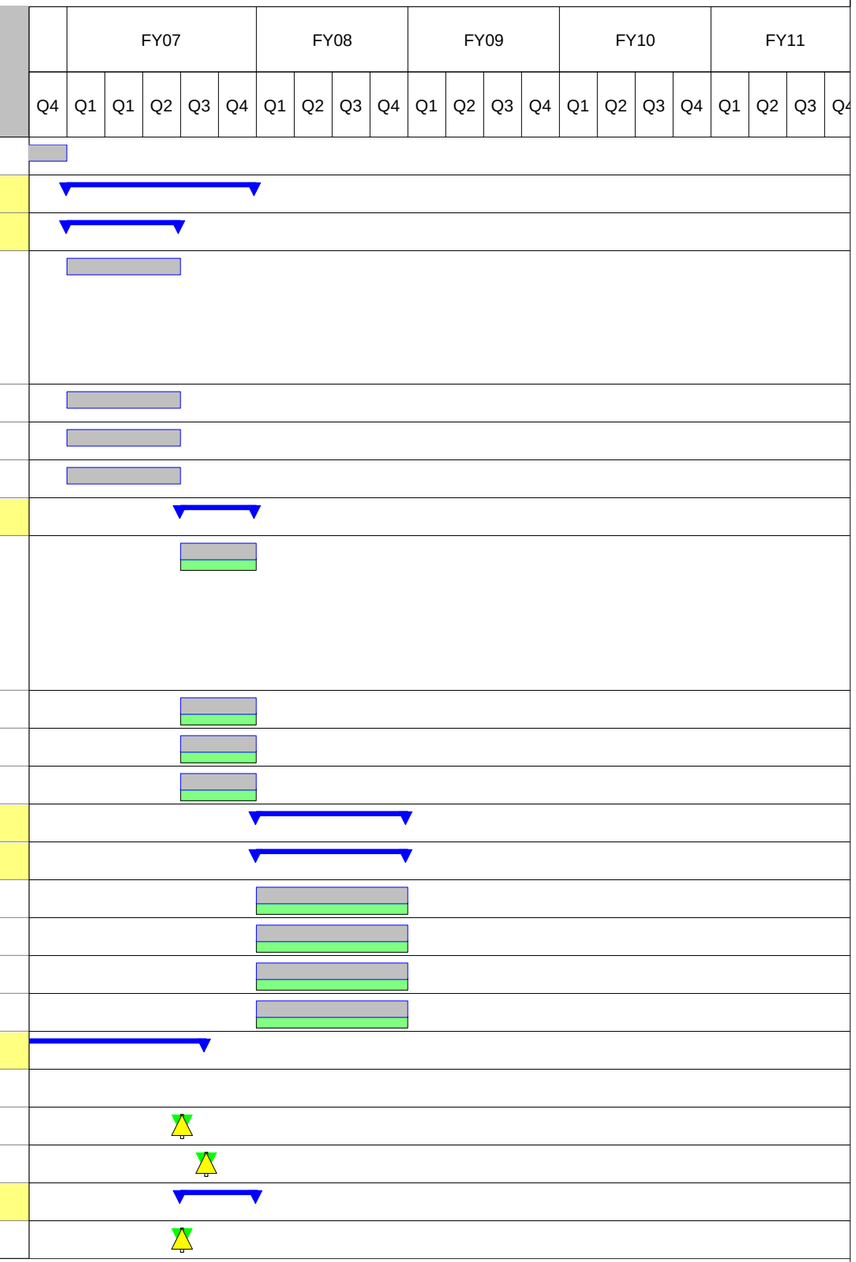
Nova Project
WBS 1.x - R & D
Gantt Chart

CD-2/3a Director's Review
June 4-6, 2007

WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.9.1.1.4	Materials and supplies	250d	03Oct05	28Sep06		M.FNAL.PPD.MANDS,22000.00,
1.9.2	**FY07**	**250d**	**02Oct06**	**28Sep07**		
1.9.2.1	**Management - 1HFY07**	**123d**	**02Oct06**	**30Mar07**		
1.9.2.1.1	Labor	123d	02Oct06	30Mar07	1.9.1.1.1[FS]	L.FNAL.PPD.MNG.PC,442.00,;L.FNAL.PPD.MNG.SCHED,1326.00,;L.FNAL.PPD.MNG.PE,295.00,;L.FNAL.PPD.MNG.BUD,884.00,;L.FNAL.PPD.MNG.AS_W,884.00,;L.FNAL.PPD.MNG.DPM,884.00,;L.FNAL.PPD.MNG.PM,884.00,;L.FNAL.PPD.MNG.ESH,295.00,
1.9.2.1.2	Travel	123d	02Oct06	30Mar07	1.9.1.1.2[FS]	M.FNAL.PPD.MANDS,9500.00,
1.9.2.1.3	Equipment	123d	02Oct06	30Mar07	1.9.1.1.3[FS]	M.FNAL.PPD.MANDS,8500.00,
1.9.2.1.4	Materials and supplies	123d	02Oct06	30Mar07	1.9.1.1.4[FS]	M.FNAL.PPD.MANDS,11000.00,
1.9.2.2	**Management - 2HFY07**	**127d**	**02Apr07**	**28Sep07**		
1.9.2.2.1	Labor	127d	02Apr07	28Sep07	1.9.2.1.1[FS]	L.FNAL.PPD.MNG.BUD,884.00,;L.FNAL.PPD.MNG.ESH,295.00,;L.FNAL.AD.SCI.PHY,663.00,;L.FNAL.PPD.MNG.PM,884.00,;L.FNAL.PPD.MNG.PE,295.00,;L.FNAL.PPD.MNG.SCHED,1680.00,;L.FNAL.PPD.MNG.DPM,884.00,;L.FNAL.PPD.MNG.PC,442.00,;L.FNAL.AD.MNG.SCHED,663.00,;L.FNAL.PPD.MNG.AS_W,600.00,
1.9.2.2.2	Travel	127d	02Apr07	28Sep07	1.9.2.1.2[FS]	M.FNAL.PPD.MANDS,9500.00,
1.9.2.2.3	Equipment	127d	02Apr07	28Sep07	1.9.2.1.3[FS]	M.FNAL.PPD.MANDS,8500.00,
1.9.2.2.4	Materials and supplies	127d	02Apr07	28Sep07	1.9.2.1.4[FS]	M.FNAL.PPD.MANDS,11000.00,
1.9.3	**FY08**	**251d**	**01Oct07**	**29Sep08**		
1.9.3.1	**Management FY08**	**251d**	**01Oct07**	**29Sep08**		
1.9.3.1.1	Labor	251d	01Oct07	29Sep08	1.9.2.2.1[FS]	
1.9.3.1.2	Travel	251d	01Oct07	29Sep08	1.9.2.2.2[FS]	
1.9.3.1.3	Equipment	251d	01Oct07	29Sep08	1.9.2.2.3[FS]	
1.9.3.1.4	Materials and supplies	251d	01Oct07	29Sep08	1.9.2.2.4[FS]	
1.9.4	**Critical Decision Milestones**	**378d**	**29Nov05**	**01Jun07**		
1.9.4.1	CD-0	0	29Nov05	29Nov05		
1.9.4.2	CD-1	0	02Apr07	02Apr07	1.9.4.1[FS]	
1.9.4.3	CD-2	0	01Jun07	01Jun07	1.9.4.2[FS]	
1.9.5	**Other Management R&D Milestones**	**127d**	**02Apr07**	**01Oct07**		
1.9.5.5	Cooperative-agreement institution determined	0	02Apr07	02Apr07	1.9.4.2[FS]	



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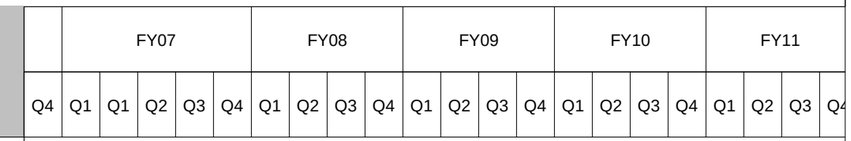
Nova Project
WBS 1.x - R & D
Gantt Chart

CD-2/3a Director's Review
June 4-6, 2007

WBS	Activity Desc.	Duration	Start	Finish	Predecessors	ResInfo
1.9.5.6	Aquisition strategy approved by DOE	0	**30Apr07**	**30Apr07**	**1.9.5.5[FS+20d]; 1.9.4.1[FS]**	
1.9.5.10	Cooperative-agreement in place	0	**02Jul07**	**02Jul07**	**1.9.4.2[FS]; 1.9.5.6[FS]; 1.9.5.5[FS+60d]**	
1.9.5.15	Cooperative-agreement funds available	0	**01Oct07**	**01Oct07**	**1.9.5.10[FS]**	
1.9.5.20	Far detector site selected	0	**02Apr07**	**02Apr07**	**1.9.5.5[FS]**	
1.9.5.25	Building conceptual design frozen (FESS)	0	**02Apr07**	**02Apr07**	**1.9.5.20[FS]**	



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