



BNL-98586-2011-IR

Long-Baseline Neutrino Experiment (LBNE)

Water Cherenkov Detector

Schedule and Cost Books

LBNE Far Site Internal Review

Diwan, M. et al

December 9, 2011

**Physics Department
Electronic Detector Group**

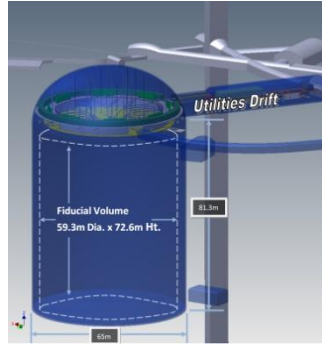
Brookhaven National Laboratory

**U.S. Department of Energy
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Water Cherenkov Detector Schedule and Cost Books

LBNE Far Site Internal Review

Dec 6-9, 2011

WCD
DETAILED
&
CRITICAL PATH
SCHEDULE

Water Cherenkov Detector Detailed Schedule

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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	
130.04 Water Cherenkov Detector		3117	08-Jan-10	09-Jun-22	2184175	15923052	\$145,275,081																	09-Jun-22, 130.0	
130.04.00 Top Level Milestones		3117	08-Jan-10	09-Jun-22	0	0	\$0																	09-Jun-22, 130.0	
A1060	CD-0 Approved	0	08-Jan-10*		0	0	\$0		A1070, PM1510, CP9660, CP9760, CP9860, CP9960,																
A1070	Begin Conceptual Design Work	0	08-Jan-10		0	0	\$0	A1060	A1080, PD12490, PD13140, PD13200, PD13130, PD13210																
A1380	FY11 Funding Available	0	01-Oct-10		0	0	\$0	A1060	PD11910, PD12220, PD13360, A1390, PD11900																
A1080	Conceptual Design Report complete	0		21-Oct-10	0	0	\$0	A1070	A1090, A1110																
A1090	Resource Loaded Schedule (RLS) Complete	0		21-Oct-10	0	0	\$0	A1080	A1100, A1130																
A1100	Revised RLS Complete	0		11-Aug-11	0	0	\$0	A1090	A1130																
A1390	FY12 Funding Available	0	03-Oct-11		0	0	\$0	A1380	PD12710, A1400, WS1920																
A1110	Revised Conceptual Design Report Complete	0		24-Oct-11	0	0	\$0	A1080	A1120																
A1120	Conceptual Design Complete	0		07-Mar-12	0	0	\$0	A1110	A1130, A1140, A1180																
A1130	CD-1 Review	0	29-Mar-12		0	0	\$0	A1120, A1090, A1100, CP10530	A1140, WS1530, WS1720, WS1900																
A1140	CD-1 Approval	0		21-Jun-12	0	0	\$0	A1120, A1130	A1150, CP9680, CP9780, CP9880, CP9980, IIS0020, A1410, CL1980																
A1400	FY13 Funding Available	0	01-Oct-12		0	0	\$0	A1390																	
A1150	Construction Project Safety and Health Plan Ready	0		28-Feb-13	0	0	\$0	A1180, A1140	A1240																
A1160	Hazard Analysis Report Complete	0		28-Feb-13	0	0	\$0	A1180	A1250																
A1170	Preliminary Security Vulnerability Report Complete	0		28-Feb-13	0	0	\$0	A1180	A1240																
A1180	Final version of RLS complete	0		12-Apr-13	0	0	\$0	A1120, A1140	A1150, A1160, A1170, A1190																
A1190	EVMS ready for CD-2	0		12-Apr-13	0	0	\$0	A1180	A1200																
A1200	Preliminary Design Complete	0		17-May-13	0	0	\$0	A1190	A1210																
A1210	CD-2 Review	0	11-Jun-13		0	0	\$0	A1200, CP10150, CP10250, CP10240, CP10290	A1220, WS1560, WS1750																
A1220	CD-2 Approval	0	22-Aug-13		0	0	\$0	A1210, IIS0140, IIS0150	A1230, CP9700, CP9800, CP9900, CP10000, IIS0030, A1240, A1300																
A1230	CD-3A Long Lead Procurement Budget Approved	0	22-Aug-13		0	0	\$0	A1220																	
A1410	FY14 Funding Available	0	01-Oct-13		0	0	\$0	A1400	A1420																
A1240	Project Safety and Health Plan Complete	0		15-Apr-14	0	0	\$0	A1150, A1170, A1230	A1250, A1260, A1270																
A1250	Activity Hazard Analysis Complete	0		15-Apr-14	0	0	\$0	A1240, A1160	A1300																
A1260	Ensure Compliance with OSHA	0		15-Apr-14	0	0	\$0	A1240	A1300																
A1270	Design Ready for Construction	0		08-Sep-14	0	0	\$0	A1240	A1280, A1290, PD12640																
A1290	CD-3B Review	0	23-Sep-14		0	0	\$0	A1270, CL1980, CP10440, WS2110	A1300, CL1970, CL2010, WS1590, WS1780																
A1420	FY15 Funding Available	0	01-Oct-14		0	0	\$0	A1410	A1430																
A1300	CD-3 Approval/Construction Funds available	0	30-Dec-14		0	0	\$0	A1290, A1230, A1250, A1260, CP10440	A1310, CP9710, CP9810, CP9910, CP10010, IIS0040, A1320																
A1310	Capital funds authorized	0	30-Dec-14		0	0	\$0	A1300, IIS0170, IIS0200																	
A1320	Start Excavation Large Cavern	0	24-Apr-15		0	0	\$0	A1310	A1340																
A1430	FY16 Funding Available	0	01-Oct-15		0	0	\$0	A1420	A1435																
A1435	FY17 Funding Available	0	03-Oct-16		0	0	\$0	A1430	A1440																
A1440	FY18 Funding Available	0	02-Oct-17		0	0	\$0	A1435	A1450																
A1330	Control Room Beneficial Occupancy	0	13-Mar-18*		0	0	\$0	CL2020, CP10270, CP10450, CP10460	IIS0260, IIS1000, WS2260, WS2250, IIS0850, IIS0340, A1460, A1360																
A1450	FY19 Funding Available	0	01-Oct-18		0	0	\$0	A1440																	

█ Critical Remaining Work
 █ Remaining Work
 ◆ Milestone
 ▼ Summary

Water Cherenkov Detector Detailed Schedule

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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024								
A1360	Partial Beneficial Occupancy	0	27-May-19		0	0	\$0	A1450	WC1310											◆ Partial Beneficial Occupancy												
A1460	FY20 Funding Available	0	01-Oct-19		0	0	\$0	A1450	A1470											◆ FY20 Funding Available												
A1340	Final Detector Design Complete	0		28-Nov-19	0	0	\$0	A1320												◆ Final Detector Design Complete												
A1350	Beneficial Occupancy Large Cavern	0	03-Dec-19*		0	0	\$0	CP10380, IIS0340, WS2090, WS2250, WS2260	IIS0870, CL2060, IIS0890, IIS0840, IIS0830, IIS0860, IIS0870, IIS0870, IIS0870											◆ Beneficial Occupancy Large Cavern												
A1280	Surface Water System Room Beneficial Occupancy	0		10-Aug-20	0	0	\$0	A1270, A1350	IIS0770											◆ Surface Water System Room Beneficial C												
A1470	FY21 Funding Available	0	01-Oct-20		0	0	\$0	A1460	A1480											◆ FY21 Funding Available												
A1480	FY22 Funding Available	0	01-Oct-21		0	0	\$0	A1470	A1370, PM1660											◆ FY22 Funding Available												
A1370	Detector Ready for Commissioning	0		09-Jun-22	0	0	\$0	IIS0320, IIS1050, WC1090, WC1095, WC2730, IIS0190,												◆ Detector Ready f												
130.04.01 WCD Project Management		3115	08-Jan-10	06-Jun-22	76893	40000	\$1,400,090			▶ 06-Jun-22, 130.04.01 WCD Project Management																						
PM1510	Project Management FY10	185	08-Jan-10	30-Sep-10	4009	0	\$75,000	A1060	PM1520	▶ Project Management FY10																						
PM1520	Project Management FY11	249	01-Oct-10	29-Sep-11	6150	95000	\$149,090	PM1510	PM1540	▶ Project Management FY11																						
PM1540	Project Management FY12 - Pre CD-1	184	30-Sep-11	26-Jun-12	4402	30000	\$85,000	PM1520	PM1545	▶ Project Management FY12 - Pre CD-1																						
PM1545	Project Management FY12 - Post CD-1	65	27-Jun-12	28-Sep-12	1553	15000	\$50,000	PM1540, A1140	PM1550	▶ Project Management FY12 - Post CD-1																						
PM1550	Project Management FY13 - Pre CD-2	221	01-Oct-12	20-Aug-13	5439	40000	\$105,000	PM1545	PM1560	▶ Project Management FY13 - Pre CD-2																						
PM1560	Project Management FY13 - Post CD-2	27	21-Aug-13	27-Sep-13	859	0	\$11,000	PM1550	PM1570	▶ Project Management FY13 - Post CD-2																						
PM1570	Project Management FY14	249	30-Sep-13	29-Sep-14	6230	0	\$155,000	PM1560	PM1580	▶ Project Management FY14																						
PM1580	Project Management FY15 - Pre CD-3	59	30-Sep-14	26-Dec-14	1660	20000	\$35,000	PM1570	PM1590	▶ Project Management FY15 - Pre CD-3																						
PM1590	Project Management FY15 - Post CD-3	190	29-Dec-14	29-Sep-15	4540	30000	\$115,000	PM1580	PM1600	▶ Project Management FY15 - Post CD-3																						
PM1600	Project Management FY16	256	30-Sep-15	29-Sep-16	6230	50000	\$105,000	PM1590	PM1610	▶ Project Management FY16																						
PM1610	Project Management FY17	260	30-Sep-16	28-Sep-17	6230	40000	\$90,000	PM1600	PM1620	▶ Project Management FY17																						
PM1620	Project Management FY18	260	29-Sep-17	27-Sep-18	6230	40000	\$90,000	PM1610	PM1630	▶ Project Management FY18																						
PM1630	Project Management FY19	261	28-Sep-18	27-Sep-19	6230	20000	\$90,000	PM1620	PM1640	▶ Project Management FY19																						
PM1640	Project Management FY20	262	30-Sep-19	29-Sep-20	6230	20000	\$85,000	PM1630	PM1650	▶ Project Management FY20																						
PM1650	Project Management FY21	261	30-Sep-20	29-Sep-21	6230	0	\$90,000	PM1640	PM1660	▶ Project Management FY21																						
PM1660	Project Management FY22	177	01-Oct-21	06-Jun-22	4671	0	\$70,000	A1480, PM1650	A1370	▶ Project Management FY22																						
130.04.02 Water Containment		3094	08-Jan-10	05-May-22	131322	1023873	\$35,156,112			▶ 05-May-22, 130.04.02 Water Containment																						
130.04.02.01 Management and Safety		3094	08-Jan-10	05-May-22	0	31706	\$227,205			▶ 05-May-22, 130.04.02.01 Management and Safety																						
130.04.02.01.01 Management		3094	08-Jan-10	05-May-22	0	28968	\$227,205			▶ 05-May-22, 130.04.02.01.01 Management																						
WC1050	Conceptual Design Phase, preparation for CD-1	581	08-Jan-10	03-May-12	0	3509	\$31,200	A1060	WC1060	▶ Conceptual Design Phase, preparation for CD-1																						
WC1060	Preliminary Design Phase, preparation for CD-2	370	04-May-12	25-Oct-13	0	5776	\$52,470	WC1050	WC1070	▶ Preliminary Design Phase, preparation for CD-2																						
WC1070	Final Design Phase, preparation for CD-3	305	28-Oct-13	22-Jan-15	0	6847	\$55,435	WC1060	WC1080	▶ Final Design Phase, preparation for CD-3																						
WC1080	Construction Phase	1889	23-Jan-15	05-May-22	0	12837	\$88,100	WC1070	WC1090	▶ Construction Phase																						
WC1090	Detector ready for comissioning	0		05-May-22	0	0	\$0	WC1080	A1370	▶ Detector ready for																						
130.04.02.01.02 Safety		3094	08-Jan-10	05-May-22	0	2738	\$0			▶ 05-May-22, 130.04.02.01.02 Safety																						
WC1095	Saftey	3145	08-Jan-10	05-May-22	0	2738	\$0	A1060	A1370	▶ Saftey																						
130.04.02.02 Liner/Vessel		2722	08-Jan-10	06-Nov-20	0	30038	\$13,029,878			▶ 06-Nov-20, 130.04.02.02 Liner/Vessel																						
130.04.02.02.01 Vessel		2663	08-Jan-10	14-Aug-20	0	26101	\$12,268,568			▶ 14-Aug-20, 130.04.02.02.01 Vessel																						
130.04.02.02.01.01 Conceptual design		667	08-Jan-10	30-Aug-12	0	5306	\$573,210			▶ 30-Aug-12, 130.04.02.02.01.01 Conceptual design																						
WC1140	Vessel - Conceptual Design - Selection preferred alternate	60	08-Jan-10	05-Apr-10	0	599	\$0	A1060	WC1150, WC1570, WC1920, WC2120, WC2430, WC2750,	▶ Vessel - Conceptual Design - Selection preferred alternate																						
WC1150	Vessel - Conceptual Design - 15% design of preferred alternative and cost estimate	150	06-Apr-10	04-Nov-10	0	1369	\$0	WC1140	WC1160, WC1170, WC1450, WC1152	▶ Vessel - Conceptual Design - 15% design of preferred alternative and cost estimate																						

Water Cherenkov Detector Detailed Schedule

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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024				
WC1960	Floor Structure - Procurement and contracts	200	13-Jun-18	19-Mar-19	0	0	\$0	WC1950, WC1300	WC1970										■	Floor Structure - Procurement and contracts								
WC1970	Floor Structure - Construction	40	08-May-19	02-Jul-19	0	0	\$0	WC1960	WC1320, WC1980, WC2060, WC2840, WC2730, WC2062										■	Floor Structure - Construction								
WC1980	Floor Structure - Construction Complete	0		02-Jul-19	0	0	\$0	WC1970	WC1320, WC1325										◆	Floor Structure - Construction Complete								
130.04.02.04.02 Floor Auxiliary Equipment		2200	16-Feb-12	17-Nov-20	0	1712	\$901,647												▶									
WC2000	Floor Auxiliary Equipment - Conceptual design	200	16-Feb-12	04-Dec-12	0	171	\$0	WC1560	WC2010										■	Floor Auxiliary Equipment - Conceptual design								
WC2010	Floor Auxiliary Equipment - Preliminary design	200	04-Dec-12	23-Sep-13	0	171	\$0	WC2000	WC2020										■	Floor Auxiliary Equipment - Preliminary design								
WC2020	Floor Auxiliary Equipment - Final design	200	23-Sep-13	15-Jul-14	0	342	\$0	WC2010	WC2030										■	Floor Auxiliary Equipment - Final design								
WC2030	Floor Auxiliary Equipment - Design Complete	0		15-Jul-14	0	0	\$0	WC2020	WC2040										◆	Floor Auxiliary Equipment - Design Complete								
WC2040	Floor Auxiliary Equipment - Prototype and test	100	15-Jul-14	08-Dec-14	0	0	\$124,250	WC2030	WC2050										■	Floor Auxiliary Equipment - Prototype and test								
WC2050	Floor Auxiliary Equipment - Procurement and contracts	100	13-Jun-18	30-Oct-18	0	342	\$0	WC2040, WC1300	WC2060, WC2180, WC2062										■	Floor Auxiliary Equipment - Procurement and contracts								
WC2060	Floor Auxiliary Equipment - Fabrication Support	300	03-Jul-19	25-Aug-20	0	342	\$0	WC1970, WC2050	WC2070										■	Floor Auxiliary Equipment - Fabrication Support								
WC2062	Floor Auxiliary Equipment - Fabrication	300	03-Jul-19	25-Aug-20	0	0	\$777,397	WC1970, WC2050	WC2070, WC2061										■	Floor Auxiliary Equipment - Fabrication								
WC2070	Floor Auxiliary Equipment - Fabrication Complete	0		25-Aug-20	0	0	\$0	WC2060, WC2062, WC2061	WC2080										◆	Floor Auxiliary Equipment - Fabrication Complete								
WC2080	Floor Auxiliary Equipment - Install on detector	60	26-Aug-20	17-Nov-20	0	342	\$0	WC1680, WC2070	IIS0680										■	Floor Auxiliary Equipment - Install on detector								
130.04.02.05 Water Volume		2661	06-Apr-10	06-Nov-20	72567	12597	\$1,067,420												▶									
130.04.02.05.01 Water Distribution		2602	06-Apr-10	14-Aug-20	71883	4039	\$913,960												▶									
WC2120	Water Distribution - Conceptual design	197	06-Apr-10	18-Jan-11	342	941	\$3,000	WC1140	WC2130										■	Water Distribution - Conceptual design								
WC2130	Water Distribution - Preliminary design	498	19-Dec-12	18-Dec-14	342	342	\$8,000	WC2120	WC2140										■	Water Distribution - Preliminary design								
WC2140	Water Distribution - Final design	498	19-Dec-14	06-Dec-16	856	856	\$7,000	WC2130	WC2150										■	Water Distribution - Final design								
WC2150	Water Distribution - Design Complete	0		06-Dec-16	0	0	\$0	WC2140	WC2160										◆	Water Distribution - Design Complete								
WC2160	Water Distribution - Prototype and test	98	07-Dec-16	21-Apr-17	171	342	\$43,000	WC2150	WC2170, WC2175, WC2177										■	Water Distribution - Prototype and test								
WC2170	Water Distribution - Procurement and contracts Support	100	24-Apr-17	08-Sep-17	10000	274	\$10,000	WC2160	WC2180										■	Water Distribution - Procurement and contracts Support								
WC2175	Water Distribution - Procurement and contracts	100	24-Apr-17	08-Sep-17	10000	0	\$772,960	WC2160	WC2180										■	Water Distribution - Procurement and contracts								
WC2180	Water Distribution - Fabrication	300	31-Oct-18	24-Dec-19	171	856	\$20,000	WC2050, WC2170, WC2175, WC2177	WC2190										■	Water Distribution - Fabrication								
WC2190	Water Distribution - Fabrication Complete	0		24-Dec-19	0	0	\$0	WC2180	WC2200										◆	Water Distribution - Fabrication Complete								
WC2200	Water Distribution - Install on detector	40	19-Jun-20	14-Aug-20	50000	428	\$50,000	WC1680, WC2190	IIS0700										■	Water Distribution - Install on detector								
130.04.02.05.02 Water Collection		1455	27-Jan-15	06-Nov-20	685	1078	\$32,500												▶									
WC2220	Water Collection - Conceptual design	200	27-Jan-15	10-Nov-15	137	377	\$5,000	WC1250, WC1240	WC2230										■	Water Collection - Conceptual design								
WC2230	Water Collection - Preliminary design	200	16-Nov-15	29-Aug-16	171	171	\$5,000	WC2320, WC2220	WC2240										■	Water Collection - Preliminary design								
WC2240	Water Collection - Final design	200	29-Aug-16	05-Jun-17	171	171	\$5,000	WC2330, WC2230	WC2250										■	Water Collection - Final design								
WC2250	Water Collection - Design Complete	0		05-Jun-17	0	0	\$0	WC2240	WC2260										◆	Water Collection - Design Complete								
WC2260	Water Collection - Prototype and test	200	05-Jun-17	12-Mar-18	68	68	\$2,500	WC2340, WC2250	WC2270										■	Water Collection - Prototype and test								
WC2270	Water Collection - Procurement and contracts	60	12-Mar-18	04-Jun-18	34	34	\$0	WC2360, WC2260	WC2280										■	Water Collection - Procurement and contracts								
WC2280	Water Collection - Fabrication	200	04-Jun-18	11-Mar-19	68	171	\$10,000	WC2370, WC2270	WC2290										■	Water Collection - Fabrication								
WC2290	Water Collection - Fabrication Complete	0		11-Mar-19	0	0	\$0	WC2280	WC2300										◆	Water Collection - Fabrication Complete								
WC2300	Water Collection Installation	60	14-Aug-20	06-Nov-20	34	86	\$5,000	WC1680, WC2380, WC2290	IIS0790										■	Water Collection Installation								
130.04.02.05.03 Thermal Management		1452	30-Jan-15	06-Nov-20	0	7479	\$120,960												▶									
WC2320	Thermal Management - Conceptual design	200	30-Jan-15	16-Nov-15	0	2848	\$49,140	WC1250, WC1240	WC2230, WC2330										■	Thermal Management - Conceptual design								
WC2330	Thermal Management - Preliminary design	200	16-Nov-15	29-Aug-16	0	890	\$15,120	WC2320	WC2240, WC2340										■	Thermal Management - Preliminary design								
WC2340	Thermal Management - Final design	200	29-Aug-16	05-Jun-17	0	890	\$15,120	WC2330	WC2260, WC2350										■	Thermal Management - Final design								

Water Cherenkov Detector Detailed Schedule

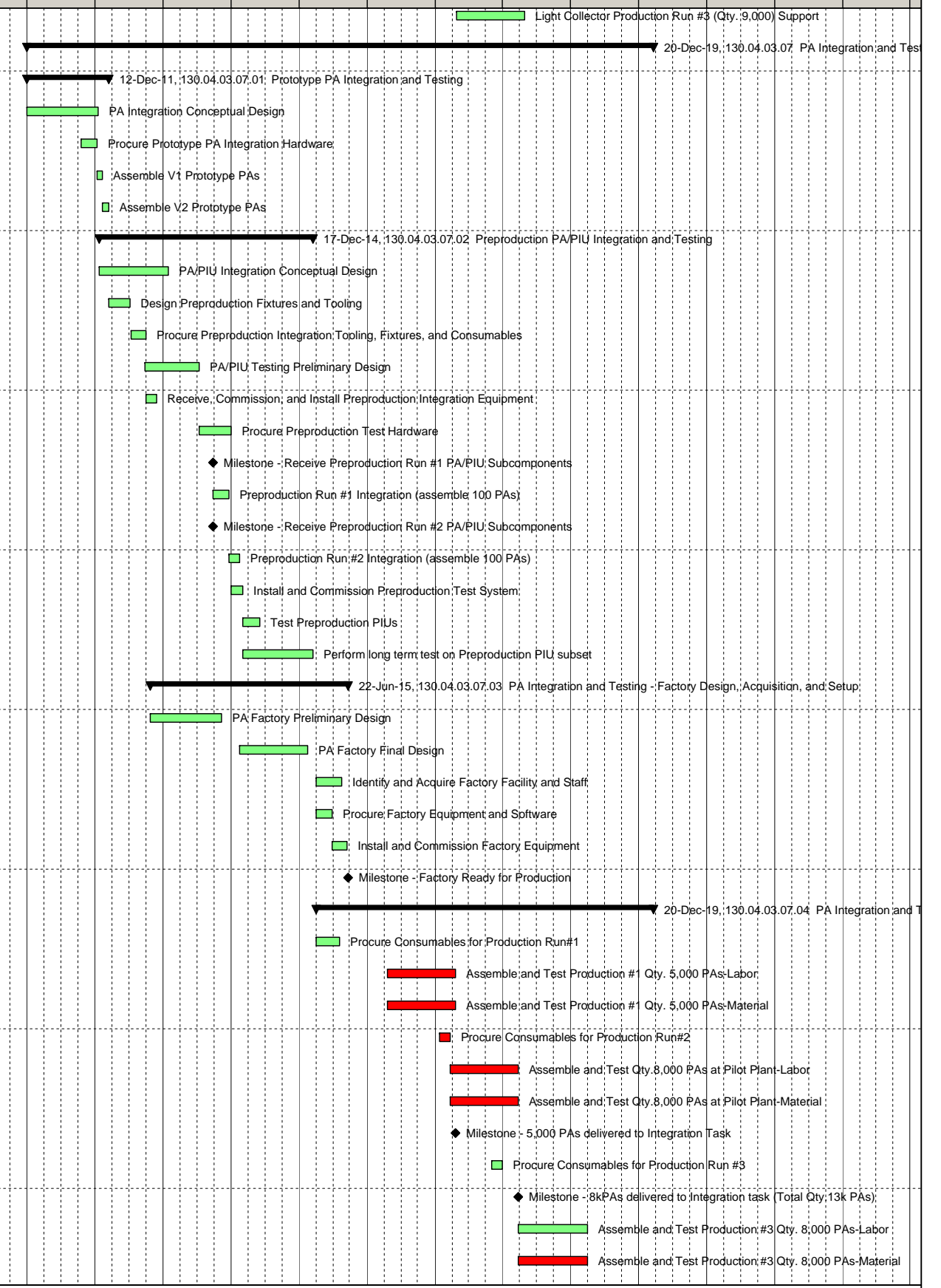
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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	
WC2350	Thermal Management - Design Complete	0		05-Jun-17	0	0	\$0	WC2340	WC2360										◆ Thermal Management - Design Complete						
WC2360	Thermal Management - Prototype and test	200	05-Jun-17	12-Mar-18	0	890	\$0	WC2350	WC2270, WC2370										■ Thermal Management - Prototype and test						
WC2370	Thermal Management - Procurement and contracts	60	12-Mar-18	04-Jun-18	0	51	\$0	WC2360	WC2280, WC2380										■ Thermal Management - Procurement and contracts						
WC2380	Thermal Management - Fabrication	200	04-Jun-18	11-Mar-19	0	1424	\$22,680	WC2370	WC2300, WC2390										■ Thermal Management - Fabrication						
WC2390	Thermal Management - Fabrication Complete	0		11-Mar-19	0	0	\$0	WC2380	WC2400										◆ Thermal Management - Fabrication Complete						
WC2400	Thermal Management - Install on detector	60	14-Aug-20	06-Nov-20	0	486	\$18,900	WC1680, WC2390	IIS0930										■ Thermal Management - Install on detector						
130.04.02.06 PMT Supports (PIU)		2722	06-Apr-10	10-Feb-21	57728	30258	\$3,644,261			▶ 10-Feb-21, 130.04.02.06 PMT Supports (PIU)															
130.04.02.06.01 Vessel/Liner		2669	06-Apr-10	18-Nov-20	685	19091	\$2,902,340			▶ 18-Nov-20, 130.04.02.06.01 Vessel/Liner															
WC2430	PMT Support (PIU) - Vessel/Liner - Conceptual design	198	06-Apr-10	19-Jan-11	685	1027	\$3,125	WC1140	WC2440, WC2530										■ PMT Support (PIU) - Vessel/Liner - Conceptual design						
WC2440	PMT Support (PIU) - Vessel/Liner - Preliminary design	200	18-Jan-13	01-Nov-13	0	1643	\$12,500	WC2430	WC2450, WC2540										■ PMT Support (PIU) - Vessel/Liner - Preliminary design						
WC2450	PMT Support (PIU) - Vessel/Liner - Final design	200	16-Apr-14	04-Feb-15	0	6230	\$12,500	WC2440	WC2460										■ PMT Support (PIU) - Vessel/Liner - Final design						
WC2460	PMT Support (PIU) - Vessel/Liner - Design Complete	0		04-Feb-15	0	0	\$0	WC2450	WC2470										◆ PMT Support (PIU) - Vessel/Liner - Design Complete						
WC2470	PMT Support (PIU) - Vessel/Liner - Prototype and test	100	05-Feb-15	26-Jun-15	0	1130	\$96,000	WC2460	WC2480										■ PMT Support (PIU) - Vessel/Liner - Prototype and test						
WC2480	PMT Support (PIU) - Vessel/Liner - Procurement and contracts	100	29-Jun-15	19-Nov-15	0	205	\$0	WC2470	WC2490, WC2485, WC2483										■ PMT Support (PIU) - Vessel/Liner - Procurement and contracts						
WC2490	PMT Support (PIU) - Vessel/Liner - Fabrication	600	20-Nov-15	15-Mar-18	0	0	\$2,778,215	WC2480, WC2485	WC2500										■ PMT Support (PIU) - Vessel/Liner - Fabrication						
WC2483	PMT Support (PIU) - Vessel/Liner - Fabrication Support	600	20-Nov-15	15-Mar-18	0	8855	\$0	WC2480	WC2500										■ PMT Support (PIU) - Vessel/Liner - Fabrication Support						
WC2500	PMT Support (PIU) - Vessel/Liner - Fabrication Complete	0		15-Mar-18	0	0	\$0	WC2490, WC2483	WC2510										◆ PMT Support (PIU) - Vessel/Liner - Fabrication Complete						
WC2510	PMT Support (PIU) - Vessel/Liner - Install on detector	100	01-Jul-20	18-Nov-20	0	0	\$0	WC2610, WC2500	WC2710										■ PMT Support (PIU) - Vessel/Liner - Install on detector						
130.04.02.06.02 Deck		2374	20-Jan-11	01-Jul-20	31531	5961	\$373,354			▶ 01-Jul-20, 130.04.02.06.02 Deck															
WC2530	PMT Support (PIU) - Deck - Conceptual design	199	20-Jan-11	02-Nov-11	411	137	\$1,197	WC2430	WC2630										■ PMT Support (PIU) - Deck - Conceptual design						
WC2540	PMT Support (PIU) - Deck - Preliminary design	200	04-Nov-13	25-Aug-14	3591	719	\$3,591	WC2440	WC2550, WC2640										■ PMT Support (PIU) - Deck - Preliminary design						
WC2550	PMT Support (PIU) - Deck - Final design	200	26-Aug-14	15-Jun-15	3591	2875	\$3,591	WC2540	WC2560										■ PMT Support (PIU) - Deck - Final design						
WC2560	PMT Support (PIU) - Deck - Design Complete	0		15-Jun-15	0	0	\$0	WC2550	WC2570										◆ PMT Support (PIU) - Deck - Design Complete						
WC2570	PMT Support (PIU) - Deck - Prototype and test	100	16-Jun-15	05-Nov-15	23938	205	\$23,938	WC2560	WC2580										■ PMT Support (PIU) - Deck - Prototype and test						
WC2580	PMT Support (PIU) - Deck - Procurement and contracts	100	06-Nov-15	01-Apr-16	0	103	\$0	WC2570	WC2590, WC2585, WC2587										■ PMT Support (PIU) - Deck - Procurement and contracts						
WC2590	PMT Support (PIU) - Deck - Fabrication	701	04-Apr-16	10-Dec-18	0	0	\$341,037	WC2580	WC2600										■ PMT Support (PIU) - Deck - Fabrication						
WC2585	PMT Support (PIU) - Deck - Fabrication Support	701	04-Apr-16	10-Dec-18	0	1922	\$0	WC2580	WC2600										■ PMT Support (PIU) - Deck - Fabrication Support						
WC2600	PMT Support (PIU) - Deck - Fabrication Complete	0		10-Dec-18	0	0	\$0	WC2590, WC2585, WC2587	WC2610										◆ PMT Support (PIU) - Deck - Fabrication Complete						
WC2610	PMT Support (PIU) - Deck - Install on detector	60	08-Apr-20	01-Jul-20	0	0	\$0	WC1680, WC2600	WC2510										■ PMT Support (PIU) - Deck - Install on detector						
130.04.02.06.03 Floor		2425	10-Jun-11	10-Feb-21	25513	5206	\$368,567			▶ 10-Feb-21, 130.04.02.06.03 Floor															
WC2630	PMT Support (PIU) - Floor - Conceptual design	199	10-Jun-11	29-Mar-12	377	137	\$2,394	WC2530	WC2640										■ PMT Support (PIU) - Floor - Conceptual design						
WC2640	PMT Support (PIU) - Floor - Preliminary design	200	26-Aug-14	15-Jun-15	2394	650	\$2,394	WC2540, WC2630	WC2650										■ PMT Support (PIU) - Floor - Preliminary design						
WC2650	PMT Support (PIU) - Floor - Final design	200	16-Jun-15	01-Apr-16	4788	2259	\$4,788	WC2640	WC2660										■ PMT Support (PIU) - Floor - Final design						
WC2660	PMT Support (PIU) - Floor - Design Complete	0		01-Apr-16	0	0	\$0	WC2650	WC2670										◆ PMT Support (PIU) - Floor - Design Complete						
WC2670	PMT Support (PIU) - Floor - Prototype and test	100	04-Apr-16	19-Aug-16	17954	205	\$17,954	WC2660	WC2680										■ PMT Support (PIU) - Floor - Prototype and test						
WC2680	PMT Support (PIU) - Floor - Procurement and contracts	81	22-Aug-16	12-Dec-16	0	103	\$0	WC2670	WC2690, WC2740, WC2720										■ PMT Support (PIU) - Floor - Procurement and contracts						
WC2690	PMT Support (PIU) - Floor - Fabrication Support	301	13-Dec-16	06-Feb-18	0	1852	\$0	WC2680	WC2700										■ PMT Support (PIU) - Floor - Fabrication Support						
WC2740	PMT Support (PIU) - Floor - Fabrication	301	13-Dec-16	06-Feb-18	0	0	\$341,037	WC2680	WC2700										■ PMT Support (PIU) - Floor - Fabrication						
WC2700	PMT Support (PIU) - Floor - Fabrication Complete	0		06-Feb-18	0	0	\$0	WC2690, WC2740, WC2720	WC2710										◆ PMT Support (PIU) - Floor - Fabrication Complete						
WC2710	PMT Support (PIU) - Floor - Install on detector	60	18-Nov-20	10-Feb-21	0	0	\$0	WC2510, WC2700	IIS0680										■ PMT Support (PIU) - Floor - Install on detector						

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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
PD13323	Light Collector Production Run #3 (Qty. 9,000) Support	264	25-Jan-17	29-Jan-18	0	1356	\$0	PD13320, PD13325, PD13312	PD13760, PD13761															
130.04.03.07 PA Integration and Testing		2313	01-Oct-10	20-Dec-19	1725667	82289	\$1,213,460																	
130.04.03.07.01 Prototype PA Integration and Testing		300	01-Oct-10	12-Dec-11	0	2020	\$43,000																	
PD13360	PA Integration Conceptual Design	262	01-Oct-10	19-Oct-11	0	1780	\$2,000	A1380	PD13420															
PD13370	Procure Prototype PA Integration Hardware	59	20-Jul-11	12-Oct-11	0	40	\$41,000	PD12950	PD13380															
PD13380	Assemble V1 Prototype PAs	20	13-Oct-11	09-Nov-11	0	100	\$0	PD12950, PD12960, PD13370	PD13390															
PD13390	Assemble V2 Prototype PAs	20	10-Nov-11	12-Dec-11	0	100	\$0	PD12990, PD13000, PD13380	PD13410															
130.04.03.07.02 Preproduction PA/PIU Integration and Testing		793	20-Oct-11	17-Dec-14	0	6784	\$69,000																	
PD13420	PA/PIU Integration Conceptual Design	259	20-Oct-11	31-Oct-12	0	1784	\$4,000	PD13360	PD13560															
PD13410	Design Preproduction Fixtures and Tooling	80	13-Dec-11	06-Apr-12	0	320	\$0	PD13390	PD13430															
PD13430	Procure Preproduction Integration Tooling, Fixtures, and Consumables	60	09-Apr-12	02-Jul-12	0	540	\$30,000	PD13410	PD13440															
PD13490	PA/PIU Testing Preliminary Design	199	22-Jun-12	11-Apr-13	0	2100	\$0	A1140	PD13500															
PD13440	Receive, Commission, and Install Preproduction Integration Equipment	40	03-Jul-12	29-Aug-12	0	440	\$0	PD13430	PD13460															
PD13500	Procure Preproduction Test Hardware	120	12-Apr-13	02-Oct-13	0	160	\$35,000	PD13490	PD13510, PD13520															
PD13450	Milestone - Receive Preproduction Run #1 PA/PIU Subcomponents	0	24-Jun-13		0	0	\$0	PD12540, PD12860, PD13050, PD12330	PD13460															
PD13460	Preproduction Run #1 Integration (assemble 100 PAs)	60	24-Jun-13	18-Sep-13	0	560	\$0	PD12350, PD12630, PD12860, PD13050, PD13450	PD13480, PD13520, PD13530															
PD13470	Milestone - Receive Preproduction Run #2 PA/PIU Subcomponents	0	24-Jun-13		0	0	\$0	PD12860, PD13050, PD12340	PD13480															
PD13480	Preproduction Run #2 Integration (assemble 100 PAs)	40	19-Sep-13	14-Nov-13	0	560	\$0	PD12350, PD13460, PD13470	PD13560															
PD13510	Install and Commission Preproduction Test System	40	03-Oct-13	02-Dec-13	0	160	\$0	PD13500	PD13520, PD13530															
PD13520	Test Preproduction PIUs	60	03-Dec-13	03-Mar-14	0	160	\$0	PD13460, PD13500, PD13510	PD13640, PD13641															
PD13530	Perform long term test on Preproduction PIU subset	260	03-Dec-13	17-Dec-14	0	0	\$0	PD13460, PD13510	PD13640, PD13641															
130.04.03.07.03 PA Integration and Testing - Factory Design, Acquisition, and Setup		730	24-Jul-12	22-Jun-15	0	5530	\$145,000																	
PD13550	PA Factory Preliminary Design	264	24-Jul-12	13-Aug-13	0	1560	\$0	A1140	PD13560															
PD13560	PA Factory Final Design	252	15-Nov-13	19-Nov-14	0	1800	\$0	PD13420, PD13480, PD13550	PD13570, PD13580															
PD13570	Identify and Acquire Factory Facility and Staff	100	30-Dec-14	21-May-15	0	320	\$0	PD13560, A1300	PD13640, PD13641															
PD13580	Procure Factory Equipment and Software	60	30-Dec-14	26-Mar-15	0	250	\$140,000	PD13560, A1300	PD13590															
PD13590	Install and Commission Factory Equipment	60	27-Mar-15	19-Jun-15	0	1600	\$5,000	PD13580	PD13600															
PD13600	Milestone - Factory Ready for Production	0	22-Jun-15		0	0	\$0	PD13590	PD13640															
130.04.03.07.04 PA Integration and Testing - Production		1250	30-Dec-14	20-Dec-19	1725667	67955	\$956,460																	
PD13630	Procure Consumables for Production Run#1	90	30-Dec-14	07-May-15	0	0	\$0	PD12410	PD13640, PD13641															
PD13640	Assemble and Test Production #1 Qty. 5,000 PAs-Labor	259	21-Jan-16	17-Jan-17	174815	7115	\$19,000	PD13630, PD12420, PD13570, PD13520, PD13640	PD13650, PD13670, IIS0250, IIS0251, IIS0252															
PD13641	Assemble and Test Production #1 Qty. 5,000 PAs-Material	259	21-Jan-16	17-Jan-17	174815	0	\$148,700	PD13630, PD13570, PD13520, PD13530, PD12420	PD13642, IIS0251, IIS0252															
PD13670	Procure Consumables for Production Run#2	40	27-Oct-16	21-Dec-16	280	0	\$0	PD13640, PD13641	PD13680, PD13710, PD13681															
PD13680	Assemble and Test Qty.8,000 PAs at Pilot Plant-Labor	263	22-Dec-16	26-Dec-17	274064	11144	\$25,000	PD12430, PD13670	PD13690															
PD13681	Assemble and Test Qty.8,000 PAs at Pilot Plant-Material	263	22-Dec-16	26-Dec-17	274064	11144	\$237,920	PD12430, PD13670	PD13690, PD13682															
PD13650	Milestone - 5,000 PAs delivered to Integration Task	0		17-Jan-17	0	0	\$0	PD13640, PD13641, PD13642																
PD13710	Procure Consumables for Production Run #3	40	03-Aug-17	27-Sep-17	158	0	\$0	PD13670	PD13720, PD13721															
PD13690	Milestone - 8kPAs delivered to Integration task (Total Qty. 13k PAs)	0	26-Dec-17		0	0	\$0	PD13680, PD13681	PD13720, PD13721															
PD13720	Assemble and Test Production #3 Qty. 8,000 PAs-Labor	264	26-Dec-17	31-Dec-18	276904	13984	\$25,000	PD12660, PD13690, PD13710, PD12440, PD13680	PD13730, PD13750															
PD13721	Assemble and Test Production #3 Qty. 8,000 PAs-Material	264	26-Dec-17	31-Dec-18	276904	13984	\$237,920	PD12660, PD13690, PD13710, PD12440, PD13680	PD13730, PD13722															



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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
PD13750	Procure Consumables for Production Run #4	40	30-Oct-18	25-Dec-18	158	0	\$0	PD13720	PD13760, PD13761															
PD13730	Milestone - Prod #3 8kPAs delivered to Integration task (Total Qty.21kPAs)	0	31-Dec-18		0	0	\$0	PD13720, PD13721	PD13760, PD13761															
PD13760	Assemble and Test Production #4 Qty. 8,000 PAs-Labor	220	01-Feb-19	06-Dec-19	273504	10584	\$25,000	PD13730, PD13750, PD12425, PD12600,	PD13770, PD13780, PD13762															
PD13761	Assemble and Test Production #4 Qty. 8,000 PAs-Material	220	01-Feb-19	06-Dec-19	0	0	\$237,920	PD13730, PD13750, PD12425, PD12600,	PD13770, PD13780, PD13762															
PD13780	Milestone - All PAs Complete	0	06-Dec-19		0	0	\$0	PD13760, PD13761	PD11670															
PD13770	Milestone - Prod #4 8k PAs delivered to Integration task (Total Qty.29kPAs)	0	20-Dec-19		0	0	\$0	PD13760, PD12050, PD13761	PD11670															
130.04.04 Electronics		3071	08-Jan-10	04-Apr-22	0	28999	\$4,044,553			▶ 04-Apr-22, 130.04.04 Electronics														
130.04.04.01 Management and Safety		3071	08-Jan-10	04-Apr-22	0	2781	\$64,000			▶ 04-Apr-22, 130.04.04.01 Management and Safety														
EL1400	Management	3122	08-Jan-10	04-Apr-22	0	2225	\$64,000	A1060	A1370	▶ Management														
EL1410	Safety	1578	08-Jan-10	03-May-16	0	556	\$0	A1060	A1370	▶ Safety														
130.04.04.02 Electrical Design/Characterization Cables and Bases		1198	08-Jan-10	13-Oct-14	0	192	\$34,500			▶ 13-Oct-14, 130.04.04.02 Electrical Design/Characterization/Cables and Bases														
130.04.04.02.01 Characterization of PMT		1198	08-Jan-10	13-Oct-14	0	56	\$30,000			▶ 13-Oct-14, 130.04.04.02.01 Characterization of PMT														
EL1430	Characterization of PMT	799	08-Jan-10	21-Mar-13	0	0	\$0	A1060	EL1440	▶ Characterization of PMT														
EL1440	Characterization of cables	400	24-Oct-12	04-Jun-14	0	56	\$30,000	EL1430	EL1450, EL1520, EL1580	▶ Characterization of cables														
EL1450	Design Review of Cables	0		13-Oct-14	0	0	\$0	EL1440	EL1530	▶ Design Review of Cables														
130.04.04.02.02 Characterization of Cables		1097	08-Jan-10	20-May-14	0	136	\$4,500			▶ 20-May-14, 130.04.04.02.02 Characterization of Cables														
EL1470	Electrical Design of Base - Version 1 design, fab, test	100	08-Jan-10	01-Jun-10	0	56	\$1,500	A1060	EL1480	▶ Electrical Design of Base - Version 1 design, fab, test														
EL1480	Electrical Design of Base - Version 2 design, fab, test	150	22-Jun-12	31-Jan-13	0	40	\$1,500	EL1470, A1140	EL1490	▶ Electrical Design of Base - Version 2 design, fab, test														
EL1490	Electrical Design of Base - Version 3 design, fab, test	100	27-Dec-13	20-May-14	0	40	\$1,500	EL1480, A1220	EL1500	▶ Electrical Design of Base - Version 3 design, fab, test														
EL1500	Electrical Design of Base - Design Review of Base	0		20-May-14	0	0	\$0	EL1490	EL1530	▶ Electrical Design of Base - Design Review of Base														
130.04.04.03 High Voltage		1735	05-Jun-14	04-May-21	0	2136	\$1,017,355			▶ 04-May-21, 130.04.04.03 High Voltage														
EL1520	High Voltage - Conceptual Design	1000	05-Jun-14	03-May-18	0	160	\$0	EL1440	EL1530	▶ High Voltage - Conceptual Design														
EL1530	High Voltage - Design	410	04-May-18	28-Nov-19	0	384	\$0	EL1520, EL1500, EL1450	EL1540	▶ High Voltage - Design														
EL1540	High Voltage - Prototype and test	3	29-Nov-19	03-Dec-19	0	288	\$18,000	EL1530	EL1550	▶ High Voltage - Prototype and test														
EL1550	High Voltage - Preproduction Design Review	0	31-Dec-19		0	0	\$0	EL1540	EL1560, EL1561	▶ High Voltage - Preproduction Design Review														
EL1560	High Voltage - Production-Material	350	31-Dec-19	04-May-21	0	440	\$999,355	EL1550	EL1565, IIS0980	▶ High Voltage - Production-Material														
EL1561	High Voltage - Production-Labor	350	31-Dec-19	04-May-21	0	864	\$0	EL1550	IIS0980	▶ High Voltage - Production-Labor														
130.04.04.04 Front End Elect.		2629	08-Jan-10	26-Jun-20	0	10896	\$1,665,180			▶ 26-Jun-20, 130.04.04.04 Front End Elect.														
130.04.04.04.01 Integrated Circuit		1301	05-Jun-14	09-Aug-19	0	6624	\$750,308			▶ 09-Aug-19, 130.04.04.04.01 Integrated Circuit														
EL1580	Front End Elect. - Conceptual Design	350	05-Jun-14	28-Oct-15	0	800	\$0	EL1440	EL1600	▶ Front End Elect. - Conceptual Design														
EL1600	Front End Elect - Integrated Circuit - Design - v1	152	24-Sep-15	02-May-16	0	1880	\$0	EL1580	EL1610, EL1850	▶ Front End Elect - Integrated Circuit - Design - v1														
EL1610	Front End Elect - Integrated Circuit - Design Review - v1	0	17-May-16		0	0	\$0	EL1600	EL1620	▶ Front End Elect - Integrated Circuit - Design Review - v1														
EL1620	Front End Elect - Integrated Circuit - Prototype - v1	76	17-May-16	30-Aug-16	0	48	\$45,000	EL1610	EL1630	▶ Front End Elect - Integrated Circuit - Prototype - v1														
EL1630	Front End Elect - Integrated Circuit - Test - v1	102	31-Aug-16	19-Jan-17	0	640	\$16,000	EL1620	EL1640	▶ Front End Elect - Integrated Circuit - Test - v1														
EL1640	Front End Elect - Integrated Circuit - Design - v2	150	20-Jan-17	17-Aug-17	0	640	\$0	EL1630, EL1800, EL1810	EL1650	▶ Front End Elect - Integrated Circuit - Design - v2														
EL1650	Front End Elect - Integrated Circuit - Prototype - v2	361	18-Aug-17	04-Jan-19	0	48	\$45,000	EL1640	EL1660	▶ Front End Elect - Integrated Circuit - Prototype - v2														
EL1660	Front End Elect - Integrated Circuit - Test - v2	5	07-Jan-19	11-Jan-19	0	600	\$9,600	EL1650	EL1670, EL1740	▶ Front End Elect - Integrated Circuit - Test - v2														
EL1670	Front End Elect - Integrated Circuit - Preproduction Design Review	0	11-Jan-19		0	0	\$0	EL1660, EL1820	EL1680, EL1790	▶ Front End Elect - Integrated Circuit - Preproduction Design Review														
EL1680	Front End Elect - Integrated Circuit - Production-Material	150	11-Jan-19	09-Aug-19	0	944	\$634,708	EL1820, EL1670	EL1780, EL1830, EL1681	▶ Front End Elect - Integrated Circuit - Production-Material														
EL1790	Front End Elect - Integrated Circuit - Production-Labor	150	11-Jan-19	09-Aug-19	0	1024	\$0	EL1820, EL1670	EL1780, EL1830	▶ Front End Elect - Integrated Circuit - Production-Labor														

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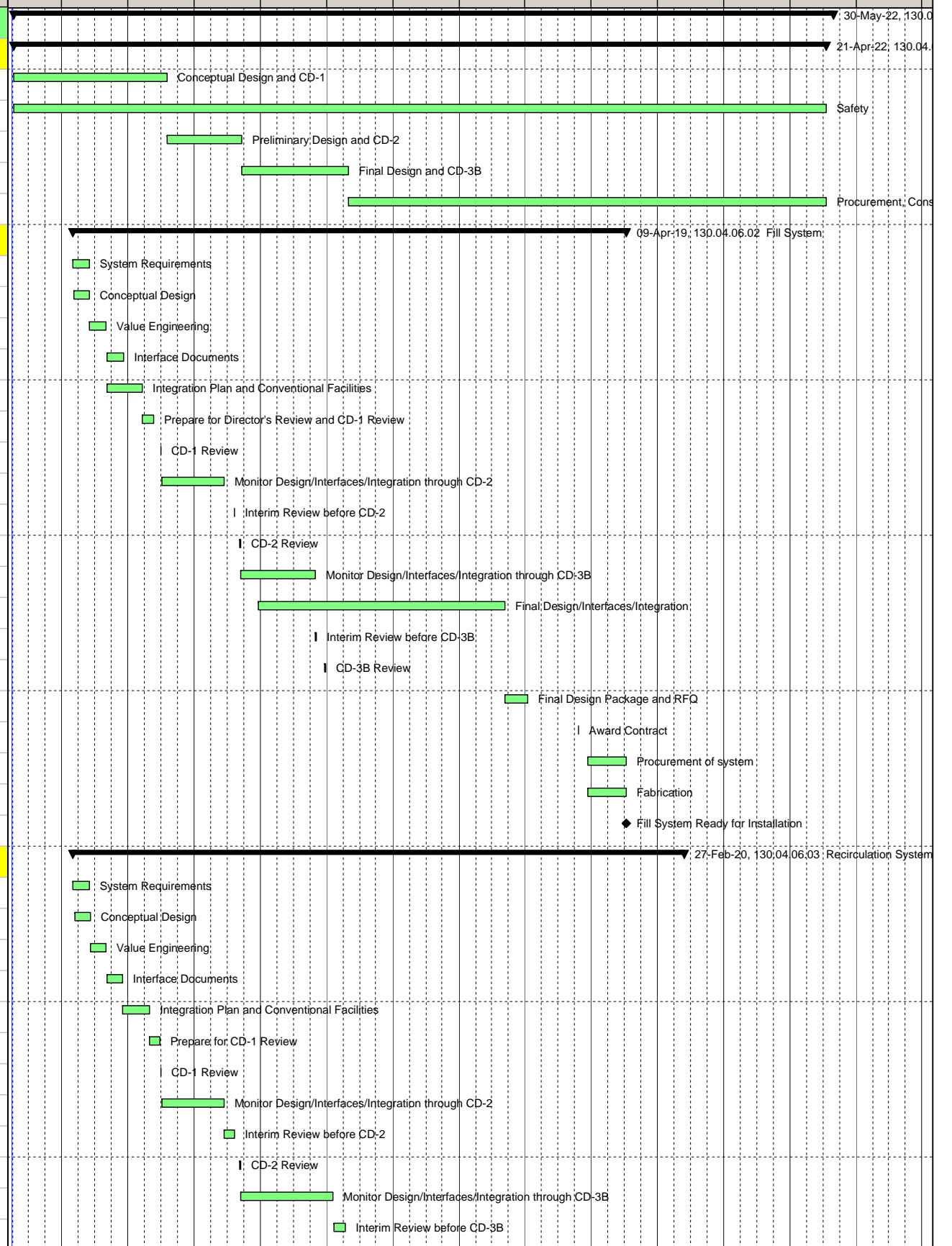
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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
EL2090	Low Voltage Power - Production-Material	150	12-Dec-19	09-Jul-20	0	0	\$324,300	EL2060, EL2070	EL2240															
130.04.04.08.02 Racks/Crates/Backplanes		2623	08-Jan-10	19-Jun-20	0	1770	\$285,962																	
EL2100	Racks/Crates/Backplanes - Conceptual design	1900	08-Jan-10	28-Jul-17	0	80	\$0	A1060	EL2110															
EL2110	Racks/Crates/Backplanes - Design	200	28-Jul-17	04-May-18	0	480	\$0	EL2100	EL2120, EL2190															
EL2120	Racks/Crates/Backplanes - Prototype - v1	75	04-May-18	17-Aug-18	0	160	\$5,000	EL2110, EL1800	EL2130															
EL2130	Racks/Crates/Backplanes - Design - v2	150	17-Aug-18	15-Mar-19	0	120	\$0	EL2120	EL2140															
EL2140	Racks/Crates/Backplanes - Prototype - v2	40	15-Mar-19	10-May-19	0	160	\$5,000	EL2130	EL2150, EL2160, EL2200, EL2230, EL2300															
EL2150	Racks/Crates/Backplanes - Production Readiness Review	0		10-May-19	0	0	\$0	EL2140	EL2160, EL2230, EL2300															
EL2160	Racks/Crates/Backplanes - Production-Labor	250	05-Jul-19	19-Jun-20	0	770	\$0	EL2140, EL2150	EL2220, EL2240, IIS0900, IIS0895															
EL2230	Racks/Crates/Backplanes - Production-Material	250	05-Jul-19	19-Jun-20	0	0	\$275,962	EL2140, EL2150	EL2220, EL2240, IIS0900, IIS0895															
130.04.04.08.03 Cooling		2623	08-Jan-10	19-Jun-20	0	696	\$67,240																	
EL2180	Cooling - Conceptual design	1800	08-Jan-10	09-Mar-17	0	240	\$0	A1060	EL2190															
EL2190	Cooling - Design	100	04-May-18	21-Sep-18	0	160	\$0	EL2110, EL2180	EL2200															
EL2200	Cooling - Prototype	75	19-Apr-19	02-Aug-19	0	80	\$1,000	EL2060, EL2190, EL2140	EL2210															
EL2210	Cooling - Production Readiness Review	0		02-Aug-19	0	0	\$0	EL2200	EL2220															
EL2220	Cooling - Production	230	02-Aug-19	19-Jun-20	0	216	\$66,240	EL2160, EL2210, EL2230	EL2240															
130.04.04.09 Electronics Installation and Commissioning		281	09-Jul-20	20-Aug-21	0	5340	\$196,224																	
EL2240	Physical installation UG	260	09-Jul-20	08-Jul-21	0	450	\$50,000	EL2220, EL2160, EL2080, EL2000, EL1780, EL2090	EL2250, EL2260															
EL2260	Connection to PMTs	260	23-Jul-20	22-Jul-21	0	2100	\$60,000	EL2240	IIS1020															
EL2250	Connection to DAQ	260	06-Aug-20	05-Aug-21	0	300	\$20,000	EL2240, EL1940	EL2270															
EL2270	Verification	180	20-Aug-20	29-Apr-21	0	1050	\$40,000	EL2250	EL2280															
EL2280	Ready to hand over for calibration	0		29-Apr-21	0	0	\$0	EL2270	EL2290															
EL2290	Begin calibrations	50	11-Jun-21	20-Aug-21	0	1440	\$26,224	EL2280, EL1880	IIS0660															
130.04.05 Calibration		3099	08-Jan-10	12-May-22	0	266953	\$2,020,009																	
130.04.05.01 Management and Safety		3069	08-Jan-10	01-Apr-22	0	6260	\$170,358																	
130.04.05.01.01 Management		3069	08-Jan-10	01-Apr-22	0	6260	\$170,358																	
CL1690	Management, Los Alamos	3120	08-Jan-10	01-Apr-22	0	4000	\$98,000	A1060	A1370															
CL1700	Management, ISU	3120	08-Jan-10	01-Apr-22	0	2260	\$72,358	A1060	A1370															
130.04.05.01.02 Safety		3069	08-Jan-10	31-Mar-22	0	0	\$0																	
CL1710	Safety	3120	08-Jan-10	31-Mar-22	0	0	\$0	A1060	A1370															
130.04.05.02 Water Transparency Monitoring		1290	02-Jan-17	22-Feb-22	0	21800	\$276,251																	
130.04.05.02.01 In situ water monitoring		1290	02-Jan-17	22-Feb-22	0	14200	\$142,250																	
CL1740	In Situ Laser/LED system-Labor	897	02-Jan-17	09-Jun-20	0	5750	\$16,000	A1300	CL1750															
CL1745	In Situ Laser/LED system-Material	897	02-Jan-17	09-Jun-20	0	5750	\$112,500	A1300	CL1750															
CL1750	In situ portable system	560	01-Jan-20	22-Feb-22	0	2700	\$13,750	CL1740, CL1745, CL1747	A1370															
130.04.05.02.02 External System		1268	02-Jan-17	21-Jan-22	0	7600	\$134,001																	
CL1760	External system-Material	1320	02-Jan-17	21-Jan-22	0	3800	\$114,000	A1300	A1370															
CL1770	External system-Labor	1320	02-Jan-17	21-Jan-22	0	3800	\$20,001	A1300	A1370															
130.04.05.03 Photomultiplier Calibration		2788	05-Apr-11	12-May-22	0	38503	\$483,000																	
130.04.05.03.01 Timing and Pulse Height Calibration		2788	05-Apr-11	12-May-22	0	31003	\$458,000																	

Water Cherenkov Detector Detailed Schedule

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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
130.04.06 Water System		3110	08-Jan-10	30-May-22	18961	32045	\$12,401,912																	
130.04.06.01 Water System Management and Safety		3084	08-Jan-10	21-Apr-22	0	6549	\$51,100																	
WS1410	Conceptual Design and CD-1	580	08-Jan-10	02-May-12	0	3117	\$14,400	A1060	WS1420															
WS1450	Safety	3134	08-Jan-10	20-Apr-22	0	0	\$0	A1060	A1370															
WS1420	Preliminary Design and CD-2	282	03-May-12	19-Jun-13	0	446	\$19,500	WS1410	WS1430															
WS1430	Final Design and CD-3B	399	20-Jun-13	29-Jan-15	0	910	\$17,200	WS1420	WS1440															
WS1440	Procurement, Construction, and Installation	1874	30-Jan-15	21-Apr-22	0	2076	\$0	WS1430	A1370															
130.04.06.02 Fill System		2095	01-Dec-10	09-Apr-19	200	6601	\$3,789,000																	
WS1470	System Requirements	60	01-Dec-10	28-Feb-11	0	0	\$0	A1060	WS1490															
WS1480	Conceptual Design	55	08-Dec-10	28-Feb-11	0	0	\$0	A1060	WS1490, WS1510															
WS1490	Value Engineering	68	01-Mar-11	03-Jun-11	0	68	\$0	WS1480, WS1470	WS1500, WS1510															
WS1500	Interface Documents	65	06-Jun-11	07-Sep-11	0	219	\$0	WS1490	WS1520															
WS1510	Integration Plan and Conventional Facilities	135	06-Jun-11	20-Dec-11	0	136	\$0	WS1480, WS1490	WS1520															
WS1520	Prepare for Director's Review and CD-1 Review	40	21-Dec-11	17-Feb-12	0	34	\$0	WS1510, WS1500	WS1530															
WS1530	CD-1 Review	3	29-Mar-12	02-Apr-12	0	7	\$0	WS1520, A1130	WS1540															
WS1540	Monitor Design/Interfaces/Integration through CD-2	235	03-Apr-12	13-Mar-13	0	540	\$6,000	WS1530	WS1550															
WS1550	Interim Review before CD-2	3	09-May-13	13-May-13	0	68	\$0	WS1540	WS1560															
WS1560	CD-2 Review	3	11-Jun-13	13-Jun-13	0	7	\$0	WS1550, A1210	WS1570															
WS1570	Monitor Design/Interfaces/Integration through CD-3B	280	14-Jun-13	30-Jul-14	0	636	\$6,000	WS1560	WS1580, WS1600															
WS1600	Final Design/Interfaces/Integration	941	20-Sep-13	09-Jun-17	200	2903	\$15,000	WS1570, A1220	WS1620, WS1610															
WS1580	Interim Review before CD-3B	3	31-Jul-14	04-Aug-14	0	102	\$0	WS1570	WS1590															
WS1590	CD-3B Review	3	23-Sep-14	25-Sep-14	0	7	\$0	WS1580, A1290	WS1620															
WS1610	Final Design Package and RFQ	90	12-Jun-17	13-Oct-17	0	270	\$0	WS1600	WS1620, WS1615															
WS1620	Award Contract	2	23-Jul-18	24-Jul-18	0	0	\$3,750,000	WS1610, WS1600, WS1615, WS1590	WS1630, WS1640															
WS1630	Procurement of system	150	12-Sep-18	09-Apr-19	0	600	\$12,000	WS1620	WS2280															
WS1640	Fabrication	150	12-Sep-18	09-Apr-19	0	1004	\$0	WS1620	IIS1040, WS1650, IIS1035															
WS1650	Fill System Ready for Installation	0		09-Apr-19	0	0	\$0	WS1640	IIS0690															
130.04.06.03 Recirculation System		2317	01-Dec-10	27-Feb-20	200	7725	\$7,490,700																	
WS1660	System Requirements	60	01-Dec-10	28-Feb-11	0	0	\$0	A1060	WS1680															
WS1670	Conceptual Design	55	15-Dec-10	07-Mar-11	0	0	\$0	A1060	WS1680															
WS1680	Value Engineering	63	08-Mar-11	03-Jun-11	0	68	\$0	WS1670, WS1660	WS1690															
WS1690	Interface Documents	60	06-Jun-11	30-Aug-11	0	136	\$0	WS1680	WS1700															
WS1700	Integration Plan and Conventional Facilities	100	31-Aug-11	27-Jan-12	0	136	\$0	WS1690	WS1710															
WS1710	Prepare for CD-1 Review	40	30-Jan-12	26-Mar-12	0	34	\$0	WS1700	WS1720															
WS1720	CD-1 Review	3	29-Mar-12	02-Apr-12	0	7	\$0	WS1710, A1130	WS1730															
WS1730	Monitor Design/Interfaces/Integration through CD-2	235	03-Apr-12	13-Mar-13	0	540	\$0	WS1720	WS1740															
WS1740	Interim Review before CD-2	40	14-Mar-13	08-May-13	0	68	\$0	WS1730	WS1750															
WS1750	CD-2 Review	3	11-Jun-13	13-Jun-13	0	7	\$0	WS1740, A1210	WS1760															
WS1760	Monitor Design/Interfaces/Integration through CD-3B	351	14-Jun-13	07-Nov-14	0	636	\$0	WS1750	WS1770															
WS1770	Interim Review before CD-3B	40	10-Nov-14	12-Jan-15	0	102	\$0	WS1760	WS1780															



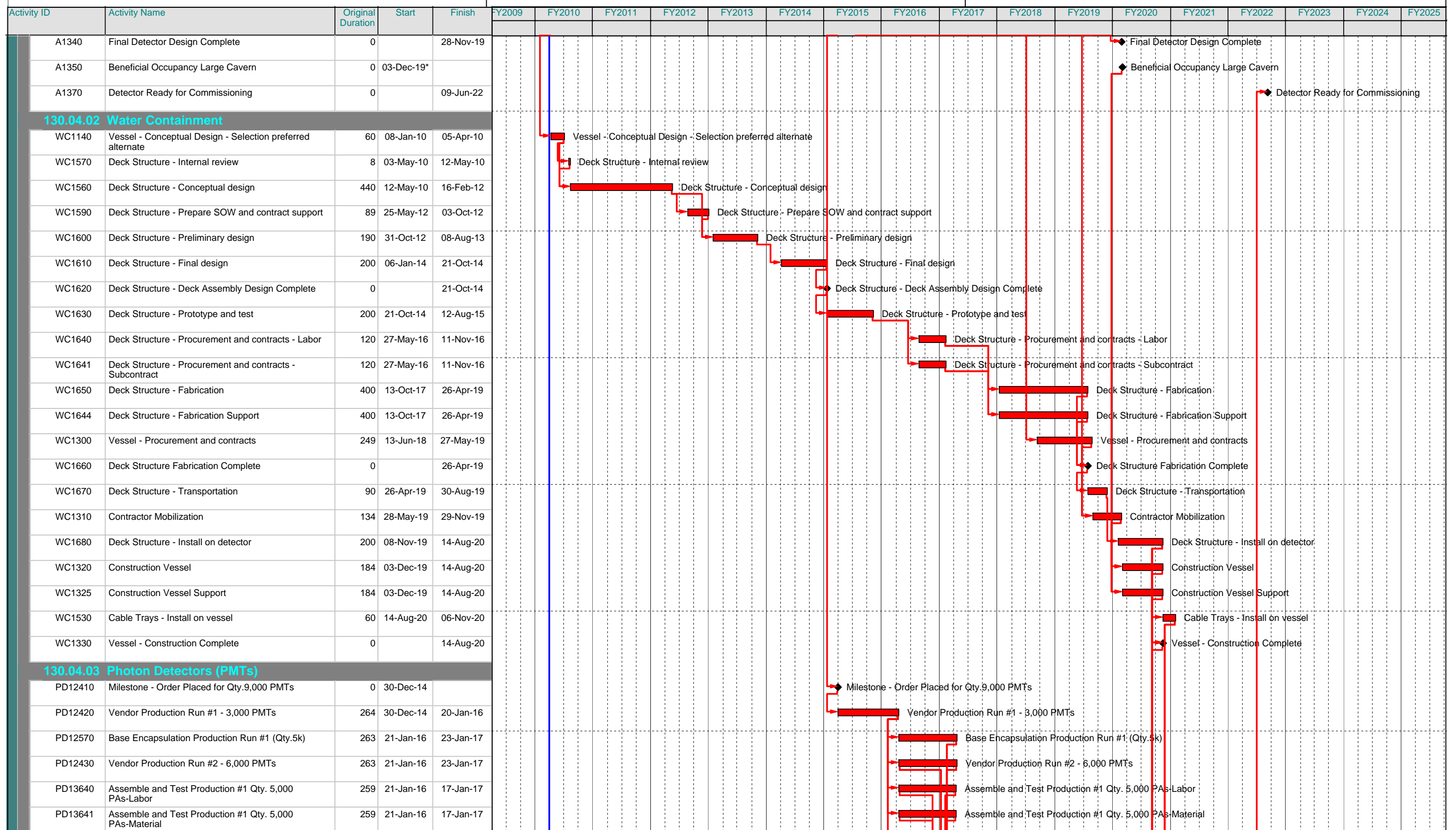
Water Cherenkov Detector Detailed Schedule

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Activity ID	Activity Name	Duration	Start	Finish	Budgeted Labor Units	Budgeted Nonlabor Units	Budgeted Material Cost	Predecessors	Successors	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024
CP9670	Testing and R&D for Preliminary Design	303	03-Jan-12	20-Mar-13	0	309	\$5,000	CP9660	CP9680															
CP9680	Preliminary Design Work	306	22-Jun-12	13-Sep-13	0	0	\$0	CP9670, A1140	CP9690															
CP9690	Testing & R&D for Final Design	289	16-Sep-13	10-Nov-14	0	397	\$9,000	CP9680	CP9700															
CP9700	Final Design Work	289	16-Sep-13	10-Nov-14	0	0	\$0	CP9690, A1220	CP9710															
CP9710	Final System Development Work post CD-3	1875	30-Dec-14	24-Mar-22	0	4787	\$154,000	CP9700, A1300	CP9720															
CP9720	System Testing Offsite	105	30-Dec-14	29-May-15	0	0	\$0	CP9710	CP9730, CP9630															
CP9730	Installation of Hardware systems onsite	1544	15-Jul-15	23-Jun-21	0	0	\$0	CP9720	A1370															
130.04.07.02.02 Prompt/Online Processing		3066	08-Jan-10	28-Mar-22	0	10573	\$108,000			▶ 28-Mar-22, 130.04.07.02.02 Prompt/Online Processing														
CP9760	Conceptual Design	495	08-Jan-10	30-Dec-11	0	350	\$3,000	A1060	CP9770															
CP9770	Testing and R&D for Preliminary Design	305	03-Jan-12	22-Mar-13	0	286	\$8,000	CP9760	CP9780															
CP9780	Preliminary Design Work	306	22-Jun-12	13-Sep-13	0	0	\$0	CP9770, A1140	CP9790															
CP9790	Testing & R&D for Final Design	289	16-Sep-13	10-Nov-14	0	374	\$8,000	CP9780	CP9800															
CP9800	Final Design Work	289	16-Sep-13	10-Nov-14	0	0	\$0	CP9790, A1220	CP9810															
CP9810	Final System Development Work post CD-3	1877	30-Dec-14	28-Mar-22	0	9563	\$89,000	CP9800, A1300	CP9820															
CP9820	System Testing Offsite	104	22-May-15	20-Oct-15	0	0	\$0	CP9810	CP9830															
CP9830	Installation of Hardware systems onsite	1551	07-Dec-15	18-Nov-21	0	0	\$0	CP9820	A1370															
130.04.07.02.03 Data Quality Monitoring		3064	08-Jan-10	24-Mar-22	0	7371	\$86,000			▶ 24-Mar-22, 130.04.07.02.03 Data Quality Monitoring														
CP9860	Conceptual Design	495	08-Jan-10	30-Dec-11	0	702	\$3,000	A1060	CP9870															
CP9870	Testing and R&D for Preliminary Design	303	03-Jan-12	20-Mar-13	0	520	\$3,000	CP9860	CP9880															
CP9880	Preliminary Design Work	306	22-Jun-12	13-Sep-13	0	0	\$0	CP9870, A1140	CP9890															
CP9890	Testing & R&D for Final Design	289	16-Sep-13	10-Nov-14	0	693	\$3,000	CP9880	CP9900															
CP9900	Final Design Work	290	16-Sep-13	12-Nov-14	0	0	\$0	CP9890, A1220	CP9910															
CP9910	Final System Development Work post CD-3	1875	30-Dec-14	24-Mar-22	0	5456	\$77,000	CP9900, A1300	CP9920															
CP9920	System Testing Offsite	104	22-May-15	20-Oct-15	0	0	\$0	CP9910	CP9930															
CP9930	Installation of Hardware systems onsite	1551	07-Dec-15	18-Nov-21	0	0	\$0	CP9920	A1370															
130.04.07.02.04 RunControl		3064	08-Jan-10	24-Mar-22	0	4558	\$9,064			▶ 24-Mar-22, 130.04.07.02.04 RunControl														
CP9960	Conceptual Design	495	08-Jan-10	30-Dec-11	0	234	\$3,000	A1060	CP9970															
CP9970	Testing and R&D for Preliminary Design	279	03-Jan-12	13-Feb-13	0	187	\$3,000	CP9960	CP9980															
CP9980	Preliminary Design Work	306	22-Jun-12	13-Sep-13	0	0	\$0	CP9970, A1140	CP9990															
CP9990	Testing & R&D for Final Design	289	16-Sep-13	10-Nov-14	0	187	\$3,000	CP9980	CP10000, CP10010															
CP10000	Final Design Work	289	16-Sep-13	10-Nov-14	0	0	\$0	CP9990, A1220	CP10010															
CP10010	Final System Development Work post CD-3	1875	30-Dec-14	24-Mar-22	0	3950	\$64	CP9990, CP10000, A1300	CP10020															
CP10020	System Testing Offsite	104	22-May-15	20-Oct-15	0	0	\$0	CP10010	CP10030															
CP10030	Installation of Hardware systems onsite	1547	07-Dec-15	12-Nov-21	0	0	\$0	CP10020	A1370															
130.04.07.03 Offline Computing		2046	08-Jan-10	05-Mar-18	4912	12480	\$40,000			▶ 05-Mar-18, 130.04.07.03: Offline Computing														
130.04.07.03.01 Simulation		762	08-Jan-10	22-Jan-13	1808	0	\$0			▶ 22-Jan-13, 130.04.07.03.01 Simulation														
CP10210	Pre CD-1 work with interim WCSim based system	557	08-Jan-10	30-Mar-12	1000	0	\$0	A1060	CP10290, CP10140															
CP10140	Integrate into framework	101	23-Aug-12	22-Jan-13	808	0	\$0	CP10210	CP10150															
CP10150	Software Release prior CD-2	0		22-Jan-13	0	0	\$0	CP10140	A1210															
130.04.07.03.02 Reconstruction		2046	08-Jan-10	05-Mar-18	2936	12480	\$40,000			▶ 05-Mar-18, 130.04.07.03.02: Reconstruction														

Activity ID	Activity Name	Original Duration	Start	Finish	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	
130.04 Water Cherenkov Detector																						
130.04.00 Top Level Milestones																						
A1060	CD-0 Approved	0	08-Jan-10*			◆																
A1070	Begin Conceptual Design Work	0	08-Jan-10		◆																	
A1380	FY11 Funding Available	0	01-Oct-10			◆																
A1080	Conceptual Design Report complete	0	21-Oct-10				◆															
A1390	FY12 Funding Available	0	03-Oct-11				◆															
A1110	Revised Conceptual Design Report Complete	0	24-Oct-11					◆														
A1120	Conceptual Design Complete	0	07-Mar-12					◆														
A1130	CD-1 Review	0	29-Mar-12					◆														
A1140	CD-1 Approval	0	21-Jun-12					◆														
A1400	FY13 Funding Available	0	01-Oct-12					◆														
A1180	Final version of RLS complete	0	12-Apr-13					◆														
A1190	EVMS ready for CD-2	0	12-Apr-13					◆														
A1200	Preliminary Design Complete	0	17-May-13					◆														
A1210	CD-2 Review	0	11-Jun-13					◆														
A1220	CD-2 Approval	0	22-Aug-13					◆														
A1230	CD-3A Long Lead Procurement Budget Approved	0	22-Aug-13					◆														
A1410	FY14 Funding Available	0	01-Oct-13					◆														
A1240	Project Safety and Health Plan Complete	0	15-Apr-14					◆														
A1270	Design Ready for Construction	0	08-Sep-14					◆														
A1290	CD-3B Review	0	23-Sep-14					◆														
A1420	FY15 Funding Available	0	01-Oct-14					◆														
A1300	CD-3 Approval/Construction Funds available	0	30-Dec-14					◆														
A1310	Capital funds authorized	0	30-Dec-14					◆														
A1320	Start Excavation Large Cavern	0	24-Apr-15					◆														
A1430	FY16 Funding Available	0	01-Oct-15					◆														
A1435	FY17 Funding Available	0	03-Oct-16					◆														
A1440	FY18 Funding Available	0	02-Oct-17					◆														
A1330	Control Room Beneficial Occupancy	0	13-Mar-18*											◆								
A1450	FY19 Funding Available	0	01-Oct-18											◆								
A1360	Partial Beneficial Occupancy	0	27-May-19											◆								

█ Actual Work █ Critical Remaining Work
█ Remaining Work ◆ Milestone

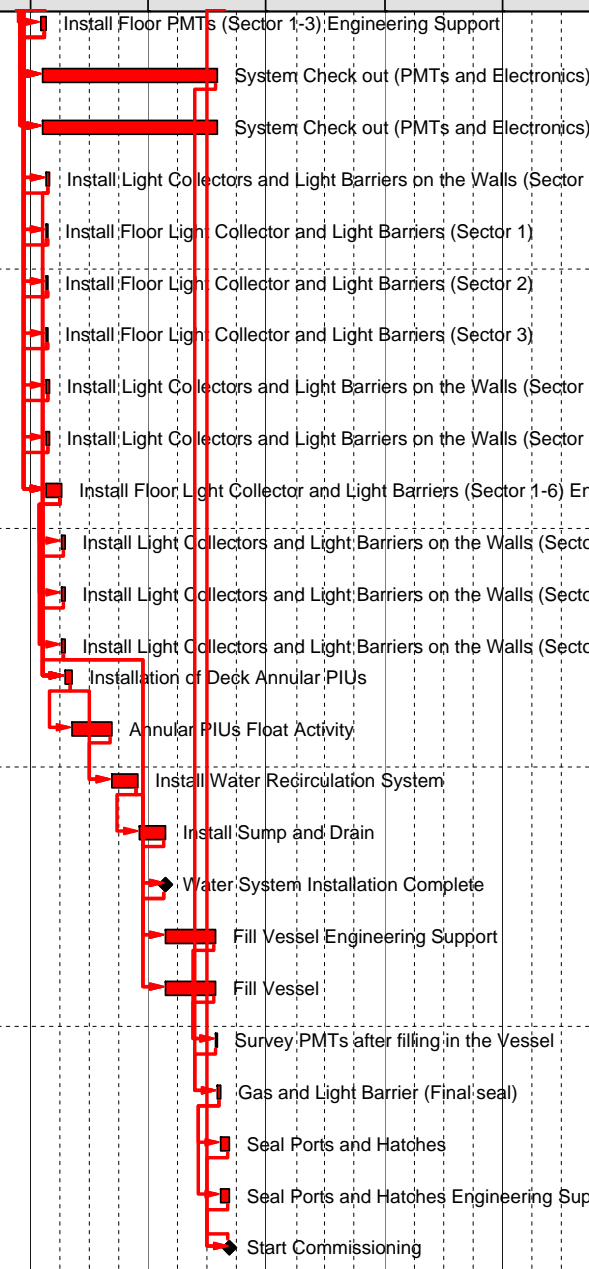


█ Actual Work █ Critical Remaining Work
█ Remaining Work ◆ Milestone

Activity ID	Activity Name	Original Duration	Start	Finish	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025
PD12571	Base Encapsulation Production Run #1 (Qty.5k)	263	21-Jan-16	23-Jan-17																	
PD13670	Procure Consumables for Production Run#2	40	27-Oct-16	21-Dec-16																	
PD13680	Assemble and Test Qty.8,000 PAs at Pilot Plant-Labor	263	22-Dec-16	26-Dec-17																	
PD13681	Assemble and Test Qty.8,000 PAs at Pilot Plant-Material	263	22-Dec-16	26-Dec-17																	
PD13650	Milestone - 5,000 PAs delivered to Integration Task	0		17-Jan-17																	
PD12580	Base Encapsulation Production Run#2 (Qty.8k)	263	24-Jan-17	25-Jan-18																	
PD12440	Vendor Production Run #3 - 6,000 PMTs	264	24-Jan-17	26-Jan-18																	
PD12581	Base Encapsulation Production Run#2 (Qty.8k)	263	24-Jan-17	25-Jan-18																	
PD12433	Vendor Support for Production Run #3 - 6,000 PMTs	264	24-Jan-17	26-Jan-18																	
PD13690	Milestone - 8kPAs delivered to Integration task (Total Qty.13k PAs)	0	26-Dec-17																		
PD13721	Assemble and Test Production #3 Qty. 8,000 PAs-Material	264	26-Dec-17	31-Dec-18																	
PD12590	Base Encapsulation Production Run #3 (Qty. 8k)	264	26-Jan-18	30-Jan-19																	
PD12591	Base Encapsulation Production Run #3 (Qty. 8k)	264	26-Jan-18	30-Jan-19																	
PD12450	Vendor Production Run #4 - 7,000 PMTs	264	29-Jan-18	31-Jan-19																	
PD12443	Vendor Support for Production Run #4 - 7,000 PMTs	264	29-Jan-18	31-Jan-19																	
PD12600	Base Encapsulation Production Run #4 (Qty.8k)	220	31-Jan-19	04-Dec-19																	
PD12610	Base Encapsulation Production Run #4 (Qty.8k)	220	31-Jan-19	04-Dec-19																	
PD12611	Base Encapsulation Production Run #4 (Qty.8k)	1	31-Jan-19	31-Jan-19																	
PD12425	Vendor Production Run #5 - 7,000 PMTs	220	01-Feb-19	05-Dec-19																	
PD13760	Assemble and Test Production #4 Qty. 8,000 PAs-Labor	220	01-Feb-19	06-Dec-19																	
PD12424	Vendor Support for Production Run #5 - 7,000 PMTs	220	01-Feb-19	05-Dec-19																	
PD13761	Assemble and Test Production #4 Qty. 8,000 PAs-Material	220	01-Feb-19	06-Dec-19																	
130.04.08 Integration, Installation and Safety Systems																					
IIS0920	Install Cable Trays	30	14-Aug-20	25-Sep-20																	
IIS0895	Install Electronics Racks Underground Engineering Support	30	14-Aug-20	25-Sep-20																	
IIS0900	Install Electronics Racks Underground	30	17-Aug-20	25-Sep-20																	
IIS0910	Install Electronic Crates in Racks	30	28-Sep-20	06-Nov-20																	
IIS0905	Install Electronic Crates in Racks Engineering Support	30	28-Sep-20	06-Nov-20																	
IIS0460	Install Floor PMTs (Sector 1)	8	06-Nov-20	18-Nov-20																	
IIS0470	Install Floor PMTs (Sector 2)	8	06-Nov-20	18-Nov-20																	
IIS0480	Install Floor PMTs (Sector 3)	8	06-Nov-20	18-Nov-20																	

█ Actual Work █ Critical Remaining Work
█ Remaining Work ◆ Milestone

Activity ID	Activity Name	Original Duration	Start	Finish	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025
IIS0455	Install Floor PMTs (Sector 1-3) Engineering Support	8	06-Nov-20	18-Nov-20																	
IIS0940	System Check out (PMTs and Electronics)	388	09-Nov-20	04-May-22																	
IIS0935	System Check out (PMTs and Electronics) Engineering support	388	09-Nov-20	04-May-22																	
IIS0580	Install Light Collectors and Light Barriers on the Walls (Sector 1)	10	18-Nov-20	02-Dec-20																	
IIS0520	Install Floor Light Collector and Light Barriers (Sector 1)	5	18-Nov-20	25-Nov-20																	
IIS0530	Install Floor Light Collector and Light Barriers (Sector 2)	5	18-Nov-20	25-Nov-20																	
IIS0540	Install Floor Light Collector and Light Barriers (Sector 3)	5	18-Nov-20	25-Nov-20																	
IIS0590	Install Light Collectors and Light Barriers on the Walls (Sector 2)	10	18-Nov-20	02-Dec-20																	
IIS0600	Install Light Collectors and Light Barriers on the Walls (Sector 3)	10	18-Nov-20	02-Dec-20																	
IIS0515	Install Floor Light Collector and Light Barriers (Sector 1-6) Engineering Support	36	18-Nov-20	06-Jan-21																	
IIS0610	Install Light Collectors and Light Barriers on the Walls (Sector 4)	9	07-Jan-21	19-Jan-21																	
IIS0620	Install Light Collectors and Light Barriers on the Walls (Sector 5)	9	07-Jan-21	19-Jan-21																	
IIS0630	Install Light Collectors and Light Barriers on the Walls (Sector 6)	9	07-Jan-21	19-Jan-21																	
IIS0640	Installation of Deck Annular PIUs	15	20-Jan-21	09-Feb-21																	
IIS0645	Annular PIUs Float Activity	86	10-Feb-21	09-Jun-21																	
IIS0780	Install Water Recirculation System	60	10-Jun-21	01-Sep-21																	
IIS0800	Install Sump and Drain	60	02-Sep-21	24-Nov-21																	
IIS0820	Water System Installation Complete	0		24-Nov-21																	
IIS1040	Fill Vessel Engineering Support	110	25-Nov-21	27-Apr-22																	
IIS1035	Fill Vessel	110	25-Nov-21	27-Apr-22																	
IIS0680	Survey PMTs after filling in the Vessel	5	28-Apr-22	04-May-22																	
IIS1020	Gas and Light Barrier (Final seal)	5	05-May-22	11-May-22																	
IIS1030	Seal Ports and Hatches	20	12-May-22	08-Jun-22																	
IIS1025	Seal Ports and Hatches Engineering Support	20	12-May-22	08-Jun-22																	
IIS1050	Start Commissioning	0	09-Jun-22																		



█ Actual Work █ Critical Remaining Work
█ Remaining Work ◆ Milestone

WBS DICTIONARY

WBS Element #	WBS Element Name	WBS Element Responsible Person	WBS Description
130.04	Water Cherenkov Detector	J. Stewart	Includes all phases of design, procurement, installation, commissioning and testing of a Water Cherenkov Detector (WCD) in an underground cavern at a site ~1200 km from Fermilab
130.04.01	Project Management	J. Stewart/P. Novakova	This element includes the general project management of the design, construction and testing of the WCD. It includes all activities related to the management and administration to ensure that construction activities meet the project goals and that work is done in accordance with DOE Cost, Schedule and Technical Guidelines. This consists of a sub-project Manager, and a project office activities with primary responsibility to ensure that project goals and objectives are successfully accomplished. They will report to the LBNE project management office, using earned-value-management, their tracking performance of cost, schedule and variance reporting. This element will provide for computers, software and supplies for the WCD project along with travel costs.
130.04.02	Water Containment	F. Feyzi/B. Paulos	This includes the vessel holding the water, the deck covering the vessel and all components therein not covered under other WBS items
130.04.02.01	Water Containment Management and Safety	F. Feyzi/B. Paulos	This element includes the general management of the water containment system and all activities related to the management and administration to ensure that construction activities meet the project goals and that work is done in accordance with DOE Cost, Schedule and Technical Guidelines.
130.04.02.02	Liner/Vessel	F. Feyzi/B. Paulos	This includes the water containment vessel starting from the rock wall inward, floor upward and deck downward containing all within except the Photo Multiplier Tubes (PMT) assemblies.
130.04.02.03	Deck Assembly	J. Fowler	This is the assembly over the vessel that forms the roof of the detector. It includes provisions for holding all equipment below and above.
130.04.02.04	Floor	F. Feyzi/Kriesel	This includes the water containment vessel floor starting from rock floor upward to the water. It includes all waste and leak water collection systems.
130.04.02.05	Water Volume	D. Alspach	This is all the items that have to do with water except for the water itself.
130.04.02.06	PMT Supports	D. Warner	This includes all support and installation elements that allow for attachment of PMTs inside the water volume. It does not include the PMT assembly itself.
130.04.02.06.01	Vessel/Liner	D. Warner	This is the support elements unique to attachment of the PMT assemblies to wall.
130.04.02.06.02	Deck	D. Warner	This is the support elements unique to attachment of the PMT assemblies to deck.
130.04.02.06.03	Floor	D. Warner	This is the support elements unique to attachment of the PMT assemblies to floor.
130.04.02.07	Installation	J. Dolph	This includes all the experts, physicist and engineering supervision supporting the installation and test activities of all tasks in 1.4.2. Installation labor itself is not included here.
130.04.02.08	Magnetic Compensation	Robl	This includes all the cables, supports, power supplies, and control systems for compensation of the earth's magnetic field within the detector.
130.04.02.09	Installation Equipment	Fowler/Kriesel	This includes all the systems and components necessary for installation of components within the Water Containment Vessel and on deck
130.04.02.10	Veto System	R. Breedon	This includes design, testing and fabrication of the WCD veto system.
130.04.03	Photon Detectors	P. Mantsch	This element includes the evaluation, selection, procurement, integration, testing and delivery of photon detector units which meet the required performance for light collection in the LBNE water Cherenkov detector.
130.04.03.01	Management and Safety	P. Mantsch/M. Kaducak	This element includes the general management of the photon detector system and all activities related to the management and administration to ensure that construction activities meet the project goals and that work is done in accordance with DOE Cost, Schedule and Technical Guidelines.
130.04.03.02	PMT	P. Mantsch/M. Kaducak	Includes Characterization and selection, procurement, supplier management, and delivery to the PA integration site(s) of all PMTs required for the project.
130.04.03.02.01	PMT Optical Electronic Characterization	P. Mantsch/M. Kaducak	Several PMT types will be evaluated. A data base will be maintained which for each PMT examined will include its relative efficiency, single photo-electron charge spectrum, single-photoelectron timing spectrum and noise rate.

WBS Element #	WBS Element Name	WBS Element Responsible Person	WBS Description
130.04.03.02.02	PMT Characterization	P. Mantsch/M. Kaducak	Compile the mechanical drawings, details of glass characteristics, thickness, materials. Document/Understand the static pressure rating from the vendors. Document and understand the shock tolerance for ordinary handling, packaging and shipping.
130.04.03.02.03	PMT Selection	P. Mantsch/M. Kaducak	This element includes the development of PMT performance requirements based on physics requirements.
130.04.03.02.04	PMT Procurement	P. Mantsch/M. Kaducak	The procurement process begins with an RFI and subsequent conferences with the vendors. Once the performance requirements are final, an RFP will go to interested vendors. A Source Selection Process will be used to determine the final vendor(s). The procurement of the PMTs will occur in several steps.
130.04.03.03	Base	B. Paulos	Includes origination of engineering requirements, design to meet those requirements, build prototype(s) and procurement and delivery to the PA integration site(s) of all bases required for the project.
130.04.03.04	Cable Assembly	Wahl	Includes specification, design, fabrication, procurement and delivery to the PA integration site(s) of all PMT cables required for the project. It also includes the design and prototype fabrication of PMT cables.
130.04.03.05	PMT Housing	Wahl	Design, build prototypes, procurement and delivery to the PA integration site(s) of all housing components including but not limited to waterproofing, packaging, shock and environment conditions protection required for the PMT from assembly into PA and PIU, installation and throughout the duration of the experiment.
130.04.03.06	Light Collector	Maricic	Includes the design, prototype fabrication and testing, procurement and delivery of light collector components for enhanced efficiency.
130.04.03.07	PA Integration & Testing	Haugen	It includes the facilities and the procurement of materials, components and supplies needed to construct all PMT Assemblies (PA) required for the project. Also includes the design, fabrication and testing of prototypes of the PMT Assembly.
130.04.04	Electronics/Readout	R. Van Berg/Kearns	Take electrical signals from PMT anodes, measure the amplitude and time of each signal, select "events" from these signals and write those "events" to disk for physics processing. This task includes providing HV to the PMT and LV to the custom electronics plus all control and monitoring of the hardware involved.
130.04.04.01	Electronics Management and Safety	R. Van Berg	This element includes the general management of the electronics/readout system and all activities related to the management and administration to ensure that construction activities meet the project goals and that work is done in accordance with DOE Cost, Schedule and Technical Guidelines.
130.04.04.02	Electrical Design/Characterization Cables and Bases	R. Van Berg	Detailed characterization of base and base cable system to provide best possible signal propagation, best signal shape in the electronics.
130.04.04.03	High Voltage	E. Hazen	System to provide power to PMTs, to provide monitoring of that HV power, and to provide control or adjustment at the group and single PMT level.
130.04.04.04	Front End Elect.	E. Hazen	Electronics board(s) and circuits that receive and then digitize PMT signals.
130.04.04.05	Trigger	R. Van Berg	System to locate and tag "events" for storage.
130.04.04.06	DAQ	Keener	Data Acquisition System that takes data from the Front End.
130.04.04.07	Monitoring and Control	TBD	System to monitor and control the Electronics Readout.
130.04.04.08	Power/Racks/Cooling	E. Hazen/R. Van Berg	Low voltage power for electronics, Racks and Crates to support electronics, cooling for all of above. AC power and associated hardware will be provided by the Installation Group.
130.04.04.09	Electronics Installation	E. Kearns/R. Van Berg	Installation of electronics and DAQ system at detector.
130.04.05	Calibration	G. Sinnis/M. Sanchez	This WBS element covers the management, design, fabrication, and delivery of the calibration systems for the Water Cherenkov Detector subsystem of the LBNE as well as the material compatibility R&D required for the systems.
130.04.05.01	Calibration Management and Safety	G. Sinnis/M. Sanchez	This element includes the general management of the calibration system and all activities related to the management and administration to ensure that construction activities meet the project goals and that work is done in accordance with DOE Cost, Schedule and Technical Guidelines.

WBS Element #	WBS Element Name	WBS Element Responsible Person	WBS Description
130.04.05.02	Water Transparency Monitoring	Napolitano	This WBS element covers requirements specifications, conceptual design, engineering development, fabrication, installation, integration, and commissioning of systems to monitor the absorption and scattering lengths of the WCD water.
130.04.05.03	PMT Calibration	Leonard	This WBS element covers the requirements specification, conceptual design, engineering development, fabrication, installation, integration and commissioning of the laser calibration systems. This section addresses the calibration of the PMT and electronics slewing and amplitude response, as well as position dependence, and calibration of the veto region.
130.04.05.04	Energy Calibration	T. Kutter	This WBS element covers the requirements specification, conceptual design, engineering development, fabrication, installation, integration and commissioning of the systems which address the energy calibration of the detector. The task includes the calibration of the energy scale and linearity, energy resolution, directional dependencies of energy scale and resolution and the stability of the energy calibrations.
130.04.05.05	Particle ID/Vertex Resolution	Maricic/Sanchez	This WBS element covers the design and implement systems to calibrate the vertex resolution, angular resolution, and particle identification efficiency of the LBNE WCD.
130.04.05.06	Gadolinium Monitoring (alternative - no cost associated)	Dazeley	This WBS element covers the requirements specification, conceptual design, engineering development, fabrication, installation, integration and commissioning of the system that monitors the concentration of any gadolinium content of the water.
130.04.05.07	Detector Environmental Monitoring	McTaggart	This WBS element covers the requirements specification, conceptual design, engineering development, fabrication, installation, integration and commissioning of the system that monitors the environment within the detector volume. This will be an interface with the slow control group.
130.04.06	Water System	J. Fowler/H. Sobel	This WBS Element covers the management, design, fabrication and delivery of the Water Supply and Purification Plant ("Water Plant ") for the Water Cherenkov Detector (WCD) subsystem of the LBNE as well as Material Compatibility R&D. The Water Plant includes a Fill System, one or more Recirculation Systems, Shaft Systems (i.e. piping and pump systems) to/from the surface, one or more Sump systems, a Waste Treatment System, and all of the necessary piping and plumbing between parts of the Water Plant as well as the supply, return, and waste piping from the detector tanks. The development plan also includes the R&D efforts on materials compatibility for down selection of water system materials.
130.04.06.01	Water System Management and Safety	J. Fowler	This element includes the general management of the water system and all activities related to the management and administration to ensure that construction activities meet the project goals and that work is done in accordance with DOE Cost, Schedule and Technical Guidelines.
130.04.06.02	Fill System	J. Fowler	This WBS Element covers the design, fabrication and delivery of the Water Fill System for the Cherenkov Water System. The Water Fill System, parts of which may reside on the surface, treats local water from the Lead- Deadwood Sanitary District and transports it to the detector tanks for the purposes of filling the tanks and adding makeup water. Embedded in the Fill Systems is the requisite Cooling System. In addition to the cooling units, and the mechanical interface to the water systems, the cooling system also includes the mechanism of removing waste heat and all of the associated plumbing and piping. Tasks included under this WBS element will bring the physics requirements and engineering specifications to maturity, and complete the final design drawings, engineering analysis, interface specifications, and safety and risk assessments. The process will include at a minimum Conceptual, Preliminary, Final Design, and Installation Readiness reviews. Final designs will be followed by procurement planning and fabrication of the water fill system. Fabricated parts will be shipped directly to the DUSEL site.

WBS Element #	WBS Element Name	WBS Element Responsible Person	WBS Description
130.04.06.03	Recirculation System	J. Fowler	This WBS Element covers the design, fabrication and delivery of the Water Recirculation System(s) for the WCD(s). There will be one recirculation system for each WCD tank, up to 3 total, and all identical. Each recirculation system will be located underground alongside its WCD tank. The recirculation system takes in water from the tank, cleans it, and delivers it back to the tank. Embedded in the Recirculation Systems are the requisite Cooling Systems, one for each recirculation system. In addition to the cooling units, and the mechanical interface to the water systems, cooling systems also includes the mechanism of removing waste heat and all of the associated plumbing and piping. Tasks included under this WBS element will bring the physics requirements and engineering specifications to maturity, and complete the final design drawings, engineering analysis, interface specifications, and safety and risk assessments. The process will include at a minimum Conceptual, Preliminary, Final Design, and Installation Readiness reviews. Final designs will be followed by procurement planning and fabrication of the water fill system. Fabricated parts will be shipped directly to the DUSEL site.
130.04.06.04	Water Shaft	J. Fowler	This WBS Element covers the requirements specification, engineering development, and fabrication of the Water Shaft Systems. The Water Shaft Systems consist of two types of systems, each having the piping and flow elements necessary to move water to/from the surface and the 4850' level. The first type includes two shaft systems to transport water from the surface Fill System to the Recirculation Systems below. One system delivers water that has been pre-filtered and the other purified (pre-filtered, reversed-osmosis, etc.) water. The second type of system will pump water from the Sump/Drain systems at the 4850' level to the Waste Treatment Systems on the surface. The shaft systems may be combined or eliminated as the design matures. Tasks included under this WBS element will bring the physics requirements and engineering specifications to maturity, and complete the final design drawings, engineering analysis, interface specifications, and safety and risk assessments. The process will include at a minimum Conceptual, Preliminary, Final Design, and Installation Readiness reviews. Final designs will be followed by procurement planning and fabrication of the water fill system. Fabricated parts will be shipped directly to the DUSEL site.
130.04.06.05	Water Sump System	J. Fowler	This WBS Element covers the requirements specification, engineering development, and fabrication of the water sump systems. The sumps reside near the base of each tank to collect leakage, overflow, and ground water, and to provide a mechanism for draining the tank. This WBS element includes the piping from the collection system at the bottom of the tank, the drain pipe and valve, the sump pump(s) and modifications to the cavern where the sump is situated. The piping from the sump to the waste system is included in this WBS element.
130.04.06.06	Water Waste Treatment System	J. Fowler	This WBS Element covers the requirements specification, engineering development, and fabrication of the Waste Treatment System. The Waste Treatment System resides underground and collects water from the sumps and waste water from the fill and recirculation systems, where it is appropriately treated and released into the environment.
130.04.06.07	Material Compatibility Testing	M. Yeh	Material Compatibility Testing covers Investigation of compatible materials for long term WCD storage. The study will cover liquid effects on material, material effects on liquids, and kinetics modeling of leaching. It will also develop precleaning procedures to reduce cost and time for purification. The study will conclude with material recommendations/down selections.
130.04.06.08	Water System Installation	J. Fowler	Planning and execution of the installation of the WCD system in the Homestake mine. This Planning Phase brings together all elements for installation and deployment of the WCD in the Homestake mine. All contractor SOW, work plans and permits, installation plans/schedules, and PPE will be in place at the conclusion of the planning stage. Also, the requisite subsystems will be ready for installation. Execution of the installation of the WCD, including water purification, water cooling, and water sump and waste mechanical systems. Also, the corresponding electrical and control elements will be installed and conclude with functional system testing and certification.

WBS Element #	WBS Element Name	WBS Element Responsible Person	WBS Description
130.04.07	Computing	B. Viren	Processing, archiving, simulating and reconstructing the detector data after it has been readout from DAQ/Electronics.
130.04.07.01	Computing Management and Safety	B. Viren	This element includes the general management of the computing system and all activities related to the management and administration to ensure that construction activities meet the project goals and that work is done in accordance with DOE Cost, Schedule and Technical Guidelines.
130.04.07.02	Online Computing	G. Sullivan	The online system is comprised of the computing systems run online to collect and store raw physics data, process and filter raw data in near real time to a subset of interesting events at lower data rate, provide the software infrastructure for near real time monitoring of detector systems and data quality, and to provide a generalized run control system for setting up and controlling the running of the various detector systems in a coordinated manner. The responsibility for online processing and handling of data is separate from DAQ and begins when DAQ has readout the data from the electronics and transmits it to online systems. It ends with the hand off of data to the Infrastructure group for off-site archival.
130.04.07.03	Offline Computing	T. Junk	Software to simulate, reconstruct and analyze raw DAQ data.
130.04.07.04	Infrastructure	B. Viren	Support Online and Offline computing.
130.04.08	Integration, Installation and Safety Systems	J. Dolph	The primary scope of this WBS element is to provide system management, engineering, design and administration to the LBNE project office and to assist the sub-project manager and system managers in fulfilling project interface, installation and safety objectives.
130.04.08.01	Management	J. Dolph	This element includes the general management of the integration installation and safety. It includes all activities related to the management and administration to ensure that construction activities meet the project goals and that work is done in accordance with DOE Cost, Schedule and Technical Guidelines. This consists of a system Manager and sub-system managers for each defined element whose primary responsibility will be to ensure subsystem goals and objectives are successfully accomplished. They will report to the project management office, using earned-value-management, their tracking performance of cost, schedule and variance reporting. The system manager will be a member of the project management Technical Board. This element will provide for computers, software and supplies for this subsystem along with travel costs.
130.04.08.02	Integration	J. Dolph	The scope of effort for this element includes the cost of labor and materials to assist experimental subsystems and their managers in developing, defining, and controlling the mechanical systems, electrical systems, experimental assembly, safety systems, and civil construction interface between each subsystem. To this end this element will act as liaisons between each subsystem to coordinate and document efforts in resolving all physical interface issues. Engineering and design effort is being devoted to ensure that subsystem hardware can fit together, be assembled and serviced, and have minimal negative impact on other subsystem performance. This element will communicate integration issues and their resolution based on change control policy to sub-project manager, project management and the collaboration in general on interface issues. This element must approve and process all Engineering Change Request and Engineering Change Notice (ECR/ECN) dealing with subsystem interfaces, experimental assembly and physical envelope related issues. This element will also assist in the development of general engineering policies, guidelines and standards to be used project wide for engineering documentation, specification and procedures, drawing standards, change control, hoisting and rigging, and the design review process.

WBS Element #	WBS Element Name	WBS Element Responsible Person	WBS Description
130.04.08.03	Installation	J. Dolph	<p>This element supports the overall planning, staging, control and execution of the final assembly, installation and test of the experimental hardware on site at DUSEL. It includes labor, materials and general equipment required to perform these functions. For example, man-lifts, scaffolding, hand-tools and general rigging equipment. It does not include custom installation and test hardware required by individual detector subsystems. It also includes overall system testing and commissioning of the experiment once installed. The element includes activities in the surface assembly buildings as well as in the underground caverns and rooms at DUSEL. It includes all technical, trades, supervisory and engineering labor required to install and test the detector subsystems, but not the subsystem experts, physicist and engineering supervision, from the subsystems supporting the installation and test activities.</p>
130.04.08.04	Safety Systems	R. Gill	<p>The primary scope of this WBS element is to assist in the development and implementation of Environmental, Safety, Security and Health policies and safety systems hardware for the protection of all collaborative members working at the LBNE experimental complex. They will develop and define life safety and equipment protection policies that meet minimum standards as negotiated between LBNE and DUSEL. These policies will include radiological controls, chemical management, emergency egress and access, fire protection and suppression, laser operation, cryogenics, ODH, fall protection and PPE, LOTO of electrical and mechanical hazards, spill confinement/cleanup controls, and underground safety and training. It will also provide for engineering and design efforts in the development of a global safety interlocks system using programmable logic controller (PLC) to alarm on preprogrammed fault conditions and automatically bring the experimental hardware to a safe state. This includes the design, specification, procurement and programming of the PLC along with integration of water leak detection, heat/smoke detection, AC ground-fault detection and ODH detection.</p>

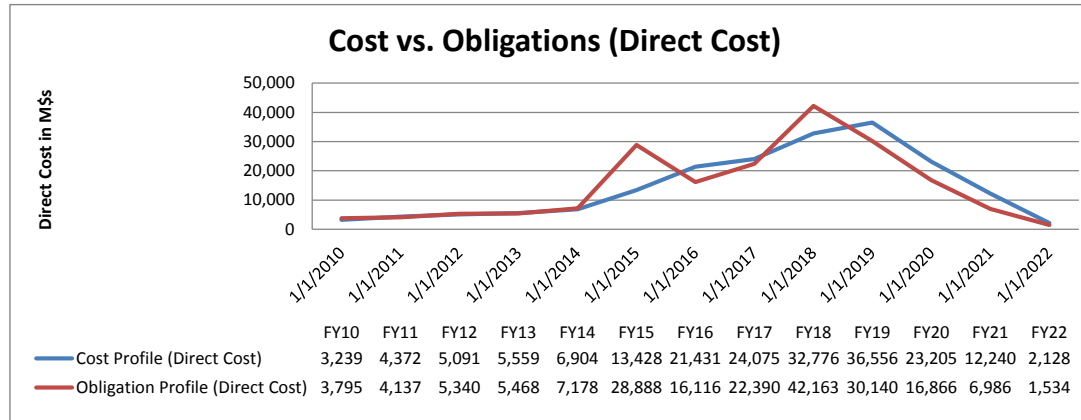
**WATER
CHERENKOV
DETECTOR**

SUMMARY COST

Water Cherenkov Detector Total Project Cost

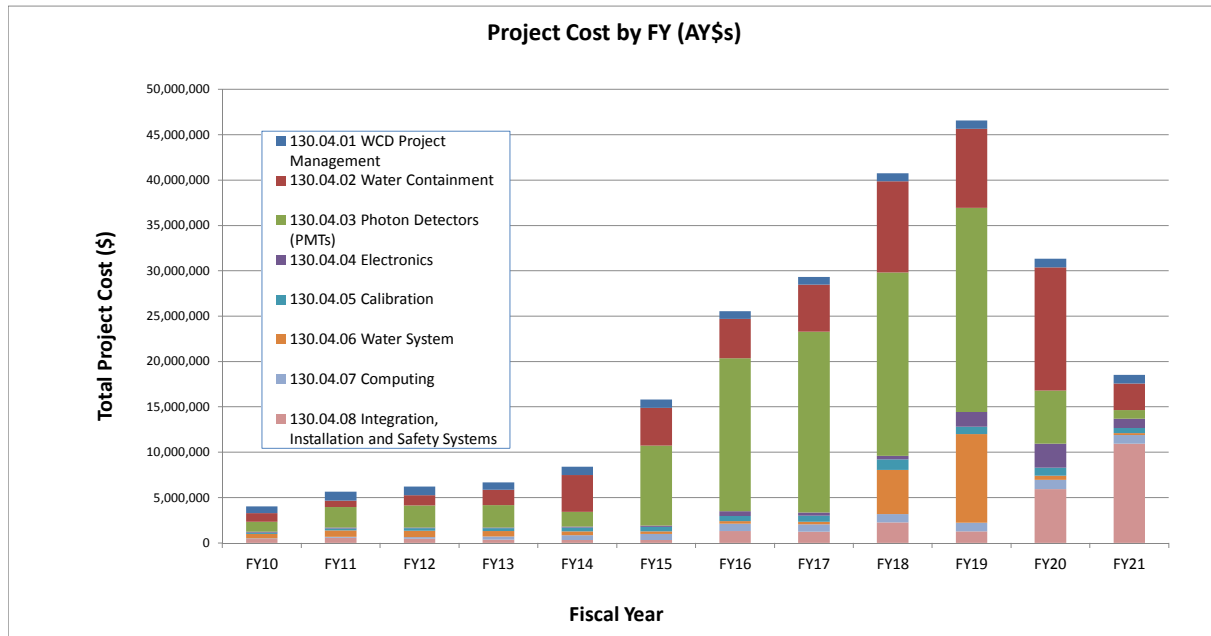
WBS	Direct Cost	Direct and Indirect	Direct/Indirect/Escalation	Contingency %	TPC
130.04.01 WCD Project Management	7,238,277	10,394,052	11,394,188	16%	13,217,258
130.04.02 Water Containment	48,323,173	48,838,531	57,795,566	28%	73,978,325
130.04.03 Photon Detectors (PMTs)	84,455,285	90,646,594	105,329,816	28%	134,822,165
130.04.04 Electronics	6,193,314	6,193,314	7,589,085	15%	8,727,447
130.04.05 Calibration	5,735,799	5,735,799	6,681,588	29%	8,619,249
130.04.06 Water System	15,430,070	16,199,873	19,166,324	12%	21,466,283
130.04.07 Computing	6,069,156	6,756,332	7,814,836	16%	9,065,210
130.04.08 Integration, Installation and Safety System	17,615,310	22,242,386	26,550,435	40%	37,170,609
Grand Total	191,060,384	207,006,881	242,321,839	27%	307,066,546

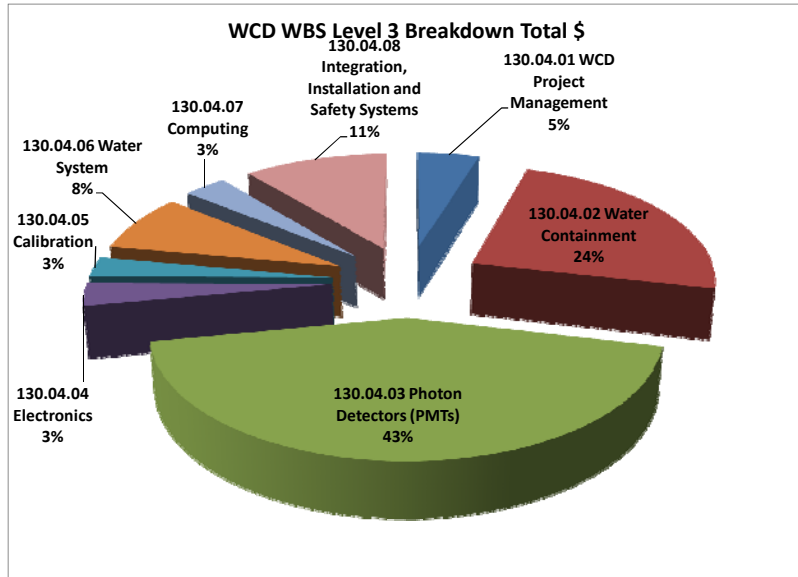
FY	Cost Profile (Direct Cost)	Obligation Profile (Direct Cost)
FY10	3,239	3,795
FY11	4,372	4,137
FY12	5,091	5,340
FY13	5,559	5,468
FY14	6,904	7,178
FY15	13,428	28,888
FY16	21,431	16,116
FY17	24,075	22,390
FY18	32,776	42,163
FY19	36,556	30,140
FY20	23,205	16,866
FY21	12,240	6,986
FY22	2,128	1,534
Total	191,004	191,001



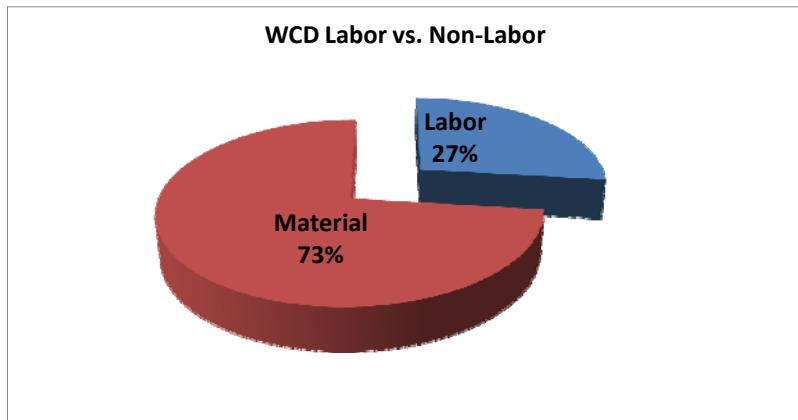
Water Cherenkov Detector Cost Distribution at L3 (AY\$)

WBS - Level 3	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
130.04.01 WCD Project Management	711,191	1,021,468	953,568	808,115	920,790	927,389	873,458	870,787	894,128	917,628	936,269	975,345
130.04.02 Water Containment	962,708	705,679	1,123,802	1,680,086	4,062,129	4,175,692	4,319,947	5,184,343	10,052,449	8,709,880	13,590,448	2,929,350
130.04.03 Photon Detectors (PMTs)	1,110,377	2,231,986	2,434,977	2,466,344	1,622,617	8,787,243	16,855,428	19,928,063	20,216,360	22,499,430	5,863,904	931,910
130.04.04 Electronics	80,775	104,402	91,524	80,870	100,452	174,305	560,076	352,603	398,297	1,633,599	2,620,968	1,048,956
130.04.05 Calibration	153,988	209,754	251,636	332,602	433,487	471,706	548,770	676,114	1,159,803	827,916	888,761	545,916
130.04.06 Water System	496,902	732,597	729,037	582,235	403,012	298,471	289,144	270,894	4,839,265	9,747,302	477,697	200,063
130.04.07 Computing	71,915	99,532	183,124	345,184	521,394	674,683	788,482	822,396	923,465	960,384	990,115	979,389
130.04.08 Integration, Installation and Safety Systems	423,677	561,824	449,489	371,518	335,808	308,157	1,327,643	1,227,433	2,273,654	1,278,569	5,949,728	10,928,803
Total Project Cost (\$)	4,011,532	5,667,241	6,217,156	6,666,955	8,399,690	15,817,647	25,562,946	29,332,634	40,757,420	46,574,707	31,317,890	18,539,732





WBS - Level 2	Cost (AY\$s)
130.04.01 WCD Project Management	11,394,188
130.04.02 Water Containment	57,795,566
130.04.03 Photon Detectors (PMTs)	105,329,816
130.04.04 Electronics	7,589,085
130.04.05 Calibration	6,681,588
130.04.06 Water System	19,166,324
130.04.07 Computing	7,814,836
130.04.08 Integration, Installation and Safety Systems	26,550,435
Total Project Cost (\$)	242,321,839

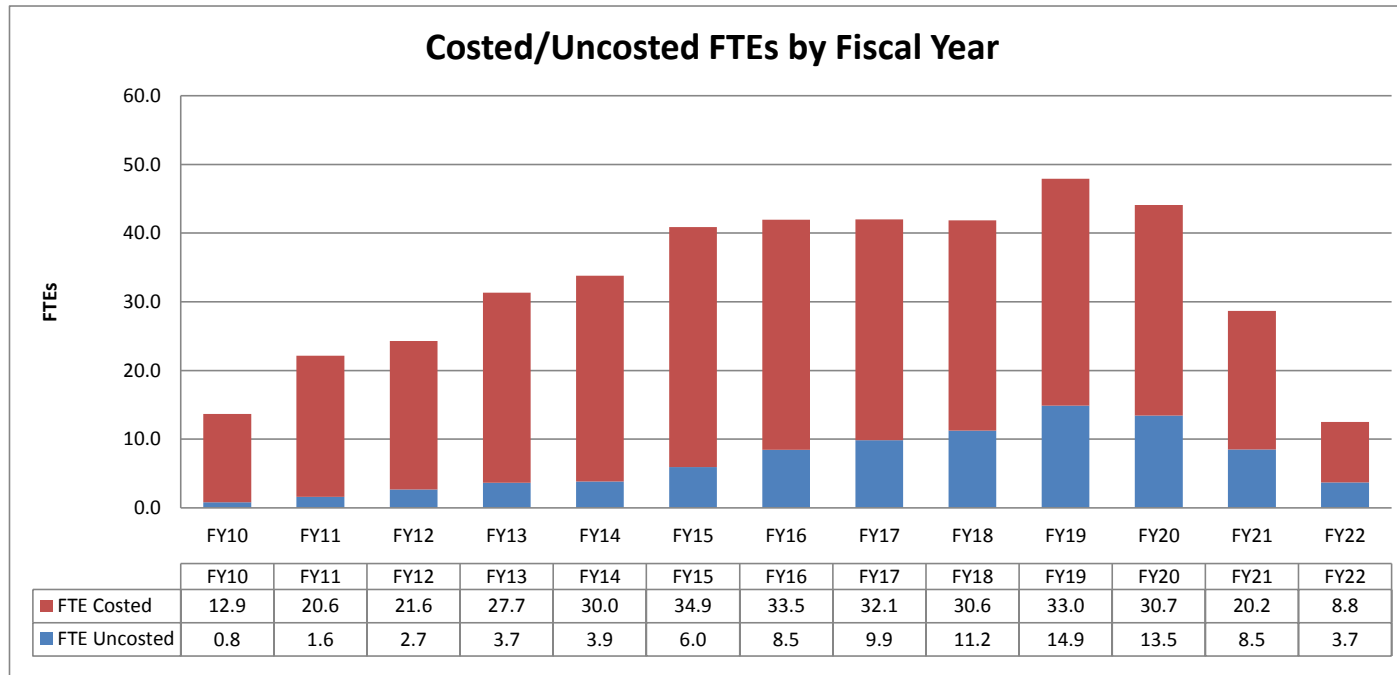


WCD Labor vs. Non-Labor	Cost (AY\$s)
Labor	65,183,980
Material	177,137,858
Total Project Cost (\$)	242,321,839

Uncosted FTEs		
FY	Total	
9/30/2010	0.80	
9/30/2011	1.61	
9/30/2012	2.66	
9/30/2013	3.68	
9/30/2014	3.86	
9/30/2015	5.96	
9/30/2016	8.48	
9/30/2017	9.85	
9/30/2018	11.24	
9/30/2019	14.90	
9/30/2020	13.46	
9/30/2021	8.50	
9/30/2022	3.72	
Grand Total	88.71	

Costed FTEs		
FY	Total	
9/30/2010	12.87	
9/30/2011	20.56	
9/30/2012	21.63	
9/30/2013	27.66	
9/30/2014	29.96	
9/30/2015	34.95	
9/30/2016	33.46	
9/30/2017	32.15	
9/30/2018	30.64	
9/30/2019	33.02	
9/30/2020	30.65	
9/30/2021	20.18	
9/30/2022	8.80	
Grand Total	336.53	

FY	FTE Uncosted	FTE Costed
FY10	0.8	12.9
FY11	1.6	20.6
FY12	2.7	21.6
FY13	3.7	27.7
FY14	3.9	30.0
FY15	6.0	34.9
FY16	8.5	33.5
FY17	9.9	32.1
FY18	11.2	30.6
FY19	14.9	33.0
FY20	13.5	30.7
FY21	8.5	20.2
FY22	3.7	8.8

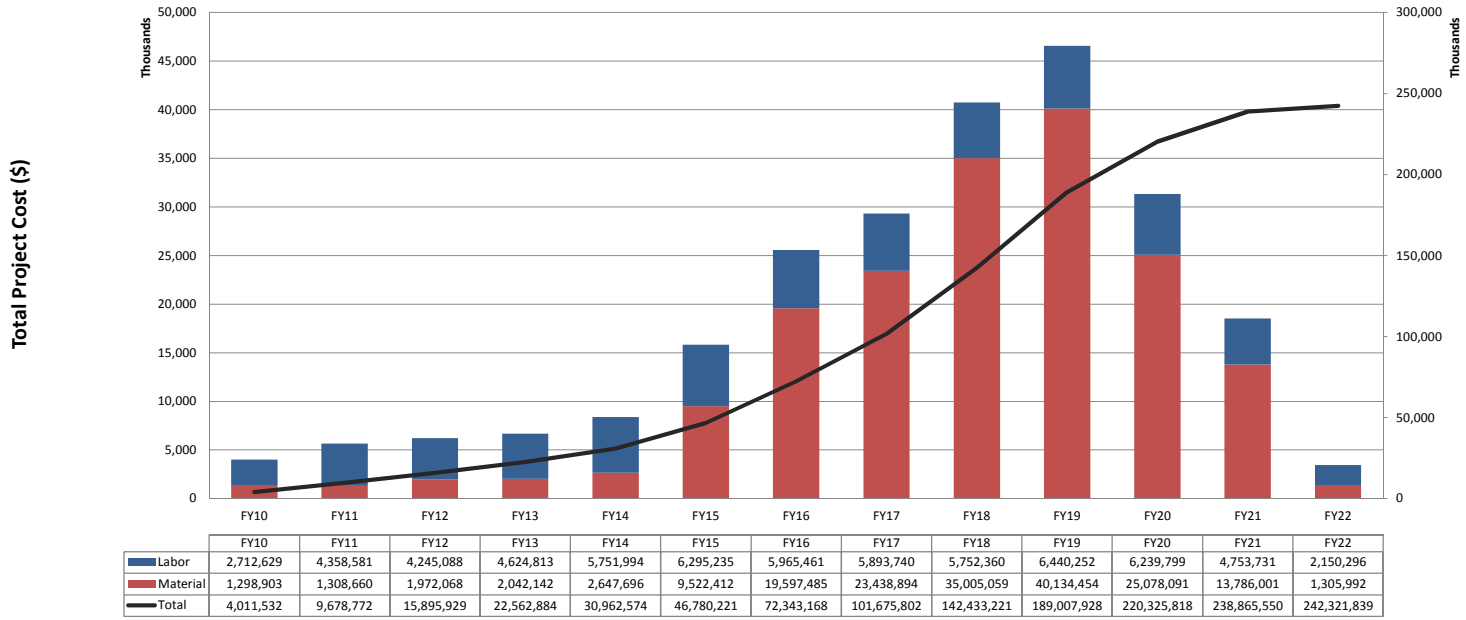


Responsibility assignment Matrix

Total Cost (\$K)

WBS - Level 3	J. Stewart	F. Feyzi/R. Paulos	P. Mantsch/M. Kaducak	R. Van Berg/E. Kearns	G. Sinnis/M. Sanchez	J. Fowler	B. Viren	J. Dolph	Cost (AY\$s)
130.04.01 WCD Project Management	11,394								11,394
130.04.02 Water Containment		57,796							57,796
130.04.03 Photon Detectors (PMTs)			105,330						105,330
130.04.04 Electronics				7,589					7,589
130.04.05 Calibration					6,682				6,682
130.04.06 Water System						19,166			19,166
130.04.07 Computing							7,815		7,815
130.04.08 Integration, Installation and Safety Systems								26,550	26,550
Total Project Cost (\$)	11,394	57,796	105,330	7,589	6,682	19,166	7,815	26,550	242,322

Labor vs. Non-labor by Fiscal Year (AY\$)



FY	Material	Labor	Total
FY10	1,298,903	2,712,629	4,011,532
FY11	1,308,660	4,358,581	9,678,772
FY12	1,972,068	4,245,088	15,895,929
FY13	2,042,142	4,624,813	22,562,884
FY14	2,647,696	5,751,994	30,962,574
FY15	9,522,412	6,295,235	46,780,221
FY16	19,597,485	5,965,461	72,343,168
FY17	23,438,894	5,893,740	101,675,802
FY18	35,005,059	5,752,360	142,433,221
FY19	40,134,454	6,440,252	189,007,928
FY20	25,078,091	6,239,799	220,325,818
FY21	13,786,001	4,753,731	238,865,550
FY22	1,305,992	2,150,296	242,321,839

**WATER
CHERENKOV
DETECTOR

COST BOOKS**

130.04.01 WCD Project Management - Total Cost (\$ Including Direct, Indirect & Escalation)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.01 WCD Project Management	711,191	1,021,468	953,568	808,115	920,790	927,389	873,458	870,787	894,128	917,628	936,269	975,345	584,052	11,394,188
Grand Total	711,191	1,021,468	953,568	808,115	920,790	927,389	873,458	870,787	894,128	917,628	936,269	975,345	584,052	11,394,188

130.04.01 WCD Project Management - Labor (\$)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.01 WCD Project Management	617,101	820,622	746,294	634,608	669,349	680,071	700,509	719,853	739,155	758,907	779,497	813,454	535,314	9,214,734
Grand Total	617,101	820,622	746,294	634,608	669,349	680,071	700,509	719,853	739,155	758,907	779,497	813,454	535,314	9,214,734

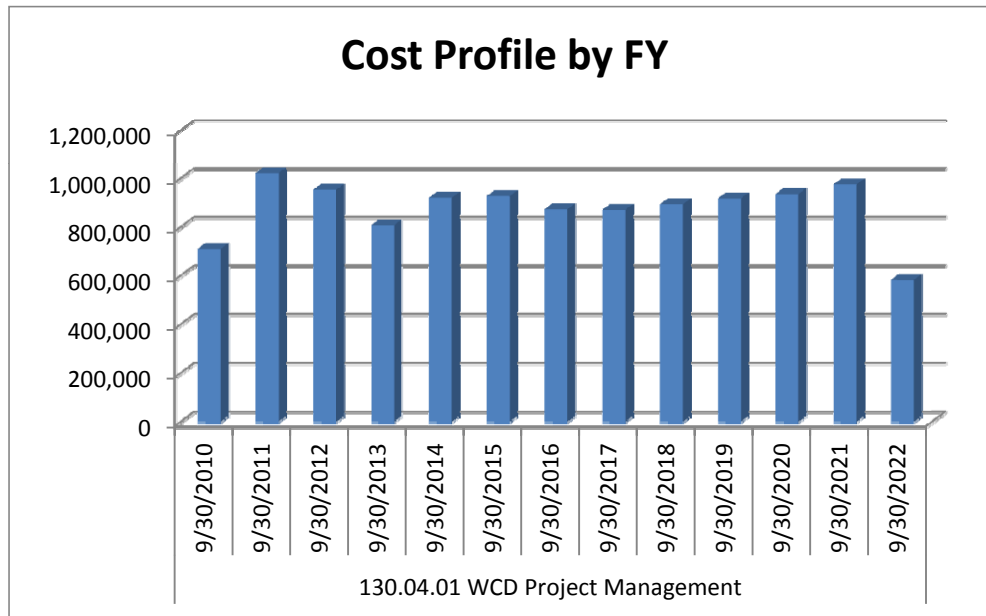
130.04.01 WCD Project Management - Material (\$)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.01 WCD Project Management	94,089	200,845	207,274	173,507	251,441	247,318	172,949	150,934	154,973	158,720	156,773	161,892	48,738	2,179,453
Grand Total	94,089	200,845	207,274	173,507	251,441	247,318	172,949	150,934	154,973	158,720	156,773	161,892	48,738	2,179,453

130.04.01 WCD Project Management - FTEs

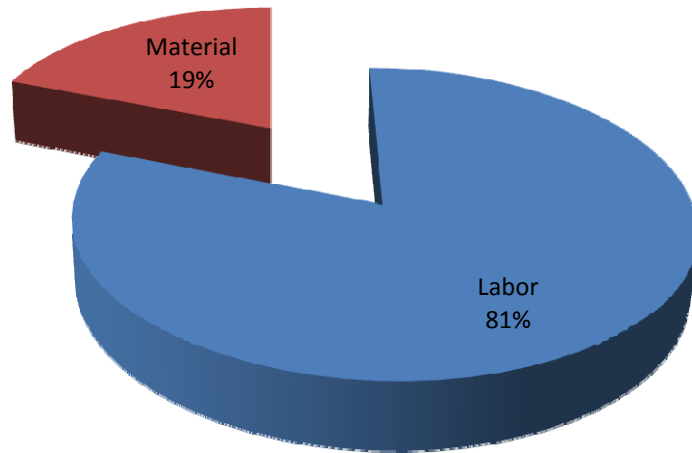
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.01 WCD Project Management	1.98	3.09	3.01	3.08	3.15	3.11	3.13	3.12	3.14	3.14	3.13	3.16	2.04	38.27
Grand Total	1.98	3.09	3.01	3.08	3.15	3.11	3.13	3.12	3.14	3.14	3.13	3.16	2.04	38.27

FY	Cost
130.04.01 WCD Project Management	11,394,188
9/30/2010	711,191
9/30/2011	1,021,468
9/30/2012	953,568
9/30/2013	808,115
9/30/2014	920,790
9/30/2015	927,389
9/30/2016	873,458
9/30/2017	870,787
9/30/2018	894,128
9/30/2019	917,628
9/30/2020	936,269
9/30/2021	975,345
9/30/2022	584,052
Grand Total	11,394,188

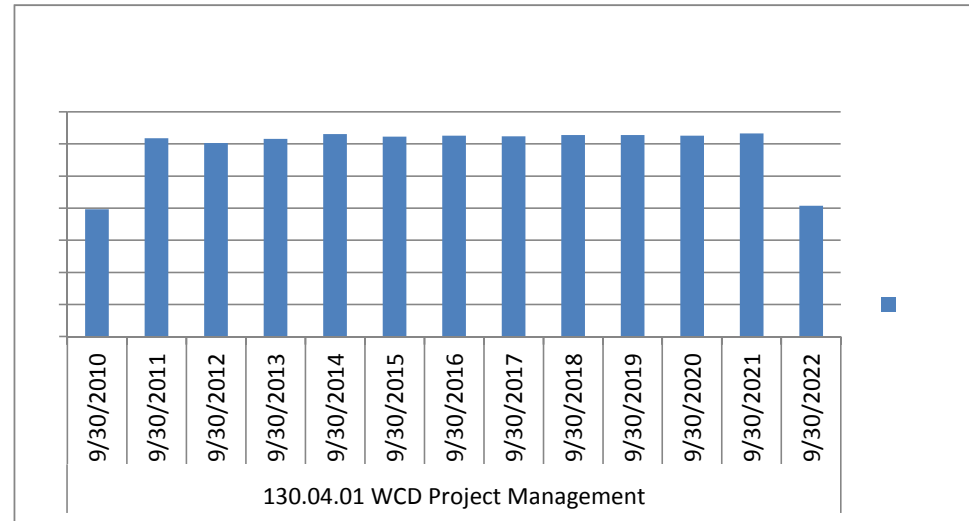


WBS	Cost
130.04.01 WCD Project Management	11,394,188
Labor	9,214,734
Material	2,179,453
Grand Total	11,394,188

130.04.01 Labor Material Ratio

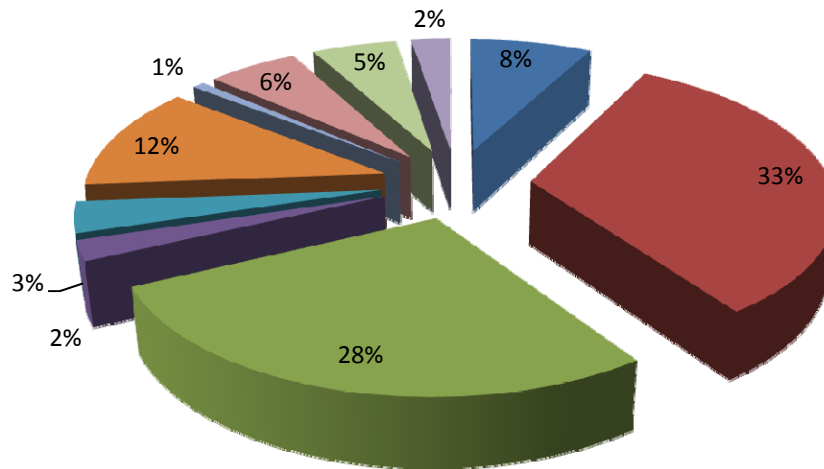


FY	FTEs
130.04.01 WCD Project Management	38
9/30/2010	2
9/30/2011	3
9/30/2012	3
9/30/2013	3
9/30/2014	3
9/30/2015	3
9/30/2016	3
9/30/2017	3
9/30/2018	3
9/30/2019	3
9/30/2020	3
9/30/2021	3
9/30/2022	2
Grand Total	38

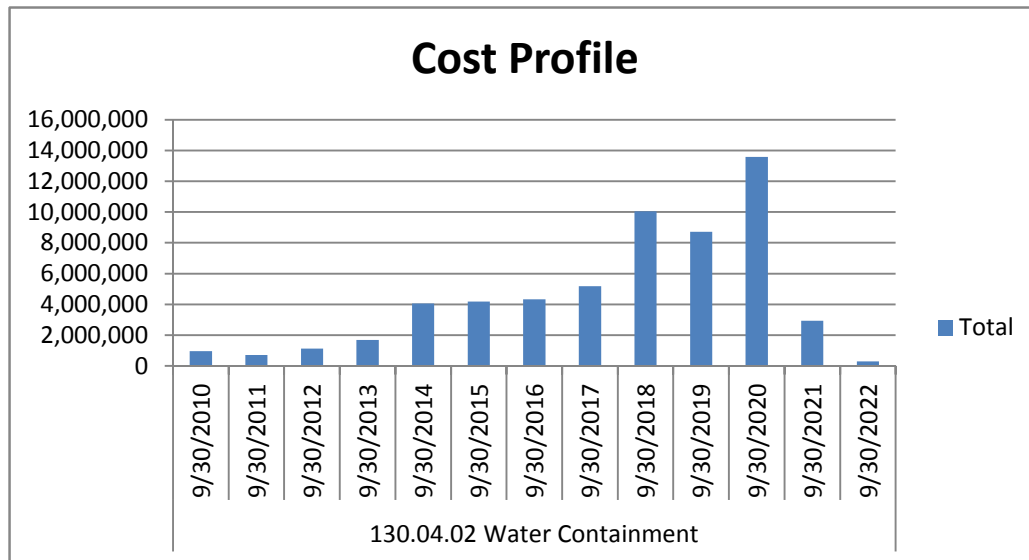


WBS	Cost
130.04.02 Water Containment	57,795,566
130.04.02.01 Management and Safety	4,469,877
130.04.02.02 Liner/Vessel	18,873,510
130.04.02.03 Deck Assembly	15,942,720
130.04.02.04 Floor	1,307,519
130.04.02.05 Water Volume	2,020,542
130.04.02.06 PMT Supports (PIU)	6,854,676
130.04.02.07 Installation	444,510
130.04.02.08 Magnetic Compensation	3,301,888
130.04.02.09 Installation Equipment	3,118,571
130.04.02.10 Veto System	1,461,753
Grand Total	57,795,566

130.04.02 Vessel - Cost Distribution at L4

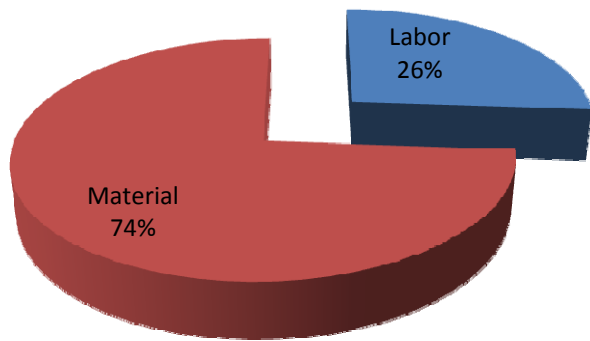


FY	Cost
130.04.02 Water Containment	57,795,566
9/30/2010	962,708
9/30/2011	705,679
9/30/2012	1,123,802
9/30/2013	1,680,086
9/30/2014	4,062,129
9/30/2015	4,175,692
9/30/2016	4,319,947
9/30/2017	5,184,343
9/30/2018	10,052,449
9/30/2019	8,709,880
9/30/2020	13,590,448
9/30/2021	2,929,350
9/30/2022	299,054
Grand Total	57,795,566



WBS	Cost
130.04.02 Water Containment	
Labor	15,063,539
Material	42,732,028
Total	57,795,566

130.04.02 Labor/Material Ratio



COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
130.04.02.03.02 Gas Blanket	WC1700 Gas Blanket - Conceptual design	BNL M&S CE from UW: Mechanical Engineer					42.99							42.99
	WC1700 Gas Blanket - Conceptual design Total						342.99							342.99
	WC1710 Gas Blanket - Preliminary design	BNL M&S CE from DK: Mechanical Engineer					238.55	103.46						342.01
		BNL M&S CE from UW: Mechanical Designer					119.97	52.03						172.00
		BNL M&S CE from UW: Mechanical Engineer					104.62	45.37						149.99
	WC1710 Gas Blanket - Preliminary design Total						463.14	200.86						664.00
	WC1720 Gas Blanket - Technology review	BNL M&S CE from DK: Mechanical Engineer						42.80						42.80
	WC1720 Gas Blanket - Technology review Total							42.80						42.80
	WC1730 Gas Blanket - Final design	BNL M&S CE from DK: Mechanical Engineer						311.65	30.35					342.00
		BNL M&S CE from UW: Mechanical Designer						623.30	60.71					684.01
		BNL M&S CE from UW: Mechanical Engineer						136.69	13.31					150.00
	WC1730 Gas Blanket - Final design Total							1,071.64	104.37					1,176.01
	WC1750 Gas Blanket - Prototype and test	BNL M&S CE from DK: Mechanical Engineer							135.80	35.20				171.00
		BNL M&S CE from UW: Mechanical Engineer							135.80	35.20				171.00
	WC1750 Gas Blanket - Prototype and test Total								271.60	70.40				342.00
	WC1760 Gas Blanket - Procurement and contracts	BNL M&S CE from UW: Mechanical Engineer								148.69	1.31			150.00
	WC1760 Gas Blanket - Procurement and contracts Total									148.69	1.31			150.00
	WC1790 Gas Blanket - Install on detector	BNL M&S CE from DK: Mechanical Engineer												171.59
		BNL M&S CE from UW: Mechanical Engineer												171.59
	WC1790 Gas Blanket - Install on detector Total													343.18
	WC1771 Gas Blanket - Fabrication Support	BNL M&S CE from DK: Mechanical Engineer									183.36	29.64		213.00
		BNL M&S CE from UW: Mechanical Designer									294.41	47.60		342.01
		BNL M&S CE from UW: Mechanical Engineer									74.89	12.10		86.99
WC1771 Gas Blanket - Fabrication Support Total										552.66	89.34		642.00	
130.04.02.03.02 Gas Blanket Total							806.13	1,315.30	375.97	219.09	553.97	89.34	343.18	3,702.98
130.04.02.03.03 Calibration ports and Access	WC1810 Calibration ports and Access - Conceptual design	BNL M&S CE from DK: Mechanical Engineer						150.00						150.00
		BNL M&S CE from UW: Mechanical Designer						150.00						150.00
		BNL M&S CE from UW: Mechanical Engineer						300.00						300.00
	WC1810 Calibration ports and Access - Conceptual design Total							600.00						600.00
	WC1820 Calibration ports and Access - Preliminary design	BNL M&S CE from DK: Mechanical Engineer						91.12	58.87					149.99
		BNL M&S CE from UW: Mechanical Designer						91.12	58.87					149.99
		BNL M&S CE from UW: Mechanical Engineer						91.12	58.87					149.99
	WC1820 Calibration ports and Access - Preliminary design Total							273.36	176.61					449.97
	WC1830 Calibration ports and Access - Final design	BNL M&S CE from DK: Mechanical Engineer							1,063.23	134.78				1,198.01
		BNL M&S CE from UW: Mechanical Designer							266.25	33.75				300.00
		BNL M&S CE from UW: Mechanical Engineer							133.12	16.87				149.99
	WC1830 Calibration ports and Access - Final design Total								1,462.60	185.40				1,648.00
	WC1850 Calibration ports and Access - Prototype and test	BNL M&S CE from DK: Mechanical Engineer								1,626.00				1,626.00
		BNL M&S CE from UW: Mechanical Engineer								192.99				192.99
	WC1850 Calibration ports and Access - Prototype and test Total									1,818.99				1,818.99
	WC1860 Calibration ports and Access - Procurement and con	BNL M&S CE from DK: Mechanical Engineer								171.01				171.01
	WC1860 Calibration ports and Access - Procurement and con Total									171.01				171.01
	WC1870 Calibration ports and Access - Fabrication	BNL M&S CE from DK: Mechanical Engineer								208.50	903.50			1,112.00
		BNL M&S CE from UW: Mechanical Designer								7.88	34.13			42.01
		BNL M&S CE from UW: Mechanical Engineer								28.12	121.87			149.99
	WC1870 Calibration ports and Access - Fabrication Total									244.50	1,059.50			1,304.00
	WC1890 Calibration ports and Access - Install on detector	BNL M&S CE from DK: Mechanical Engineer												171.01
		BNL M&S CE from UW: Mechanical Engineer												171.01
WC1890 Calibration ports and Access - Install on detector Total													342.02	
130.04.02.03.03 Calibration ports and Access Total								873.36	1,639.21	2,419.90	1,059.50		342.02	6,333.99
Grand Total			477.14	960.00	580.92	1,890.24	4,280.27	3,080.53	2,685.54	3,333.32	1,959.58	238.74	3,425.18	22,911.46

130.04.02.04 Floor (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY12	FY13	FY14	FY15	FY19	FY20	FY21	Grand Total
130.04.02.04.02 Floor Auxiliary Equipment	WC2000 Floor Auxiliary Equipment - Conceptual design	BNL M&S CE from UW: Mechanical Engineer	12,552	3,610						16,162
	WC2000 Floor Auxiliary Equipment - Conceptual design Total		12,552	3,610						16,162
	WC2010 Floor Auxiliary Equipment - Preliminary design	BNL M&S CE from UW: Mechanical Engineer		16,225						16,225
	WC2010 Floor Auxiliary Equipment - Preliminary design Total			16,225						16,225
	WC2020 Floor Auxiliary Equipment - Final design	BNL M&S CE from UW: Mechanical Designer		278	12,407					12,685
		BNL M&S CE from UW: Mechanical Engineer		365	16,288					16,653
	WC2020 Floor Auxiliary Equipment - Final design Total			643	28,695					29,338
	WC2040 Floor Auxiliary Equipment - Prototype and test	BNL M&S CE Supplies			43,029	38,407				81,436
		FNAL M&S CE Costs			28,976	25,863				54,839
	WC2040 Floor Auxiliary Equipment - Prototype and test Total				72,004	64,270				136,275
	WC2050 Floor Auxiliary Equipment - Procurement and contra	BNL M&S CE from UW: Mechanical Engineer					37,855			37,855
	WC2050 Floor Auxiliary Equipment - Procurement and contra Total						37,855			37,855
	WC2080 Floor Auxiliary Equipment - Install on detector	BNL M&S CE from UW: Mechanical Engineer							39,998	39,998
	WC2080 Floor Auxiliary Equipment - Install on detector Total								39,998	39,998
	WC2062 Floor Auxiliary Equipment - Fabrication	BNL M&S CE Costs					814,206	178,397		992,603
	WC2062 Floor Auxiliary Equipment - Fabrication Total						814,206	178,397		992,603
	WC2060 Floor Auxiliary Equipment - Fabrication Support	BNL M&S CE from UW: Mechanical Engineer					32,042	7,021		39,063
	WC2060 Floor Auxiliary Equipment - Fabrication Support Total						32,042	7,021		39,063
130.04.02.04.02 Floor Auxiliary Equipment Total			12,552	20,478	100,699	64,270	37,855	846,248	225,416	1,307,519
Grand Total			12,552	20,478	100,699	64,270	37,855	846,248	225,416	1,307,519

130.04.02.04 Floor - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY12	FY13	FY14	FY19	FY20	FY21	Grand Total
130.04.02.04.02 Floor Auxiliary Equipment	WC2000 Floor Auxiliary Equipment - Conceptual design	BNL M&S CE from UW: Mechanical Engineer	133.73	38.27					172.00
	WC2000 Floor Auxiliary Equipment - Conceptual design Total		133.73	38.27					172.00
	WC2010 Floor Auxiliary Equipment - Preliminary design	BNL M&S CE from UW: Mechanical Engineer		172.00					172.00
	WC2010 Floor Auxiliary Equipment - Preliminary design Total			172.00					172.00
	WC2020 Floor Auxiliary Equipment - Final design	BNL M&S CE from UW: Mechanical Designer		3.87	168.13				172.00
		BNL M&S CE from UW: Mechanical Engineer		3.87	168.13				172.00
	WC2020 Floor Auxiliary Equipment - Final design Total			7.74	336.26				344.00
	WC2050 Floor Auxiliary Equipment - Procurement and contra	BNL M&S CE from UW: Mechanical Engineer				342.01			342.01
	WC2050 Floor Auxiliary Equipment - Procurement and contra Total					342.01			342.01
	WC2080 Floor Auxiliary Equipment - Install on detector	BNL M&S CE from UW: Mechanical Engineer						342.60	342.60
	WC2080 Floor Auxiliary Equipment - Install on detector Total							342.60	342.60
	WC2060 Floor Auxiliary Equipment - Fabrication Support	BNL M&S CE from UW: Mechanical Engineer					281.87	60.14	342.01
	WC2060 Floor Auxiliary Equipment - Fabrication Support Total						281.87	60.14	342.01
130.04.02.04.02 Floor Auxiliary Equipment Total			133.73	218.01	336.26	342.01	281.87	402.74	1,714.62
Grand Total			133.73	218.01	336.26	342.01	281.87	402.74	1,714.62

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.02.05.03 Thermal Management	WC2380 Thermal Management - Fabrication	Total								599.86	824.14			1,424.00
	WC2400 Thermal Management - Install on detector	BNL M&S CE from RP: Post Doc										263.25	222.75	486.00
	WC2400 Thermal Management - Install on detector	Total										263.25	222.75	486.00
130.04.02.05.03 Thermal Management Total							2,395.88	1,450.03	1,157.00	1,166.54	824.14	263.25	222.75	7,479.59
Grand Total			815.00	469.44	269.10	343.62	3,579.60	2,789.95	2,465.78	1,414.76	1,511.09	1,234.20	277.75	15,170.29

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.02.06.02 Deck	WC2585 PMT Support (PIU) - Deck - Fabrication Support	Total									460.32	715.14	717.88	27.40	1,920.74
130.04.02.06.02 Deck Total				488.52	59.34		1,077.50	2,668.94	155.56		460.32	715.14	717.88	27.40	6,370.60
130.04.02.06.03 Floor	WC2630 PMT Support (PIU) - Floor - Conceptual design	BNL M&S CE from UN: Non Sr. Mechanical Engineer		53.82	83.49										137.31
		Mechanical Designer P2		53.82	83.49										137.31
		Mechanical Engineer P2		53.82	83.49										137.31
		Mechanical Technician T2		40.56	62.92										103.48
	WC2630 PMT Support (PIU) - Floor - Conceptual design	Total		202.02	313.39										515.41
	WC2640 PMT Support (PIU) - Floor - Preliminary design	BNL M&S CE from UN: Mechanical Technician					42.75	299.25							342.00
		BNL M&S CE from UN: Non Sr. Mechanical Engineer					38.50	269.50							308.00
	WC2640 PMT Support (PIU) - Floor - Preliminary design	Total					81.25	568.75							650.00
	WC2650 PMT Support (PIU) - Floor - Final design	BNL M&S CE from UN: Mechanical Technician						278.98	475.02						754.00
		BNL M&S CE from UN: Non Sr. Mechanical Engineer						557.22	948.78						1,506.00
	WC2650 PMT Support (PIU) - Floor - Final design	Total						836.20	1,423.80						2,260.00
	WC2670 PMT Support (PIU) - Floor - Prototype and test	BNL M&S CE from UN: Mechanical Technician							103.00						103.00
		BNL M&S CE from UN: Non Sr. Mechanical Engineer							103.00						103.00
	WC2670 PMT Support (PIU) - Floor - Prototype and test	Total							206.00						206.00
	WC2680 PMT Support (PIU) - Floor - Procurement and contra	BNL M&S CE from UN: Administrative Support							25.50	43.35					68.85
		BNL M&S CE from UN: Non Sr. Mechanical Engineer							12.60	21.42					34.02
	WC2680 PMT Support (PIU) - Floor - Procurement and contra	Total							38.10	64.77					102.87
	WC2690 PMT Support (PIU) - Floor - Fabrication Support	BNL M&S CE from UN: General Labor								409.64	180.32				589.96
		BNL M&S CE from UN: Mechanical Technician								457.71	201.48				659.19
		BNL M&S CE from UN: Non Sr. Mechanical Engineer								418.00	184.00				602.00
	WC2690 PMT Support (PIU) - Floor - Fabrication Support	Total								1,285.35	565.80				1,851.15
130.04.02.06.03 Floor Total				202.02	313.39		81.25	1,404.95	1,667.90	1,350.12	565.80				5,585.43
Grand Total			1,080.00	1,321.26	372.73	1,444.96	4,969.19	7,954.39	5,157.52	5,187.72	2,782.56	715.14	717.88	27.40	31,730.75

130.04.02.07 Installation (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY19	FY20	FY21	FY22	Grand Total
130.04.02.07 Installation	WC2730 Installation Oversight	BNL M&S CE from UW: Sr. Mechanical Engineer	12,363	131,752	134,799	78,901	357,816
		BNL M&S CE from UW: Travel	2,996	31,923	32,660	19,116	86,694
	WC2730 Installation Oversight	Total	15,359	163,676	167,458	98,017	444,510
130.04.02.07 Installation Total			15,359	163,676	167,458	98,017	444,510
Grand Total			15,359	163,676	167,458	98,017	444,510

130.04.02.07 Installation - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY19	FY20	FY21	FY22	Grand Total
130.04.02.07 Installation	WC2730 Installation Oversight	BNL M&S CE from UW: Sr. Mechanical Engineer	92.92	964.16	960.48	547.40	2,564.96
	WC2730 Installation Oversight	Total	92.92	964.16	960.48	547.40	2,564.96
130.04.02.07 Installation Total			92.92	964.16	960.48	547.40	2,564.96
Grand Total			92.92	964.16	960.48	547.40	2,564.96

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
130.04.02.09.01 Permanent (Gondolas)	WC2930 Installation Equipment - Permanent (Gondolas) - Pr Total								108.73	62.88				171.61
	WC2940 Installation Equipment - Permanent (Gondolas) - Pr	BNL M&S CE from UW: Mechanical Engineer								25.68	145.52			171.20
	WC2940 Installation Equipment - Permanent (Gondolas) - Pr Total									25.68	145.52			171.20
	WC2970 Installation Equipment - Permanent (Gondolas) - In	BNL M&S CE from DK: Mechanical Engineer										3.96	167.64	171.60
		BNL M&S CE from UW: Mechanical Engineer										3.96	167.64	171.60
	WC2970 Installation Equipment - Permanent (Gondolas) - In Total											7.92	335.28	343.20
	WC2942 Installation Equipment - Permanent (Gondolas) - Fa	BNL M&S CE from DK: Mechanical Engineer										172.00		172.00
		BNL M&S CE from UW: Mechanical Engineer										172.00		172.00
	WC2942 Installation Equipment - Permanent (Gondolas) - Fa Total											344.00		344.00
130.04.02.09.01 Permanent (Gondolas) Total			343.40			147.84	159.36	218.88	274.81	88.56	145.52	351.92	335.28	2,065.57
130.04.02.09.02 Personnel (Elevator)	WC2990 Installation Equipment - Personnel (Elevator) - Co	BNL M&S CE from DK: Mechanical Engineer	33.30	45.00	44.64	3.06								126.00
	WC2990 Installation Equipment - Personnel (Elevator) - Co Total		33.30	45.00	44.64	3.06								126.00
	WC3000 Installation Equipment - Personnel (Elevator) - Pr	BNL M&S CE from DK: Mechanical Engineer				71.92	77.19	19.53						168.64
	WC3000 Installation Equipment - Personnel (Elevator) - Pr Total					71.92	77.19	19.53						168.64
	WC3010 Installation Equipment - Personnel (Elevator) - Fi	BNL M&S CE from DK: Mechanical Engineer						66.96	62.28					129.24
	WC3010 Installation Equipment - Personnel (Elevator) - Fi Total							66.96	62.28					129.24
	WC3050 Installation Equipment - Personnel (Elevator) - Fa	BNL M&S CE from DK: Mechanical Engineer								256.80				256.80
	WC3050 Installation Equipment - Personnel (Elevator) - Fa Total									256.80				256.80
130.04.02.09.02 Personnel (Elevator) Total			33.30	45.00	44.64	74.98	77.19	86.49	62.28	256.80				680.68
130.04.02.09.03 Temporary (Mast Climber)	WC3090 Installation Equipment - Temporary (Mast Climber)	BNL M&S CE from DK: Mechanical Engineer	46.25	62.50	62.00	3.75								174.50
		Mechanical Engineer P2	46.25	62.50	62.00	3.75								174.50
	WC3090 Installation Equipment - Temporary (Mast Climber) Total		92.50	125.00	124.00	7.50								349.00
	WC3100 Installation Equipment - Temporary (Mast Climber)	BNL M&S CE from DK: Mechanical Engineer				74.88	79.68	18.88						173.44
		Mechanical Engineer P2				74.88	79.68	18.88						173.44
	WC3100 Installation Equipment - Temporary (Mast Climber) Total					149.76	159.36	37.76						346.88
	WC3110 Installation Equipment - Temporary (Mast Climber)	BNL M&S CE from DK: Mechanical Engineer						91.20	80.16					171.36
		Mechanical Engineer P2						91.20	80.16					171.36
	WC3110 Installation Equipment - Temporary (Mast Climber) Total							182.40	160.32					342.72
	WC3130 Installation Equipment - Temporary (Mast Climber)	BNL M&S CE from DK: Mechanical Engineer								171.57				171.57
		Mechanical Engineer P2								171.57				171.57
	WC3130 Installation Equipment - Temporary (Mast Climber) Total									343.14				343.14
	WC3140 Installation Equipment - Temporary (Mast Climber)	Mechanical Engineer P2									342.40			342.40
	WC3140 Installation Equipment - Temporary (Mast Climber) Total										342.40			342.40
130.04.02.09.03 Temporary (Mast Climber) Total			92.50	125.00	124.00	157.26	159.36	220.16	160.32	343.14	342.40			1,724.14
Grand Total			469.20	170.00	168.64	380.08	395.91	525.53	497.41	688.50	487.92	351.92	335.28	4,470.39

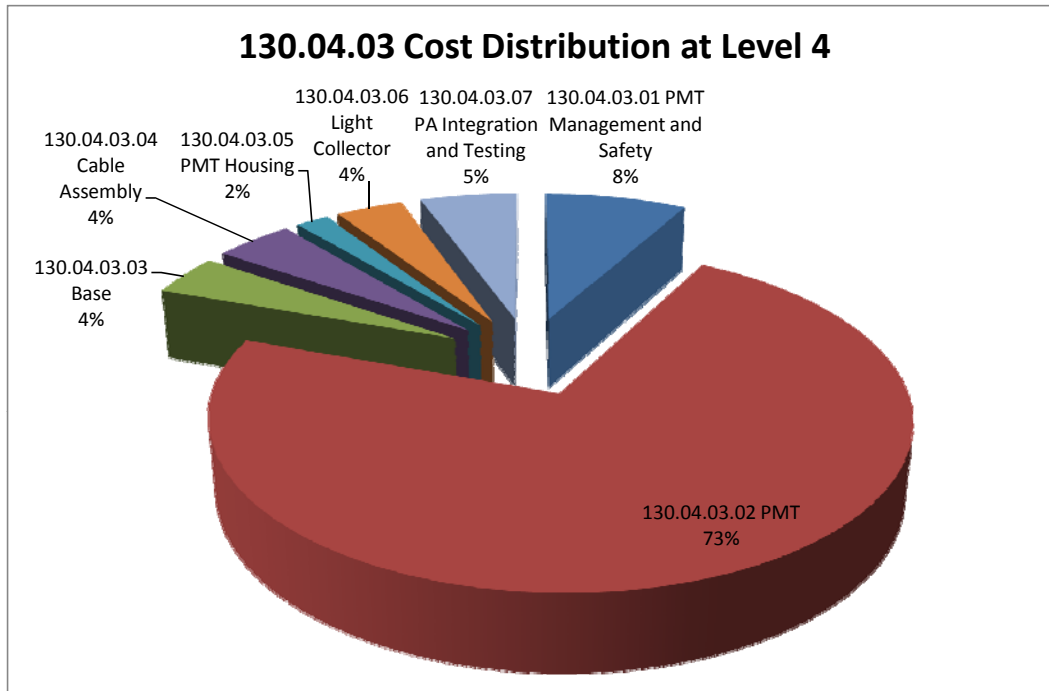
130.04.02.10 Veto System (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY14	FY15	FY19	FY20	FY21	Grand Total
130.04.02.10 Veto System	WC3210 Veto - Conceptual Design	BNL M&S CE from CD: Sr. Physicist/Scientist	37,137								37,137
	WC3210 Veto - Conceptual Design	Total	37,137								37,137
	WC3220 Veto - Preliminary Design	BNL M&S CE from CD: Sr. Physicist/Scientist		49,120	23,232						72,351
	WC3220 Veto - Preliminary Design	Total		49,120	23,232						72,351
	WC3230 Veto - Final Design	BNL M&S CE from UN: Mechanical Designer				34,023	2,936				36,958
		BNL M&S CE from CD: Sr. Physicist/Scientist				114,634	9,891				124,525
	WC3230 Veto - Final Design	Total				148,656	12,827				161,483
	WC3235 Veto - Fabrication Support	BNL M&S CE from CD: Sr. Physicist/Scientist						68,146			68,146
	WC3235 Veto - Fabrication Support	Total						68,146			68,146
	WC3240 Veto - Fabrication	BNL M&S CS PO Purchases						983,634			983,634
		BNL M&S CE from CD: Sr. Physicist/Scientist						68,146			68,146
	WC3240 Veto - Fabrication	Total						1,051,780			1,051,780
	WC3250 Installation	BNL M&S CE from CD: Sr. Physicist/Scientist							37,910	32,945	70,856
	WC3250 Installation	Total							37,910	32,945	70,856
130.04.02.10 Veto System Total			37,137	49,120	23,232	148,656	12,827	1,119,926	37,910	32,945	1,461,753
Grand Total			37,137	49,120	23,232	148,656	12,827	1,119,926	37,910	32,945	1,461,753

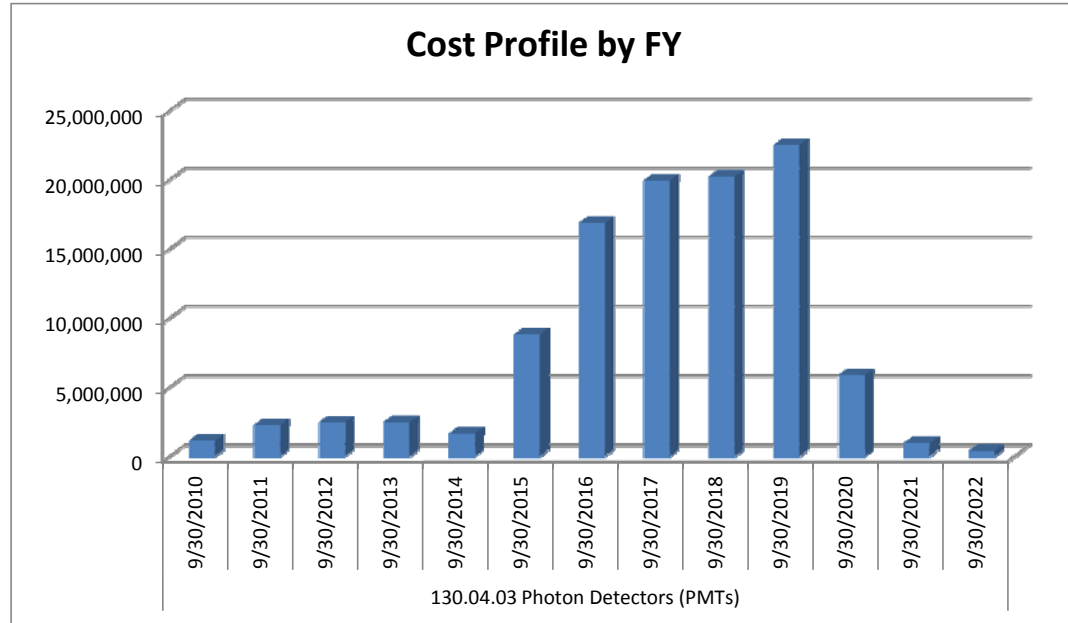
130.04.02.10 Veto System - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY14	FY15	FY19	FY20	FY21	Grand Total
130.04.02.10 Veto System	WC3210 Veto - Conceptual Design	BNL M&S CE from CD: Sr. Physicist/Scientist	310.00								310.00
	WC3210 Veto - Conceptual Design	Total	310.00								310.00
	WC3220 Veto - Preliminary Design	BNL M&S CE from CD: Sr. Physicist/Scientist		408.00	192.00						600.00
	WC3220 Veto - Preliminary Design	Total		408.00	192.00						600.00
	WC3230 Veto - Final Design	BNL M&S CE from UN: Mechanical Designer				691.88	58.13				750.01
		BNL M&S CE from CD: Sr. Physicist/Scientist				922.50	77.50				1,000.00
	WC3230 Veto - Final Design	Total				1,614.38	135.63				1,750.01
	WC3235 Veto - Fabrication Support	BNL M&S CE from CD: Sr. Physicist/Scientist						480.00			480.00
	WC3235 Veto - Fabrication Support	Total						480.00			480.00
	WC3240 Veto - Fabrication	BNL M&S CE from CD: Sr. Physicist/Scientist						480.00			480.00
	WC3240 Veto - Fabrication	Total						480.00			480.00
	WC3250 Installation	BNL M&S CE from CD: Sr. Physicist/Scientist							260.00	220.00	480.00
	WC3250 Installation	Total							260.00	220.00	480.00
130.04.02.10 Veto System Total			310.00	408.00	192.00	1,614.38	135.63	960.00	260.00	220.00	4,100.01
Grand Total			310.00	408.00	192.00	1,614.38	135.63	960.00	260.00	220.00	4,100.01

WBS	Cost
130.04.03.01 PMT Management and Safety	8,392,231
130.04.03.02 PMT	76,344,304
130.04.03.03 Base	4,319,560
130.04.03.04 Cable Assembly	4,625,311
130.04.03.05 PMT Housing	1,935,208
130.04.03.06 Light Collector	3,960,333
130.04.03.07 PA Integration and Testing	5,752,868
Grand Total	105,329,816

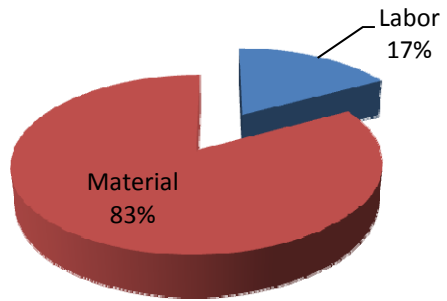


FY	Cost
130.04.03 Photon Detectors (PMTs)	105,329,816
9/30/2010	1,110,377
9/30/2011	2,231,986
9/30/2012	2,434,977
9/30/2013	2,466,344
9/30/2014	1,622,617
9/30/2015	8,787,243
9/30/2016	16,855,428
9/30/2017	19,928,063
9/30/2018	20,216,360
9/30/2019	22,499,430
9/30/2020	5,863,904
9/30/2021	931,910
9/30/2022	381,176
Grand Total	105,329,816



WBS	Cost
130.04.03 PMTs	
Labor	17,974,540
Material	87,355,276
	105,329,816

130.04.03 Labor/Material Ratio



COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
	PD12390 Vendor Proposal Submittal Period -Production Phas Total						99.88							99.88
	PD12400 Evaluate Proposals and Prepare Production Phase I	Accelerator Physicist Experimental					119.77							119.77
		Administrative Support					15.93							15.93
		BNL M&S CE from UN: General Labor					100.20							100.20
		General ES&H					119.77							119.77
		Non-Sr. Electrical Design Engineer					119.77							119.77
	PD12400 Evaluate Proposals and Prepare Production Phase I Total						475.44							475.44
	PD12425 Vendor Production Run #5 - 7,000 PMTs	BNL M&S CE from UN: General Labor										76.95	22.05	99.00
	PD12425 Vendor Production Run #5 - 7,000 PMTs Total											76.95	22.05	99.00
	PD12440 Vendor Production Run #3 - 6,000 PMTs	BNL M&S CE from UN: General Labor								68.02	32.30			100.32
	PD12440 Vendor Production Run #3 - 6,000 PMTs Total									68.02	32.30			100.32
	PD12450 Vendor Production Run #4 - 7,000 PMTs	BNL M&S CE from UN: General Labor									66.12	34.20		100.32
	PD12450 Vendor Production Run #4 - 7,000 PMTs Total										66.12	34.20		100.32
	PD12443 Vendor Support for Production Run #4 - 7,000 PMT	BNL M&S CE from UN: General Labor									66.12	34.20		100.32
	PD12443 Vendor Support for Production Run #4 - 7,000 PMT Total										66.12	34.20		100.32
130.04.03.02.04 PMT Procurement Total					216.04	205.76	750.60			68.02	164.54	145.35	22.05	1,572.36
Grand Total			3,857.25	8,639.10	9,425.78	10,816.66	3,259.81	11,109.30	14,222.38	10,097.32	8,279.14	8,291.16	1,832.23	89,830.13

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
130.04.03.03.01 Base Encapsulation Development	PD12550 Base Encapsulation Final Design					248.40	837.20							1,085.60
130.04.03.03.01 Base Encapsulation Development Total			933.50	1,926.78	42.28	1,771.65	837.20							5,511.41
130.04.03.03.02 Base Encapsulation Production	PD12570 Base Encapsulation Production Run #1 (Qty.5k)	BNL M&S CE from UW: General Labor							1,730.82	770.31				2,501.13
	PD12570 Base Encapsulation Production Run #1 (Qty.5k) Total								1,730.82	770.31				2,501.13
	PD12580 Base Encapsulation Production Run#2 (Qty.8k)	BNL M&S CE from UW: General Labor								2,722.59	1,277.64			4,000.23
	PD12580 Base Encapsulation Production Run#2 (Qty.8k) Total									2,722.59	1,277.64			4,000.23
	PD12590 Base Encapsulation Production Run #3 (Qty. 8k)	BNL M&S CE from UW: General Labor										2,666.40	1,333.20	3,999.60
	PD12590 Base Encapsulation Production Run #3 (Qty. 8k) Total											2,666.40	1,333.20	3,999.60
	PD12600 Base Encapsulation Production Run #4 (Qty.8k)	BNL M&S CE from UW: General Labor											3,145.14	854.46
	PD12600 Base Encapsulation Production Run #4 (Qty.8k) Total												3,145.14	854.46
130.04.03.03.02 Base Encapsulation Production Total									1,730.82	3,492.90	3,944.04	4,478.34	854.46	14,500.56
130.04.03.03.03 Base Electronics Production	PD12630 Base Electronics Preproduction (Qty.200)	BNL M&S CE from UW: Sr. Electrical Engineer				5.60	34.40							40.00
	PD12630 Base Electronics Preproduction (Qty.200) Total					5.60	34.40							40.00
	PD12650 Base Electronics Production Procurement #1 (Qty.1)	BNL M&S CE from UW: Sr. Electrical Engineer							57.00	22.20				79.20
	PD12650 Base Electronics Production Procurement #1 (Qty.1) Total								57.00	22.20				79.20
	PD12660 Base Electronics Production Procurement #2 (Qty.1)	BNL M&S CE from UW: Sr. Electrical Engineer								54.60	24.60			79.20
	PD12660 Base Electronics Production Procurement #2 (Qty.1) Total									54.60	24.60			79.20
	PD12670 Base Electronics Production Procurement #3 (Qty.9)	BNL M&S CE from UW: Sr. Electrical Engineer									53.40	25.80		79.20
	PD12670 Base Electronics Production Procurement #3 (Qty.9) Total										53.40	25.80		79.20
130.04.03.03.03 Base Electronics Production Total						5.60	34.40		57.00	76.80	78.00	25.80		277.60
Grand Total			933.50	1,926.78	47.88	1,806.05	837.20	57.00	1,807.62	3,570.90	3,969.84	4,478.34	854.46	20,289.57

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Grand Total
130.04.03.04.01 Cable Assembly Prototypes	PD12760 Cable Assembly Prototype V2 Design	BNL M&S CE from UW: Sr. Electrical Engineer		159.60							159.60
	PD12760 Cable Assembly Prototype V2 Design Total			159.60							159.60
	PD12770 Cable Assembly Prototype V2 Procurement	BNL M&S CE from UW: Sr. Electrical Engineer		80.00							80.00
	PD12770 Cable Assembly Prototype V2 Procurement Total			80.00							80.00
	PD12790 Cable Assembly Prototype V2 Fabrication (at PSL)	BNL M&S CE from MA: Electrical Technician		8.01	32.04						40.05
		BNL M&S CE from UW: Sr. Electrical Engineer		24.00	96.00						120.00
	PD12790 Cable Assembly Prototype V2 Fabrication (at PSL) Total			32.01	128.04						160.05
	PD12800 Cable Assembly Prototype V2 Design Verification	BNL M&S CE from UW: Sr. Electrical Engineer			160.00						160.00
	PD12800 Cable Assembly Prototype V2 Design Verification Total				160.00						160.00
130.04.03.04.01 Cable Assembly Prototypes Total			300.00	871.71	288.04						1,459.75
130.04.03.04.02 PMT Cable Assembly Preproduction	PD12830 Cable Assembly Preliminary Design	BNL M&S CE from UW: Mechanical Designer			199.47						199.47
		BNL M&S CE from UW: Sr. Electrical Engineer			400.03						400.03
	PD12830 Cable Assembly Preliminary Design Total				599.50						599.50
	PD12840 Cable Assembly Preproduction Procurement (Qty.200)	BNL M&S CE from UW: Sr. Electrical Engineer			100.00						100.00
	PD12840 Cable Assembly Preproduction Procurement (Qty.200) Total				100.00						100.00
	PD12860 Receive and Inspect Preproduction Cable Assemblie	BNL M&S CE from UW: Sr. Electrical Engineer			200.00						200.00
	PD12860 Receive and Inspect Preproduction Cable Assemblie Total				200.00						200.00
130.04.03.04.02 PMT Cable Assembly Preproduction Total					899.50						899.50
130.04.03.04.03 PMT Cable Assembly Production	PD12880 Cable Assembly Final Design	BNL M&S CE from UW: Mechanical Designer				99.60					99.60
		BNL M&S CE from UW: Sr. Electrical Engineer				200.40					200.40
	PD12880 Cable Assembly Final Design Total					300.00					300.00
	PD12890 Cable Assembly Production Procurement #1 (Qty.10,	BNL M&S CE from UW: Sr. Electrical Engineer					144.40	56.24			200.64
	PD12890 Cable Assembly Production Procurement #1 (Qty.10, Total						144.40	56.24			200.64
	PD12901 Cable Assembly Production Procurement #2 (Qty. 10	BNL M&S CE from UW: Sr. Electrical Engineer						138.32	61.56		199.88
	PD12901 Cable Assembly Production Procurement #2 (Qty. 10 Total							138.32	61.56		199.88
	PD12920 Cable Assembly Production Procurement #3 (Qty. 9,	BNL M&S CE from UW: Sr. Electrical Engineer							136.04	64.60	200.64
	PD12920 Cable Assembly Production Procurement #3 (Qty. 9, Total								136.04	64.60	200.64
130.04.03.04.03 PMT Cable Assembly Production Total						300.00	144.40	194.56	197.60	64.60	901.16
Grand Total			300.00	871.71	1,187.54	300.00	144.40	194.56	197.60	64.60	3,260.41

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Grand Total
130.04.03.05.01 PMT Housing Prototypes	PD12950 Housing Prototype V1 Procurement	BNL M&S CE from UW: Mechanical Engineer		59.94								59.94
		BNL M&S CE from UW: Sr. Electrical Engineer		439.93								
	PD12950 Housing Prototype V1 Procurement	Tota		740.00								740.00
	PD12970 Housing Prototype V1 Design Verification	BNL M&S CE from UW: Mechanical Engineer		250.00								250.00
		BNL M&S CE from UW: Sr. Electrical Engineer		250.00								250.00
	PD12970 Housing Prototype V1 Design Verification	Tota		500.00								500.00
	PD12980 Housing Prototype V2 Design	BNL M&S CE from UW: Mechanical Designer		100.00								100.00
		BNL M&S CE from UW: Sr. Electrical Engineer		200.00								200.00
	PD12980 Housing Prototype V2 Design	Tota		300.00								300.00
	PD12990 Housing Prototype V2 Procurement	BNL M&S CE from UW: Electrical Technician		12.96	27.00							39.96
		BNL M&S CE from UW: Mechanical Designer		32.40	67.50							99.90
		BNL M&S CE from UW: Mechanical Engineer		12.96	27.00							39.96
		BNL M&S CE from UW: Sr. Electrical Engineer		110.28	229.75							340.03
	PD12990 Housing Prototype V2 Procurement	Tota		168.60	351.25							519.85
	PD13010 Housing Prototype V2 Design Verification	BNL M&S CE from UW: Mechanical Engineer			250.07							250.07
		BNL M&S CE from UW: Sr. Electrical Engineer			250.07							250.07
	PD13010 Housing Prototype V2 Design Verification	Tota			500.14							500.14
130.04.03.05.01 PMT Housing Prototypes Total			1,348.65	2,882.29	851.39							5,082.33
130.04.03.05.02 PMT Housing Preproduction	PD13040 Housing Preliminary Design	BNL M&S CE from UW: Mechanical Designer			165.00	135.00						300.00
		BNL M&S CE from UW: Mechanical Engineer			109.89	89.91						199.80
		BNL M&S CE from UW: Sr. Electrical Engineer			109.89	89.91						199.80
	PD13040 Housing Preliminary Design	Tota			384.78	314.82						699.60
	PD13050 Housing Preproduction Procurement (Qty.200)	BNL M&S CE from UW: Mechanical Engineer				100.01						100.01
		BNL M&S CE from UW: Sr. Electrical Engineer				100.01						100.01
	PD13050 Housing Preproduction Procurement (Qty.200)	Tota				200.02						200.02
130.04.03.05.02 PMT Housing Preproduction Total					384.78	514.84						899.62
130.04.03.05.03 PMT Housing Production	PD13080 Housing Final Design	BNL M&S CE from UW: Mechanical Designer					200.40					200.40
		BNL M&S CE from UW: Mechanical Engineer					200.40					200.40
		BNL M&S CE from UW: Sr. Electrical Engineer					200.40					200.40
	PD13080 Housing Final Design	Tota					601.20					601.20
	PD13090 Housing Production Procurement #1 (Qty.10,000)-La	BNL M&S CE from UW: Mechanical Engineer						110.50	49.40			159.90
		BNL M&S CE from UW: Sr. Electrical Engineer						137.70	61.56			199.26
	PD13090 Housing Production Procurement #1 (Qty.10,000)-La Total	Tota						248.20	110.96			359.16
	PD13101 Housing Production Procurement #2 (Qty. 10,000)-L	BNL M&S CE from UW: Mechanical Engineer						217.80	101.64			319.44
		BNL M&S CE from UW: Sr. Electrical Engineer						136.80	63.84			200.64
	PD13101 Housing Production Procurement #2 (Qty. 10,000)-L Total	Tota						354.60	165.48			520.08
	PD13110 Housing Production Procurement #3 (Qty. 9,000)-La	BNL M&S CE from UW: Mechanical Engineer							107.36	53.68		161.04
		BNL M&S CE from UW: Sr. Electrical Engineer							133.76	66.88		200.64
	PD13110 Housing Production Procurement #3 (Qty. 9,000)-La Total	Tota							241.12	120.56		361.68
130.04.03.05.03 PMT Housing Production Total								601.20	248.20	465.56	406.60	1,842.12
Grand Total			1,348.65	2,882.29	1,236.17	514.84	601.20	248.20	465.56	406.60	120.56	7,824.07

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Grand Total
130.04.03.06 Light Collector	PD13330 Light Collector Production Run #3 (Qty. 9,000)	BNL M&S CE from UW: Mechanical Technician								47,816	23,727	71,543
	PD13330 Light Collector Production Run #3 (Qty. 9,000) Total									776,352	385,227	1,161,579
130.04.03.06 Light Collector Total			3,343	9,880	32,539	144,237	118,198	888,538	1,205,479	1,172,892	385,227	3,960,333
Grand Total			3,343	9,880	32,539	144,237	118,198	888,538	1,205,479	1,172,892	385,227	3,960,333

130.04.03.06 Light Collector - Labor Hours

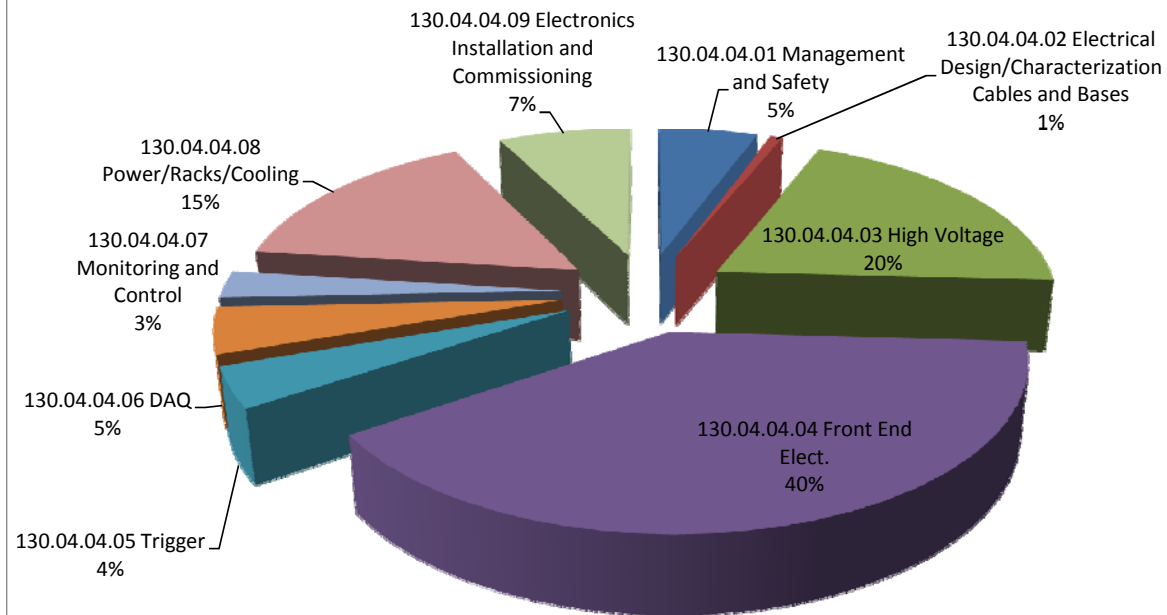
COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Grand Total
130.04.03.06 Light Collector	PD13130 Winston Cone Conceptual Design (S4)	BNL M&S CE from DR: Uncosted Grad Student	136.90	185.00								321.90
		BNL M&S CE from UN: General Labor	42.55	57.50								100.05
	PD13130 Winston Cone Conceptual Design (S4) Total		179.45	242.50								421.95
	PD13140 Winston Cone Prototype V1 procurement	BNL M&S CE from UN: General Labor	49.95	49.95								99.90
	PD13140 Winston Cone Prototype V1 procurement Total		49.95	49.95								99.90
	PD13150 Winston Cone Prototype V1 Testing	BNL M&S CE from UN: General Labor		99.60								99.60
	PD13150 Winston Cone Prototype V1 Testing Total			99.60								99.60
	PD13160 Winston Cone Conceptual Design (DOE)	BNL M&S CE from UN: General Labor			99.18							99.18
	PD13160 Winston Cone Conceptual Design (DOE) Total				99.18							99.18
	PD13170 Winston Cone Prototype V2 Procurement	BNL M&S CE from UN: General Labor			100.20							100.20
	PD13170 Winston Cone Prototype V2 Procurement Total				100.20							100.20
	PD13180 Winston Cone Prototype V2 Testing	BNL M&S CE from DR: Uncosted Grad Student			25.16	54.76						79.92
		BNL M&S CE from UN: General Labor			31.45	68.45						99.90
	PD13180 Winston Cone Prototype V2 Testing Total				56.61	123.21						179.82
	PD13190 Winston Cone Preliminary Design	BNL M&S CE from UN: General Labor				99.90						99.90
		BNL M&S CE from UN: Mechanical Designer				219.78						219.78
		BNL M&S CE from UN: Non Sr. Mechanical Engineer				219.78						219.78
	PD13190 Winston Cone Preliminary Design Total					539.46						539.46
	PD13200 WLS Plate Conceptual Design (S4)	BNL M&S CE from CS: Uncosted Physicist/Scientist	170.20	230.00								400.20
		BNL M&S CE from UN: General Labor	42.55	57.50								100.05
	PD13200 WLS Plate Conceptual Design (S4) Total		212.75	287.50								500.25
	PD13210 WLS Plate Prototype V1 procurement	BNL M&S CE from UN: General Labor	19.50	80.60								100.10
	PD13210 WLS Plate Prototype V1 procurement Total		19.50	80.60								100.10
	PD13220 WLS Plate Prototype V1 Testing	BNL M&S CE from UN: General Labor		99.60								99.60
	PD13220 WLS Plate Prototype V1 Testing Total			99.60								99.60
	PD13230 WLS Plate Conceptual Design (DOE)	BNL M&S CE from CS: Grad Student			100.30							100.30
		BNL M&S CE from CS: Mechanical Designer			100.30							100.30
		BNL M&S CE from CS: Non Sr. Mechanical Engineer			159.80							159.80
		BNL M&S CE from UN: General Labor			100.30							100.30
	PD13230 WLS Plate Conceptual Design (DOE) Total				460.70							460.70
	PD13240 WLS Plate Prototype V2 Procurement	BNL M&S CE from UN: General Labor			100.20							100.20
	PD13240 WLS Plate Prototype V2 Procurement Total				100.20							100.20
	PD13250 WLS Plate Prototype V2 Testing	BNL M&S CE from CS: Grad Student			34.20	79.80						114.00
		BNL M&S CE from CS: Mechanical Technician			34.20	79.80						114.00
		BNL M&S CE from CS: Uncosted Physicist/Scientist			34.20	79.80						114.00
		BNL M&S CE from UN: General Labor			30.06	70.14						100.20
	PD13250 WLS Plate Prototype V2 Testing Total				132.66	309.54						442.20
	PD13260 WLS Plate Preliminary Design	BNL M&S CE from CS: Grad Student				109.76						109.76
		BNL M&S CE from CS: Mechanical Designer				109.76						109.76
		BNL M&S CE from CS: Non Sr. Mechanical Engineer				109.76						109.76
		BNL M&S CE from UN: General Labor				99.96						99.96
	PD13260 WLS Plate Preliminary Design Total					429.24						429.24
	PD13290 Light Collector Preproduction Procurement	BNL M&S CE from CS: Non Sr. Mechanical Engineer				70.20						70.20
		BNL M&S CE from UN: General Labor				99.90						99.90
	PD13290 Light Collector Preproduction Procurement Total					170.10						170.10
	PD13300 Light Collector Final Design	BNL M&S CE from UN: General Labor					87.78	12.54				100.32
		BNL M&S CE from UN: Mechanical Technician					778.47	111.21				889.68
		BNL M&S CE from UN: Sr. Mechanical Engineer					778.47	111.21				889.68
		BNL M&S CE from UN: Uncosted Physicist/Scientist					390.39	55.77				446.16
	PD13300 Light Collector Final Design Total						2,035.11	290.73				2,325.84
	PD13310 Light Collector Production Run #1 (Qty. 10,000)	BNL M&S CE from UN: General Labor						72.20	28.12			100.32
		BNL M&S CE from UN: Non Sr. Mechanical Engineer						256.50	99.90			356.40
		BNL M&S CE from UW: Mechanical Technician						720.10	280.46			1,000.56

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Grand Total
	PD13310 Light Collector Production Run #1 (Qty. 10,000) Total							1,048.80	408.48			1,457.28
	PD13320 Light Collector Production Run #2 (Qty. 10,000)	BNL M&S CE from UN: General Labor							69.16	31.16		100.32
		BNL M&S CE from UN: Non Sr. Mechanical Engineer							245.70	110.70		356.40
		BNL M&S CE from UW: Mechanical Technician							689.78	310.78		1,000.56
	PD13320 Light Collector Production Run #2 (Qty. 10,000) Total							1,004.64	452.64			1,457.28
	PD13330 Light Collector Production Run #3 (Qty. 9,000)	BNL M&S CE from UN: General Labor								67.64	32.68	100.32
		BNL M&S CE from UN: Non Sr. Mechanical Engineer								240.30	116.10	356.40
		BNL M&S CE from UW: Mechanical Technician								606.98	293.26	900.24
	PD13330 Light Collector Production Run #3 (Qty. 9,000) Total									914.92	442.04	1,356.96
130.04.03.06 Light Collector Total			461.65	859.75	949.55	1,571.55	2,035.11	1,339.53	1,413.12	1,367.56	442.04	10,439.86
Grand Total			461.65	859.75	949.55	1,571.55	2,035.11	1,339.53	1,413.12	1,367.56	442.04	10,439.86

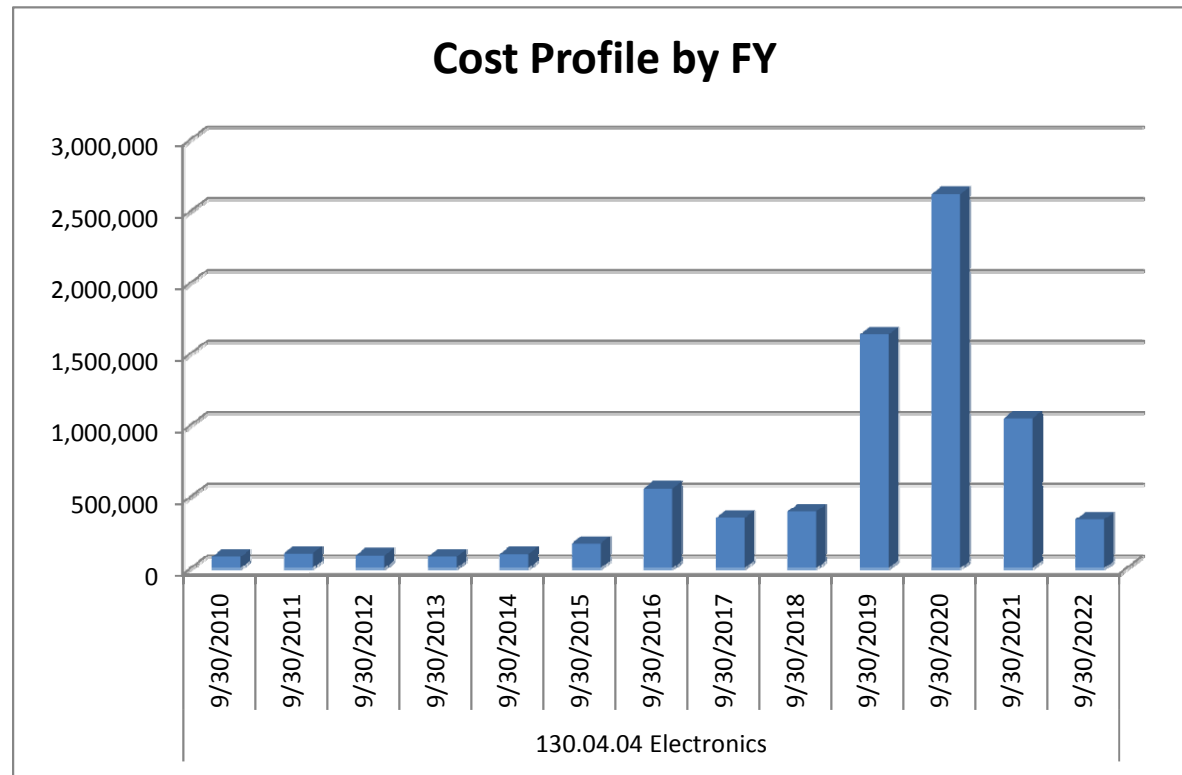
COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.03.07.02 Preproduction PA/PIU Integration and Testing	PD13510 Install and Commission Preproduction Test System Total					160.00							160.00	
	PD13520 Test Preproduction PIUs	BNL M&S CE from UW: Electrical Technician				160.20							160.20	
	PD13520 Test Preproduction PIUs Total					160.20							160.20	
130.04.03.07.02 Preproduction PA/PIU Integration and Testing Total				3,643.44	2,369.86	770.86							6,784.16	
130.04.03.07.03 PA Integration and Testing - Factory Design, Acquisiti	PD13550 PA Factory Preliminary Design	BNL M&S CE from UW: Electrical Engineer		189.12	851.04								1,040.16	
		BNL M&S CE from UW: Mechanical Engineer		94.56	425.52								520.08	
	PD13550 PA Factory Preliminary Design Total			283.68	1,276.56								1,560.24	
	PD13560 PA Factory Final Design	BNL M&S CE from UW: Electrical Engineer				896.21	144.55						1,040.76	
		BNL M&S CE from UW: Mechanical Designer				104.16	16.80						120.96	
		BNL M&S CE from UW: Mechanical Engineer				447.02	72.10						519.12	
		BNL M&S CE from UW: Sr. Project Management				104.16	16.80						120.96	
	PD13560 PA Factory Final Design Total					1,551.55	250.25						1,801.80	
	PD13570 Identify and Acquire Factory Facility and Staff	BNL M&S CE from UW: Electrical Engineer						160.00					160.00	
		BNL M&S CE from UW: Sr. Project Management						160.00					160.00	
	PD13570 Identify and Acquire Factory Facility and Staff Total							320.00					320.00	
	PD13580 Procure Factory Equipment and Software	BNL M&S CE from UW: Electrical Engineer						160.20					160.20	
		BNL M&S CE from UW: Sr. Project Management						90.00					90.00	
	PD13580 Procure Factory Equipment and Software Total							250.20					250.20	
	PD13590 Install and Commission Factory Equipment	BNL M&S CE from UW: Electrical Engineer						520.20					520.20	
		BNL M&S CE from UW: Electrical Technician						259.80					259.80	
		BNL M&S CE from UW: General Labor						520.20					520.20	
		BNL M&S CE from UW: Mechanical Technician						259.80					259.80	
		BNL M&S CE from UW: Sr. Project Management						40.20					40.20	
	PD13590 Install and Commission Factory Equipment Total							1,600.20					1,600.20	
130.04.03.07.03 PA Integration and Testing - Factory Design, Acquisiti Total				283.68	1,276.56	1,551.55	2,420.65						5,532.44	
130.04.03.07.04 PA Integration and Testing - Production	PD13720 Assemble and Test Production #3 Qty. 8,000 PAs-La	BNL M&S CE from MA: Electrical Technician								2,083.55	1,847.41		3,930.96	
		BNL M&S CE from UW: Electrical Engineer								1,484.64	1,316.39		2,801.03	
		BNL M&S CE from UW: Electrical Technician								1,632.97	1,447.91		3,080.88	
		BNL M&S CE from UW: General Labor								2,083.55	1,847.41		3,930.96	
		BNL M&S CE from UW: Sr. Project Management								127.33	112.90		240.23	
	PD13720 Assemble and Test Production #3 Qty. 8,000 PAs-La Total									7,412.04	6,572.02		13,984.06	
	PD13640 Assemble and Test Production #1 Qty. 5,000 PAs-La	BNL M&S CE from UW: Electrical Engineer						1,230.32	520.52				1,750.84	
		BNL M&S CE from UW: Electrical Technician						1,832.74	775.39				2,608.13	
		BNL M&S CE from UW: General Labor						1,832.74	775.39				2,608.13	
		BNL M&S CE from UW: Sr. Project Management						105.56	44.66				150.22	
	PD13640 Assemble and Test Production #1 Qty. 5,000 PAs-La Total							5,001.36	2,115.96				7,117.32	
	PD13680 Assemble and Test Qty.8,000 PAs at Pilot Plant-La	BNL M&S CE from UW: Electrical Engineer							1,521.52	1,277.55			2,799.07	
		BNL M&S CE from UW: Electrical Technician							2,202.20	1,849.09			4,051.29	
		BNL M&S CE from UW: General Labor							2,202.20	1,849.09			4,051.29	
		BNL M&S CE from UW: Sr. Project Management							130.13	109.26			239.39	
	PD13680 Assemble and Test Qty.8,000 PAs at Pilot Plant-La Total								6,056.05	5,084.99			11,141.04	
	PD13760 Assemble and Test Production #4 Qty. 8,000 PAs-La	BNL M&S CE from UW: Electrical Engineer									1,233.91	1,566.72	2,800.63	
		BNL M&S CE from UW: Electrical Technician									1,662.33	2,110.70	3,773.03	
		BNL M&S CE from UW: General Labor									1,662.33	2,110.70	3,773.03	
		BNL M&S CE from UW: Sr. Project Management									105.65	134.15	239.80	
	PD13760 Assemble and Test Production #4 Qty. 8,000 PAs-La Total										4,664.22	5,922.27	10,586.49	
130.04.03.07.04 PA Integration and Testing - Production Total								5,001.36	8,172.01	12,497.03	11,236.24	5,922.27	42,828.91	
Grand Total			1,732.86	4,213.36	3,646.42	2,322.41	2,420.65	5,001.36	8,172.01	12,497.03	11,236.24	5,922.27	57,164.61	

WBS	Cost
130.04.04.01 Management and Safety	420,306
130.04.04.02 Electrical Design/Characterization Cables and Bases	51,485
130.04.04.03 High Voltage	1,490,276
130.04.04.04 Front End Elect.	3,021,252
130.04.04.05 Trigger	306,636
130.04.04.06 DAQ	350,207
130.04.04.07 Monitoring and Control	205,029
130.04.04.08 Power/Racks/Cooling	1,180,397
130.04.04.09 Electronics Installation and Commissioning	563,496
Grand Total	7,589,085

130.04.04 Cost Distribution at Level 4

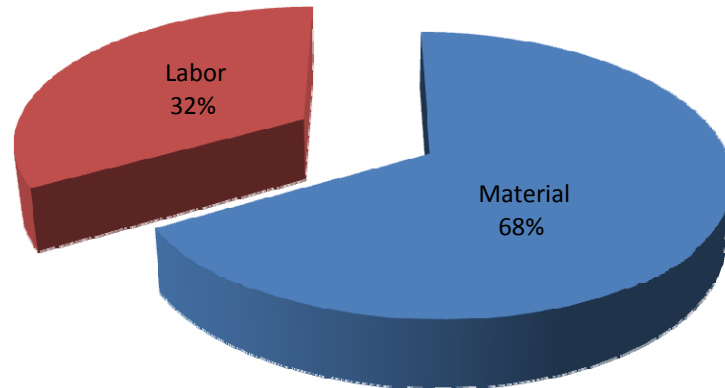


FY	Cost
130.04.04 Electronics	7,589,085
9/30/2010	80,775
9/30/2011	104,402
9/30/2012	91,524
9/30/2013	80,870
9/30/2014	100,452
9/30/2015	174,305
9/30/2016	560,076
9/30/2017	352,603
9/30/2018	398,297
9/30/2019	1,633,599
9/30/2020	2,620,968
9/30/2021	1,048,956
9/30/2022	342,257
Grand Total	7,589,085



WBS	Cost
130.04.04 Electronics	7,589,085
Material	5,072,442
Labor	2,516,642
Grand Total	7,589,085

130.04.04 Labor Material Ratio



130.04.04.01 Management and Safety (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.04.01 Management and Safety	EL1400 Management	BNL M&S CE from UN: Sr. Electrical Engineer	14,711	20,417	20,354	20,539	21,093	21,664	22,873	23,857	24,502	25,261	26,043	26,645	13,840	281,799
		BNL M&S CE from UN: Travel	3,793	5,125	5,221	5,384	5,529	5,678	5,995	6,253	6,422	6,621	6,825	6,983	3,627	73,456
	EL1400 Management	Total	18,504	25,542	25,575	25,923	26,623	27,342	28,869	30,110	30,924	31,881	32,868	33,628	17,467	355,255
	EL1410 Safety	BNL M&S CE from UN: Sr. Electrical Engineer	7,252	10,065	10,034	10,125	10,398	10,679	6,499							65,051
	EL1410 Safety	Total	7,252	10,065	10,034	10,125	10,398	10,679	6,499							65,051
130.04.04.01 Management and Safety Total			25,756	35,606	35,609	36,048	37,021	38,021	35,367	30,110	30,924	31,881	32,868	33,628	17,467	420,306
Grand Total			25,756	35,606	35,609	36,048	37,021	38,021	35,367	30,110	30,924	31,881	32,868	33,628	17,467	420,306

130.04.04.01 Management and Safety - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.04.01 Management and Safety	EL1400 Management	BNL M&S CE from UN: Sr. Electrical Engineer	131.35	177.50	176.08	176.79	176.79	176.79	181.76	184.60	184.60	185.31	186.02	185.31	93.72	2,216.62
	EL1400 Management	Total	131.35	177.50	176.08	176.79	176.79	176.79	181.76	184.60	184.60	185.31	186.02	185.31	93.72	2,216.62
	EL1410 Safety	BNL M&S CE from UN: Sr. Electrical Engineer	64.75	87.50	86.80	87.15	87.15	87.15	51.64							552.14
	EL1410 Safety	Total	64.75	87.50	86.80	87.15	87.15	87.15	51.64							552.14
130.04.04.01 Management and Safety Total			196.10	265.00	262.88	263.94	263.94	263.94	233.40	184.60	184.60	185.31	186.02	185.31	93.72	2,768.76
Grand Total			196.10	265.00	262.88	263.94	263.94	263.94	233.40	184.60	184.60	185.31	186.02	185.31	93.72	2,768.76

130.04.04.02 Electrical Design/Characterization Cables and Bases (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY12	FY13	FY14	Grand Total
130.04.04.02.01	Characterization of PM EL1440	Characterization of cables			18,352	13,648	32,000
		BNL M&S CE from UN: Materials & Services					
		BNL M&S CE from UN: Non Sr. Electrical Engineer			1,848	1,374	3,223
		BNL M&S CE from UN: Sr. Electrical Engineer			1,617	1,203	2,820
	EL1440	Characterization of cables Total			21,817	16,225	38,043
130.04.04.02.01 Characterization of PMT Total					21,817	16,225	38,043
130.04.04.02.02	Characterization of Cal EL1470	Electrical Design of Base - Version 1 design, fab,					
		BNL M&S CE from UN: Electronics Technician	2,688				2,688
		BNL M&S CE from UN: Materials & Services	1,500				1,500
		BNL M&S CE from UN: Non Sr. Electrical Engineer	768				768
	EL1470	Electrical Design of Base - Version 1 design, fab, Total	4,956				4,956
	EL1480	Electrical Design of Base - Version 2 design, fab,			825	1,000	1,826
		BNL M&S CE from UN: Electronics Technician					
		BNL M&S CE from UN: Materials & Services			698	865	1,563
		BNL M&S CE from UN: Non Sr. Electrical Engineer			337	408	745
	EL1480	Electrical Design of Base - Version 2 design, fab, Total			1,861	2,273	4,134
	EL1490	Electrical Design of Base - Version 3 design, fab,				1,909	1,909
		BNL M&S CE from UN: Electronics Technician					
		BNL M&S CE from UN: Materials & Services				1,625	1,625
		BNL M&S CE from UN: Non Sr. Electrical Engineer				818	818
	EL1490	Electrical Design of Base - Version 3 design, fab, Total				4,352	4,352
130.04.04.02.02 Characterization of Cables Total			4,956	1,861	2,273	4,352	13,442
Grand Total			4,956	1,861	24,091	20,577	51,485

130.04.04.02 Electrical Design/Characterization Cables and Bases - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY12	FY13	FY14	Grand Total
130.04.04.02.01	Characterization of PM EL1440	Characterization of cables			18.56	13.44	32.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer					
		BNL M&S CE from UN: Sr. Electrical Engineer			13.92	10.08	24.00
	EL1440	Characterization of cables Total			32.48	23.52	56.00
130.04.04.02.01 Characterization of PMT Total					32.48	23.52	56.00
130.04.04.02.02	Characterization of Cal EL1470	Electrical Design of Base - Version 1 design, fab,					
		BNL M&S CE from UN: Electronics Technician	48.00				48.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer	8.00				8.00
	EL1470	Electrical Design of Base - Version 1 design, fab, Total	56.00				56.00
	EL1480	Electrical Design of Base - Version 2 design, fab,			14.28	17.22	31.50
		BNL M&S CE from UN: Electronics Technician					
		BNL M&S CE from UN: Non Sr. Electrical Engineer			3.40	4.10	7.50
	EL1480	Electrical Design of Base - Version 2 design, fab, Total			17.68	21.32	39.00
	EL1490	Electrical Design of Base - Version 3 design, fab,				32.00	32.00
		BNL M&S CE from UN: Electronics Technician					
		BNL M&S CE from UN: Non Sr. Electrical Engineer				8.00	8.00
	EL1490	Electrical Design of Base - Version 3 design, fab, Total				40.00	40.00
130.04.04.02.02 Characterization of Cables Total			56.00	17.68	21.32	40.00	135.00
Grand Total			56.00	17.68	53.80	63.52	191.00

130.04.04.03 High Voltage (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.04.03 High Voltage	EL1520 High Voltage - Conceptual Design	BNL M&S CE from UN: Non Sr. Electrical Engineer	663	2,092	2,209	2,304	1,402				8,670
		BNL M&S CE from UN: Sr. Electrical Engineer	773	2,441	2,577	2,688	1,635				10,115
	EL1520 High Voltage - Conceptual Design	Total	1,436	4,533	4,786	4,992	3,037				18,785
	EL1530 High Voltage - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer					3,497	8,844	1,496		13,837
		BNL M&S CE from UN: PCB Layout Tech					4,703	11,893	2,012		18,609
		BNL M&S CE from UN: Sr. Electrical Engineer					3,517	8,895	1,505		13,917
	EL1530 High Voltage - Design	Total					11,718	29,632	5,014		46,363
	EL1540 High Voltage - Prototype and test	BNL M&S CE from UN: Electrical Technician							3,846		3,846
		BNL M&S CE from UN: Electronics Technician							1,617		1,617
		BNL M&S CE from UN: Materials & Services							22,874		22,874
		BNL M&S CE from UN: Non Sr. Electrical Engineer							12,599		12,599
		BNL M&S CE from UN: Sr. Electrical Engineer							11,201		11,201
	EL1540 High Voltage - Prototype and test	Total							52,138		52,138
	EL1561 High Voltage - Production-Labor	BNL M&S CE from UN: Electronics Technician							16,611	13,387	29,998
		BNL M&S CE from UN: Non Sr. Electrical Engineer							15,061	12,138	27,200
		BNL M&S CE from UN: Sr. Electrical Engineer							17,023	13,719	30,741
	EL1561 High Voltage - Production-Labor	Total							48,695	39,244	87,939
	EL1560 High Voltage - Production-Material	BNL M&S CE from UN: Materials & Services							711,597	573,454	1,285,052
	EL1560 High Voltage - Production-Material	Total							711,597	573,454	1,285,052
130.04.04.03 High Voltage Total			1,436	4,533	4,786	4,992	14,755	29,632	817,444	612,699	1,490,276
Grand Total			1,436	4,533	4,786	4,992	14,755	29,632	817,444	612,699	1,490,276

130.04.04.03 High Voltage - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.04.03 High Voltage	EL1520 High Voltage - Conceptual Design	BNL M&S CE from UN: Non Sr. Electrical Engineer	6.48	19.92	20.48	20.80	12.32				80.00
		BNL M&S CE from UN: Sr. Electrical Engineer	6.48	19.92	20.48	20.80	12.32				80.00
	EL1520 High Voltage - Conceptual Design	Total	12.96	39.84	40.96	41.60	24.64				160.00
	EL1530 High Voltage - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer					30.74	75.69	12.47		118.90
		BNL M&S CE from UN: PCB Layout Tech					41.34	101.79	16.77		159.90
		BNL M&S CE from UN: Sr. Electrical Engineer					26.50	65.25	10.75		102.50
	EL1530 High Voltage - Design	Total					98.58	242.73	39.99		381.30
	EL1540 High Voltage - Prototype and test	BNL M&S CE from UN: Electrical Technician							80.01		80.01
		BNL M&S CE from UN: Electronics Technician							23.10		23.10
		BNL M&S CE from UN: Non Sr. Electrical Engineer							104.99		104.99
		BNL M&S CE from UN: Sr. Electrical Engineer							80.01		80.01
	EL1540 High Voltage - Prototype and test	Total							288.11		288.11
	EL1561 High Voltage - Production-Labor	BNL M&S CE from UN: Electronics Technician							237.30	186.21	423.51
		BNL M&S CE from UN: Non Sr. Electrical Engineer							125.51	98.49	224.00
		BNL M&S CE from UN: Sr. Electrical Engineer							121.59	95.41	217.00
	EL1561 High Voltage - Production-Labor	Total							484.40	380.11	864.51
130.04.04.03 High Voltage Total			12.96	39.84	40.96	41.60	123.22	242.73	812.50	380.11	1,693.92
Grand Total			12.96	39.84	40.96	41.60	123.22	242.73	812.50	380.11	1,693.92

130.04.04.04 Front End Elect. (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
130.04.04.04.01 Integrated Circuit	EL1580 Front End Elect. - Conceptual Design	BNL M&S CE from UN: Integrated Circuit Designer				3,811	12,031	992					16,833
		BNL M&S CE from UN: Non Sr. Electrical Engineer				5,716	18,046	1,489					25,250
		BNL M&S CE from UN: Sr. Electrical Engineer				11,017	34,784	2,869					48,671
	EL1580 Front End Elect. - Conceptual Design Total					20,544	64,860	5,350					90,754
	EL1600 Front End Elect - Integrated Circuit - Design - v1	BNL M&S CE from UN: Integrated Circuit Designer					4,285	129,387					133,672
		BNL M&S CE from UN: Sr. Electrical Engineer					2,579	77,881					80,460
	EL1600 Front End Elect - Integrated Circuit - Design - v1 Total						6,865	207,268					214,132
	EL1620 Front End Elect - Integrated Circuit - Prototype -	BNL M&S CE from UN: Materials & Services						51,408					51,408
		BNL M&S CE from UN: Sr. Electrical Engineer						6,025					6,025
	EL1620 Front End Elect - Integrated Circuit - Prototype - Total							57,434					57,434
	EL1630 Front End Elect - Integrated Circuit - Test - v1	BNL M&S CE from UN: Electrical Technician						3,121	11,009				14,130
		BNL M&S CE from UN: Materials & Services						4,122	14,538				18,660
		BNL M&S CE from UN: Non Sr. Electrical Engineer						5,830	20,565				26,395
		BNL M&S CE from UN: Sr. Electrical Engineer						2,258	7,964				10,221
	EL1630 Front End Elect - Integrated Circuit - Test - v1 Total							15,330	54,076				69,406
	EL1640 Front End Elect - Integrated Circuit - Design - v2	BNL M&S CE from UN: Integrated Circuit Designer							53,172				53,172
		BNL M&S CE from UN: Sr. Electrical Engineer							20,743				20,743
	EL1640 Front End Elect - Integrated Circuit - Design - v2 Total								73,914				73,914
	EL1650 Front End Elect - Integrated Circuit - Prototype -	BNL M&S CE from UN: Materials & Services							4,533	39,050	10,797		54,380
		BNL M&S CE from UN: Sr. Electrical Engineer							521	4,486	1,240		6,248
	EL1650 Front End Elect - Integrated Circuit - Prototype - Total								5,054	43,536	12,037		60,628
	EL1660 Front End Elect - Integrated Circuit - Test - v2	BNL M&S CE from UN: Electronics Technician									24,537		24,537
		BNL M&S CE from UN: Materials & Services									11,879		11,879
		BNL M&S CE from UN: Non Sr. Electrical Engineer									18,693		18,693
		BNL M&S CE from UN: Sr. Electrical Engineer									10,907		10,907
	EL1660 Front End Elect - Integrated Circuit - Test - v2 Total										66,016		66,016
	EL1790 Front End Elect - Integrated Circuit - Production-	BNL M&S CE from UN: Electronics Technician									53,469		53,469
		BNL M&S CE from UN: Integrated Circuit Designer									18,752		18,752
		BNL M&S CE from UN: Sr. Electrical Engineer									10,838		10,838
	EL1790 Front End Elect - Integrated Circuit - Production- Total										83,059		83,059
	EL1680 Front End Elect - Integrated Circuit - Production-	BNL M&S CE from UN: Materials & Services									785,388		785,388
	EL1680 Front End Elect - Integrated Circuit - Production- Total										785,388		785,388
130.04.04.04.01 Integrated Circuit Total						20,544	71,725	285,382	133,044	43,536	946,501		1,500,731
130.04.04.04.02 Printed Circuit	EL1700 Front End Elect - Printed Circuit - Conceptual Des	BNL M&S CE from UN: Non Sr. Electrical Engineer	7,104	9,859	6,539								23,503
		BNL M&S CE from UN: Sr. Electrical Engineer	8,288	11,502	7,629								27,420
		BNL M&S CE from UN: Travel	17,266	23,333	15,815								56,414
	EL1700 Front End Elect - Printed Circuit - Conceptual Des Total		32,658	44,694	29,984								107,336
	EL1710 Front End Elect - Printed Circuit - Design - v1	BNL M&S CE from UN: Non Sr. Electrical Engineer					6,712	10,339					17,051
		BNL M&S CE from UN: PCB Layout Tech					10,083	15,533					25,616
		BNL M&S CE from UN: Sr. Electrical Engineer					3,934	6,059					9,993
	EL1710 Front End Elect - Printed Circuit - Design - v1 Total						20,728	31,931					52,659
	EL1720 Front End Elect - Printed Circuit - Prototype - v1	BNL M&S CE from UN: Materials & Services						15,902					15,902
		BNL M&S CE from UN: Sr. Electrical Engineer						2,013					2,013
	EL1720 Front End Elect - Printed Circuit - Prototype - v1 Total							17,916					17,916
	EL1730 Front End Elect - Printed Circuit - Test - v1	BNL M&S CE from UN: Electronics Technician						15,101					15,101
		BNL M&S CE from UN: Materials & Services						11,424					11,424
		BNL M&S CE from UN: Non Sr. Electrical Engineer						8,656					8,656
		BNL M&S CE from UN: Sr. Electrical Engineer						5,002					5,002
	EL1730 Front End Elect - Printed Circuit - Test - v1 Total							40,183					40,183
	EL1740 Front End Elect - Printed Circuit - Design - v2	BNL M&S CE from UN: Non Sr. Electrical Engineer									9,347		9,347
		BNL M&S CE from UN: PCB Layout Tech									18,695		18,695
		BNL M&S CE from UN: Sr. Electrical Engineer									5,453		5,453
	EL1740 Front End Elect - Printed Circuit - Design - v2 Total										33,495		33,495
	EL1750 Front End Elect - Printed Circuit - Prototype - v2	BNL M&S CE from UN: Materials & Services									17,225		17,225
		BNL M&S CE from UN: Sr. Electrical Engineer									2,181		2,181
	EL1750 Front End Elect - Printed Circuit - Prototype - v2 Total										19,406		19,406
	EL1760 Front End Elect - Printed Circuit - Test - v2	BNL M&S CE from UN: Electronics Technician						16,358					16,358
		BNL M&S CE from UN: Materials & Services						6,187					6,187
		BNL M&S CE from UN: Non Sr. Electrical Engineer									14,022		14,022
		BNL M&S CE from UN: Sr. Electrical Engineer									5,454		5,454
	EL1760 Front End Elect - Printed Circuit - Test - v2 Total										42,021		42,021
	EL1780 Front End Elect - Printed Circuit - Production-Lab	BNL M&S CE from UN: Electronics Technician									1,635	51,521	53,156

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
130.04.04.04.02 Printed Circuit	EL1780 Front End Elect - Printed Circuit - Production-Lab	BNL M&S CE from UN: Non Sr. Electrical Engineer									296	9,298	9,593
		BNL M&S CE from UN: Sr. Electrical Engineer									172	5,424	5,595
	EL1780 Front End Elect - Printed Circuit - Production-Lab Total										2,102	66,242	68,344
	EL1830 Front End Elect - Printed Circuit - Production-Mat	BNL M&S CE from UN: Materials & Services									29,683	935,364	965,047
	EL1830 Front End Elect - Printed Circuit - Production-Mat Total										29,683	935,364	965,047
130.04.04.04.02 Printed Circuit Total			32,658	44,694	29,984		20,728	90,030			126,707	1,001,606	1,346,407
130.04.04.04.03 Integrated System Test	EL1800 Front End Elect - Integrated System Test - V1	BNL M&S CE from UN: Electronics Technician						17,316	2,895				20,211
		BNL M&S CE from UN: Materials & Services						39,299	6,570				45,868
		BNL M&S CE from UN: Non Sr. Electrical Engineer						22,263	3,722				25,985
		BNL M&S CE from UN: Sr. Electrical Engineer						8,658	1,447				10,105
	EL1800 Front End Elect - Integrated System Test - V1 Total							87,536	14,634				102,170
	EL1820 Front End Elect - Integrated System Test - V2	BNL M&S CE Costs							18,771				18,771
		BNL M&S CE from UN: Electronics Technician							20,678				20,678
		BNL M&S CE from UN: Non Sr. Electrical Engineer							22,155				22,155
		BNL M&S CE from UN: Sr. Electrical Engineer							10,339				10,339
	EL1820 Front End Elect - Integrated System Test - V2 Total								71,943				71,943
130.04.04.04.03 Integrated System Test Total								87,536	86,577				174,113
Grand Total			32,658	44,694	29,984	20,544	92,454	462,948	219,621	43,536	1,073,208	1,001,606	3,021,252

130.04.04.04 Front End Elect. - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
130.04.04.04.01 Integrated Circuit	EL1580 Front End Elect. - Conceptual Design	BNL M&S CE from UN: Integrated Circuit Designer				37.26	114.54	9.20					161.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer				55.89	171.81	13.80					241.50
		BNL M&S CE from UN: Sr. Electrical Engineer				92.34	283.86	22.80					399.00
	EL1580 Front End Elect. - Conceptual Design Total					185.49	570.21	45.80					801.50
	EL1600 Front End Elect - Integrated Circuit - Design - v1	BNL M&S CE from UN: Integrated Circuit Designer				40.80	1,199.52						1,240.32
		BNL M&S CE from UN: Sr. Electrical Engineer					21.05	618.87					639.92
	EL1600 Front End Elect - Integrated Circuit - Design - v1 Total					61.85	1,818.39						1,880.24
	EL1620 Front End Elect - Integrated Circuit - Prototype -	BNL M&S CE from UN: Sr. Electrical Engineer						47.88					47.88
	EL1620 Front End Elect - Integrated Circuit - Prototype - Total							47.88					47.88
	EL1630 Front End Elect - Integrated Circuit - Test - v1	BNL M&S CE from UN: Electrical Technician						72.22	248.06				320.28
		BNL M&S CE from UN: Non Sr. Electrical Engineer						54.05	185.65				239.70
		BNL M&S CE from UN: Sr. Electrical Engineer						17.94	61.62				79.56
	EL1630 Front End Elect - Integrated Circuit - Test - v1 Total							144.21	495.33				639.54
	EL1640 Front End Elect - Integrated Circuit - Design - v2	BNL M&S CE from UN: Integrated Circuit Designer							480.00				480.00
		BNL M&S CE from UN: Sr. Electrical Engineer							160.50				160.50
	EL1640 Front End Elect - Integrated Circuit - Design - v2 Total								640.50				640.50
	EL1650 Front End Elect - Integrated Circuit - Prototype -	BNL M&S CE from UN: Sr. Electrical Engineer							4.03	33.80	9.10		46.93
	EL1650 Front End Elect - Integrated Circuit - Prototype - Total								4.03	33.80	9.10		46.93
	EL1660 Front End Elect - Integrated Circuit - Test - v2	BNL M&S CE from UN: Electronics Technician									360.00		360.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer									159.99		159.99
		BNL M&S CE from UN: Sr. Electrical Engineer									80.01		80.01
	EL1660 Front End Elect - Integrated Circuit - Test - v2 Total										600.00		600.00
	EL1790 Front End Elect - Integrated Circuit - Production-	BNL M&S CE from UN: Electronics Technician									784.49		784.49
		BNL M&S CE from UN: Integrated Circuit Designer									160.49		160.49
		BNL M&S CE from UN: Sr. Electrical Engineer									79.51		79.51
	EL1790 Front End Elect - Integrated Circuit - Production- Total										1,024.49		1,024.49
130.04.04.04.01 Integrated Circuit Total						185.49	632.06	2,056.28	1,139.86	33.80	1,633.59		5,681.08
130.04.04.04.02 Printed Circuit	EL1700 Front End Elect - Printed Circuit - Conceptual Des	BNL M&S CE from UN: Non Sr. Electrical Engineer	74.00	100.00	66.00								240.00
		BNL M&S CE from UN: Sr. Electrical Engineer	74.00	100.00	66.00								240.00
	EL1700 Front End Elect - Printed Circuit - Conceptual Des Total		148.00	200.00	132.00								480.00
	EL1710 Front End Elect - Printed Circuit - Design - v1	BNL M&S CE from UN: Non Sr. Electrical Engineer					63.90	95.85					159.75
		BNL M&S CE from UN: PCB Layout Tech					96.00	144.00					240.00
		BNL M&S CE from UN: Sr. Electrical Engineer					32.10	48.15					80.25
	EL1710 Front End Elect - Printed Circuit - Design - v1 Total						192.00	288.00					480.00
	EL1720 Front End Elect - Printed Circuit - Prototype - v1	BNL M&S CE from UN: Sr. Electrical Engineer						16.00					16.00
	EL1720 Front End Elect - Printed Circuit - Prototype - v1 Total							16.00					16.00
	EL1730 Front End Elect - Printed Circuit - Test - v1	BNL M&S CE from UN: Electronics Technician						240.00					240.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer						80.25					80.25
		BNL M&S CE from UN: Sr. Electrical Engineer						39.75					39.75

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
	EL1730 Front End Elect - Printed Circuit - Test - v1 Total							360.00					360.00
	EL1740 Front End Elect - Printed Circuit - Design - v2	BNL M&S CE from UN: Non Sr. Electrical Engineer									80.00		80.00
		BNL M&S CE from UN: PCB Layout Tech									160.00		160.00
		BNL M&S CE from UN: Sr. Electrical Engineer									40.00		40.00
	EL1740 Front End Elect - Printed Circuit - Design - v2 Total										280.00		280.00
	EL1750 Front End Elect - Printed Circuit - Prototype - v2	BNL M&S CE from UN: Sr. Electrical Engineer									16.00		16.00
	EL1750 Front End Elect - Printed Circuit - Prototype - v2 Total										16.00		16.00
	EL1760 Front End Elect - Printed Circuit - Test - v2	BNL M&S CE from UN: Electronics Technician									240.00		240.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer									120.01		120.01
		BNL M&S CE from UN: Sr. Electrical Engineer									40.01		40.01
	EL1760 Front End Elect - Printed Circuit - Test - v2 Total										400.02		400.02
	EL1780 Front End Elect - Printed Circuit - Production-Lab	BNL M&S CE from UN: Electronics Technician									23.99	736.01	760.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer									2.53	77.48	80.01
		BNL M&S CE from UN: Sr. Electrical Engineer									1.26	38.74	40.00
	EL1780 Front End Elect - Printed Circuit - Production-Lab Total										27.78	852.23	880.01
130.04.04.04.02 Printed Circuit Total			148.00	200.00	132.00		192.00	664.00			723.80	852.23	2,912.03
130.04.04.04.03 Integrated System Test	EL1800 Front End Elect - Integrated System Test - V1	BNL M&S CE from UN: Electronics Technician						275.20	44.80				320.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer						206.40	33.60				240.00
		BNL M&S CE from UN: Sr. Electrical Engineer						68.80	11.20				80.00
	EL1800 Front End Elect - Integrated System Test - V1 Total							550.40	89.60				640.00
	EL1820 Front End Elect - Integrated System Test - V2	BNL M&S CE from UN: Electronics Technician							320.00				320.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer							200.00				200.00
		BNL M&S CE from UN: Sr. Electrical Engineer							80.00				80.00
	EL1820 Front End Elect - Integrated System Test - V2 Total								600.00				600.00
130.04.04.04.03 Integrated System Test Total								550.40	689.60				1,240.00
Grand Total			148.00	200.00	132.00	185.49	824.06	3,270.68	1,829.46	33.80	2,357.39	852.23	9,833.11

130.04.04.05 Trigger (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY16	FY17	FY18	FY20	FY21	Grand Total
130.04.04.05 Trigger	EL1840 Trigger - Conceptual Design	BNL M&S CE from UN: Non Sr. Electrical Engineer	3,197	4,437	4,423	1,201						13,257
		BNL M&S CE from UN: Sr. Electrical Engineer	2,072	2,876	2,867	778						8,593
	EL1840 Trigger - Conceptual Design	Total	5,269	7,312	7,290	1,979						21,850
	EL1850 Trigger - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer					8,683	13,238				21,921
		BNL M&S CE from UN: PCB Layout Tech					4,863	7,413				12,276
		BNL M&S CE from UN: Sr. Electrical Engineer					3,242	4,942				8,184
	EL1850 Trigger - Design	Total					16,787	25,593				42,380
	EL1860 Trigger - Prototype	BNL M&S CE from UN: Electronics Technician						1,873	21,980			23,853
		BNL M&S CE from UN: Materials & Services						1,699	19,944			21,644
		BNL M&S CE from UN: Non Sr. Electrical Engineer						2,489	29,216			31,705
		BNL M&S CE from UN: PCB Layout Tech						489	5,734			6,223
		BNL M&S CE from UN: Sr. Electrical Engineer						1,167	13,698			14,865
	EL1860 Trigger - Prototype	Total						7,716	90,573			98,289
	EL1880 Trigger - Production	BNL M&S CE from UN: Electronics Technician								4,687	16,323	21,010
		BNL M&S CE from UN: Materials & Services								18,347	63,904	82,251
		BNL M&S CE from UN: Non Sr. Electrical Engineer								6,312	21,987	28,299
		BNL M&S CE from UN: PCB Layout Tech								1,558	5,425	6,983
		BNL M&S CE from UN: Sr. Electrical Engineer								1,243	4,331	5,574
	EL1880 Trigger - Production	Total								32,146	111,970	144,116
130.04.04.05 Trigger Total			5,269	7,312	7,290	1,979	16,787	33,309	90,573	32,146	111,970	306,636
Grand Total			5,269	7,312	7,290	1,979	16,787	33,309	90,573	32,146	111,970	306,636

130.04.04.05 Trigger - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY16	FY17	FY18	FY20	FY21	Grand Total
130.04.04.05 Trigger	EL1840 Trigger - Conceptual Design	BNL M&S CE from UN: Non Sr. Electrical Engineer	33.30	45.00	44.64	12.06						135.00
		BNL M&S CE from UN: Sr. Electrical Engineer	18.50	25.00	24.80	6.70						75.00
	EL1840 Trigger - Conceptual Design	Total	51.80	70.00	69.44	18.76						210.00
	EL1850 Trigger - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer					80.50	119.50				200.00
		BNL M&S CE from UN: PCB Layout Tech					45.08	66.92				112.00
		BNL M&S CE from UN: Sr. Electrical Engineer					25.76	38.24				64.00
	EL1850 Trigger - Design	Total					151.34	224.66				376.00
	EL1860 Trigger - Prototype	BNL M&S CE from UN: Electronics Technician						28.98	331.20			360.18
		BNL M&S CE from UN: Non Sr. Electrical Engineer						22.47	256.80			279.27
		BNL M&S CE from UN: PCB Layout Tech						4.41	50.40			54.81
		BNL M&S CE from UN: Sr. Electrical Engineer						9.03	103.20			112.23
	EL1860 Trigger - Prototype	Total						64.89	741.60			806.49
	EL1880 Trigger - Production	BNL M&S CE from UN: Electronics Technician								66.95	227.05	294.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer								52.60	178.40	231.00
		BNL M&S CE from UN: PCB Layout Tech								12.98	44.02	57.00
		BNL M&S CE from UN: Sr. Electrical Engineer								8.88	30.12	39.00
	EL1880 Trigger - Production	Total								141.41	479.59	621.00
130.04.04.05 Trigger Total			51.80	70.00	69.44	18.76	151.34	289.55	741.60	141.41	479.59	2,013.49
Grand Total			51.80	70.00	69.44	18.76	151.34	289.55	741.60	141.41	479.59	2,013.49

130.04.04.06 DAQ (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
130.04.04.06 DAQ	EL1900 DAQ - Conceptual Design	BNL M&S CE from UN: Post Doc	1,154	1,602	1,597	1,612	1,655	130						7,750
		BNL M&S CE from UN: Sr. Electrical Engineer	2,694	3,738	3,727	3,761	3,862	303						18,084
		BNL M&S CE from UN: Travel	1,480	2,000	2,038	2,101	2,158	169						9,945
	EL1900 DAQ - Conceptual Design	Total	5,328	7,340	7,362	7,473	7,675	601						35,780
	EL1910 DAQ - Design	BNL M&S CE from UN: Post Doc						12,683	12,968					25,651
		BNL M&S CE from UN: Sr. Electrical Engineer						9,864	10,086					19,951
		BNL M&S CE from UN: Travel						5,352	5,473					10,825
	EL1910 DAQ - Design	Total						27,900	28,527					56,427
	EL1920 DAQ - Prototype	BNL M&S CE from UN: Electrical Technician							222	2,192	1,230			3,644
		BNL M&S CE from UN: Materials & Services						1,798	17,777	9,971				29,546
		BNL M&S CE from UN: Post Doc						539	5,328	2,989				8,856
		BNL M&S CE from UN: Sr. Electrical Engineer						646	6,384	3,581				10,611
		BNL M&S CE from UN: Travel						863	8,532	4,786				14,180
	EL1920 DAQ - Prototype	Total						4,066	40,214	22,557				66,837
	EL1940 DAQ - Production	BNL M&S CE from UN: Electrical Technician									1,452	3,299	2,869	7,619
		BNL M&S CE from UN: Materials & Services									25,430	57,765	50,232	133,427
		BNL M&S CE from UN: Post Doc									3,155	7,166	6,232	16,554
		BNL M&S CE from UN: Sr. Electrical Engineer									2,036	4,625	4,022	10,683
		BNL M&S CE from UN: Travel									4,361	9,905	8,614	22,879
	EL1940 DAQ - Production	Total									36,434	82,760	71,969	191,163
130.04.04.06 DAQ Total			5,328	7,340	7,362	7,473	7,675	28,501	32,594	40,214	58,990	82,760	71,969	350,207
Grand Total			5,328	7,340	7,362	7,473	7,675	28,501	32,594	40,214	58,990	82,760	71,969	350,207

130.04.04.06 DAQ - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
130.04.04.06 DAQ	EL1900 DAQ - Conceptual Design	BNL M&S CE from UN: Post Doc	24.05	32.50	32.24	32.37	32.37	2.47						156.00
		BNL M&S CE from UN: Sr. Electrical Engineer	24.05	32.50	32.24	32.37	32.37	2.47						156.00
	EL1900 DAQ - Conceptual Design	Total	48.10	65.00	64.48	64.74	64.74	4.94						312.00
	EL1910 DAQ - Design	BNL M&S CE from UN: Post Doc						241.50	240.45					481.95
		BNL M&S CE from UN: Sr. Electrical Engineer						80.50	80.15					160.65
	EL1910 DAQ - Design	Total						322.00	320.60					642.60
	EL1920 DAQ - Prototype	BNL M&S CE from UN: Electrical Technician							5.13	49.40	26.98			81.51
		BNL M&S CE from UN: Post Doc						9.99	96.20	52.54				158.73
		BNL M&S CE from UN: Sr. Electrical Engineer						5.13	49.40	26.98				81.51
	EL1920 DAQ - Prototype	Total						20.25	195.00	106.50				321.75
	EL1940 DAQ - Production	BNL M&S CE from UN: Electrical Technician									31.86	70.47	59.67	162.00
		BNL M&S CE from UN: Post Doc									55.46	122.67	103.87	282.00
		BNL M&S CE from UN: Sr. Electrical Engineer									15.34	33.93	28.73	78.00
	EL1940 DAQ - Production	Total									102.66	227.07	192.27	522.00
130.04.04.06 DAQ Total			48.10	65.00	64.48	64.74	64.74	326.94	340.85	195.00	209.16	227.07	192.27	1,798.35
Grand Total			48.10	65.00	64.48	64.74	64.74	326.94	340.85	195.00	209.16	227.07	192.27	1,798.35

130.04.04.07 Monitoring and Control (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY17	FY18	FY19	FY20	Grand Total	
130.04.04.07 Monitoring and Control	EL1960 Monitoring and Control - Conceptual Design	BNL M&S CE from UN: Non Sr. Electrical Engineer	888	1,232	1,229	583							3,932	
		BNL M&S CE from UN: Sr. Electrical Engineer	1,036	1,438	1,433	680								4,587
	EL1960 Monitoring and Control - Conceptual Design	Total	1,924	2,670	2,662	1,262							8,518	
	EL1970 Monitoring and Control - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer				1,972	3,820	2,221					8,013	
		BNL M&S CE from UN: Sr. Electrical Engineer				1,227	2,377	1,382						4,986
	EL1970 Monitoring and Control - Design	Total				3,199	6,196	3,604					12,999	
	EL1980 Monitoring and Control - Prototype	BNL M&S CE from UN: Electronics Technician							594	2,044			2,639	
		BNL M&S CE from UN: Materials & Services						1,592	5,474				7,066	
		BNL M&S CE from UN: Mechanical Technician						679	2,336					3,015
		BNL M&S CE from UN: Non Sr. Electrical Engineer							2,038	7,008				9,046
		BNL M&S CE from UN: Sr. Electrical Engineer							1,189	4,088				5,277
	EL1980 Monitoring and Control - Prototype	Total						6,093	20,950				27,043	
	EL2000 Monitoring and Control - Production	BNL M&S CE from UN: Electronics Technician								1,618	4,092	3,751	9,461	
		BNL M&S CE from UN: Materials & Services							21,665	54,784	50,227		126,676	
		BNL M&S CE from UN: Mechanical Technician								563	1,423	1,305	3,291	
		BNL M&S CE from UN: Non Sr. Electrical Engineer								1,930	4,879	4,474	11,282	
		BNL M&S CE from UN: Sr. Electrical Engineer								985	2,490	2,283	5,759	
	EL2000 Monitoring and Control - Production	Total							26,760	67,668	62,040		156,469	
130.04.04.07 Monitoring and Control Total			1,924	2,670	2,662	4,461	6,196	3,604	6,093	47,711	67,668	62,040	205,029	
Grand Total			1,924	2,670	2,662	4,461	6,196	3,604	6,093	47,711	67,668	62,040	205,029	

130.04.04.07 Monitoring and Control - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY17	FY18	FY19	FY20	Grand Total
130.04.04.07 Monitoring and Control	EL1960 Monitoring and Control - Conceptual Design	BNL M&S CE from UN: Non Sr. Electrical Engineer	9.25	12.50	12.40	5.85							40.00
		BNL M&S CE from UN: Sr. Electrical Engineer	9.25	12.50	12.40	5.85							
	EL1960 Monitoring and Control - Conceptual Design	Total	18.50	25.00	24.80	11.70							80.00
	EL1970 Monitoring and Control - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer				19.80	37.35	21.15					78.30
		BNL M&S CE from UN: Sr. Electrical Engineer				10.56	19.92	11.28					41.76
	EL1970 Monitoring and Control - Design	Total				30.36	57.27	32.43					120.06
	EL1980 Monitoring and Control - Prototype	BNL M&S CE from UN: Electronics Technician							9.20	30.80			40.00
		BNL M&S CE from UN: Mechanical Technician							9.20	30.80			40.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer							18.40	61.60			80.00
		BNL M&S CE from UN: Sr. Electrical Engineer							9.20	30.80			40.00
	EL1980 Monitoring and Control - Prototype	Total						46.00	154.00				200.00
	EL2000 Monitoring and Control - Production	BNL M&S CE from UN: Electronics Technician								24.38	60.03	53.59	138.00
		BNL M&S CE from UN: Mechanical Technician								7.42	18.27	16.31	42.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer								16.96	41.76	37.28	96.00
		BNL M&S CE from UN: Sr. Electrical Engineer								7.42	18.27	16.31	42.00
	EL2000 Monitoring and Control - Production	Total							56.18	138.33	123.49		318.00
130.04.04.07 Monitoring and Control Total			18.50	25.00	24.80	42.06	57.27	32.43	46.00	210.18	138.33	123.49	718.06
Grand Total			18.50	25.00	24.80	42.06	57.27	32.43	46.00	210.18	138.33	123.49	718.06

130.04.04.08 Power/Racks/Cooling (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.04.08.01 Low Voltage Power	EL2040 Low Voltage Power - Conceptual Design	BNL M&S CE from UN: Non Sr. Electrical Engineer	710	986	983	992	1,019	1,046	1,105	1,152	246				8,238
		BNL M&S CE from UN: Sr. Electrical Engineer	829	1,150	1,147	1,157	1,188	1,220	1,289	1,344	287				9,611
	EL2040 Low Voltage Power - Conceptual Design	Total	1,539	2,136	2,130	2,149	2,207	2,267	2,393	2,496	532				17,849
	EL2050 Low Voltage Power - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer									14,531	3,911			18,441
		BNL M&S CE from UN: Sr. Electrical Engineer									8,476	2,282			10,758
	EL2050 Low Voltage Power - Design	Total									23,007	6,193			29,199
	EL2060 Low Voltage Power - Prototype	BNL M&S CE from UN: Materials & Services										23,264			23,264
	EL2060 Low Voltage Power - Prototype	Total										23,264			23,264
	EL2080 Low Voltage Power - Production-Labor	BNL M&S CE from UN: Electrical Technician											7,571		7,571
		BNL M&S CE from UN: Non Sr. Electrical Engineer												10,980	10,980
		BNL M&S CE from UN: Sr. Electrical Engineer												2,310	2,310
	EL2080 Low Voltage Power - Production-Labor	Total												20,861	20,861
	EL2090 Low Voltage Power - Production-Material	BNL M&S CE from UN: Materials & Services										125,743	282,984		408,726
	EL2090 Low Voltage Power - Production-Material	Total										125,743	282,984		408,726
130.04.04.08.01 Low Voltage Power Total			1,539	2,136	2,130	2,149	2,207	2,267	2,393	2,496	23,539	155,199	303,845		499,900
130.04.04.08.02 Racks/Crates/Backplanes	EL2100 Racks/Crates/Backplanes - Conceptual design	BNL M&S CE from UN: Non Sr. Electrical Engineer	355	493	491	496	509	523	552	474					3,894
		BNL M&S CE from UN: Sr. Electrical Engineer	414	575	573	579	594	610	644	553					4,543
	EL2100 Racks/Crates/Backplanes - Conceptual design	Total	770	1,068	1,065	1,074	1,103	1,133	1,197	1,027					8,438
	EL2110 Racks/Crates/Backplanes - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer								4,076	14,016				18,093
		BNL M&S CE from UN: PCB Layout Tech								4,076	14,016				18,093
		BNL M&S CE from UN: Sr. Electrical Engineer								4,756	16,352				21,108
	EL2110 Racks/Crates/Backplanes - Design	Total								12,909	44,385				57,294
	EL2120 Racks/Crates/Backplanes - Prototype - v1	BNL M&S CE from UN: Electronics Technician									5,325				5,325
		BNL M&S CE from UN: Materials & Services									6,025				6,025
		BNL M&S CE from UN: Non Sr. Electrical Engineer									4,522				4,522
		BNL M&S CE from UN: Sr. Electrical Engineer									5,276				5,276
	EL2120 Racks/Crates/Backplanes - Prototype - v1	Total									21,148				21,148
	EL2130 Racks/Crates/Backplanes - Design - v2	BNL M&S CE from UN: Non Sr. Electrical Engineer									952	3,754			4,706
		BNL M&S CE from UN: PCB Layout Tech									952	3,754			4,706
		BNL M&S CE from UN: Sr. Electrical Engineer									1,111	4,380			5,491
	EL2130 Racks/Crates/Backplanes - Design - v2	Total									3,015	11,888			14,904
	EL2140 Racks/Crates/Backplanes - Prototype - v2	BNL M&S CE from UN: Electrical Technician										3,745			3,745
		BNL M&S CE from UN: Materials & Services										6,187			6,187
		BNL M&S CE from UN: Non Sr. Electrical Engineer										4,674			4,674
		BNL M&S CE from UN: Sr. Electrical Engineer										5,453			5,453
	EL2140 Racks/Crates/Backplanes - Prototype - v2	Total										20,058			20,058
	EL2160 Racks/Crates/Backplanes - Production-Labor	BNL M&S CE from UN: Electrical Technician										6,152	19,161		25,313
		BNL M&S CE from UN: Non Sr. Electrical Engineer										5,216	16,243		21,459
		BNL M&S CE from UN: Sr. Electrical Engineer										2,028	6,317		8,345
	EL2160 Racks/Crates/Backplanes - Production-Labor	Total										13,396	41,721		55,118
	EL2230 Racks/Crates/Backplanes - Production-Material	BNL M&S CE from UN: Materials & Services										139,317	207,616		346,933
	EL2230 Racks/Crates/Backplanes - Production-Material	Total										139,317	207,616		346,933
130.04.04.08.02 Racks/Crates/Backplanes Total			770	1,068	1,065	1,074	1,103	1,133	1,197	13,936	68,549	184,659	249,337		523,892
130.04.04.08.03 Cooling	EL2180 Cooling - Conceptual design	BNL M&S CE from UN: Non Sr. Electrical Engineer	710	986	983	992	1,019	1,046	1,105	505					7,345
		BNL M&S CE from UN: Sr. Electrical Engineer	1,865	2,588	2,580	2,604	2,674	2,746	2,899	1,326					19,282
	EL2180 Cooling - Conceptual design	Total	2,575	3,574	3,563	3,595	3,692	3,792	4,004	1,831					26,627
	EL2190 Cooling - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer									9,102				9,102
		BNL M&S CE from UN: Sr. Electrical Engineer									10,618				10,618
	EL2190 Cooling - Design	Total									19,720				19,720
	EL2200 Cooling - Prototype	BNL M&S CE from UN: Electronics Technician										2,709			2,709
		BNL M&S CE from UN: Materials & Services										1,237			1,237
		BNL M&S CE from UN: Non Sr. Electrical Engineer										4,644			4,644
	EL2200 Cooling - Prototype	Total										8,591			8,591
	EL2220 Cooling - Production	BNL M&S CE from UN: Electronics Technician											6,623	6,922	13,545
		BNL M&S CE from UN: Materials & Services											41,721	43,602	85,324
		BNL M&S CE from UN: Non Sr. Electrical Engineer											1,368	1,430	2,798
	EL2220 Cooling - Production	Total											49,713	51,954	101,667
130.04.04.08.03 Cooling Total			2,575	3,574	3,563	3,595	3,692	3,792	4,004	1,831	19,720	8,591	49,713	51,954	156,605

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
Grand Total			4,884	6,778	6,757	6,819	7,003	7,192	7,594	18,263	111,809	348,449	602,895	51,954	1,180,397

130.04.04.08 Power/Racks/Cooling - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.04.08.01 Low Voltage Power	EL2040 Low Voltage Power - Conceptual Design	BNL M&S CE from UN: Non Sr. Electrical Engineer	7.40	10.00	9.92	9.96	9.96	9.96	10.24	10.40	2.16				80.00
		BNL M&S CE from UN: Sr. Electrical Engineer	7.40	10.00	9.92	9.96	9.96	9.96	10.24	10.40	2.16				80.00
	EL2040 Low Voltage Power - Conceptual Design	Total	14.80	20.00	19.84	19.92	19.92	19.92	20.48	20.80	4.32				160.00
	EL2050 Low Voltage Power - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer									127.72	33.47			161.19
		BNL M&S CE from UN: Sr. Electrical Engineer									63.86	16.74			80.60
	EL2050 Low Voltage Power - Design	Total									191.58	50.21		241.79	
	EL2080 Low Voltage Power - Production-Labor	BNL M&S CE from UN: Electrical Technician											157.49		157.49
		BNL M&S CE from UN: Non Sr. Electrical Engineer											91.50		91.50
		BNL M&S CE from UN: Sr. Electrical Engineer											16.50		16.50
	EL2080 Low Voltage Power - Production-Labor	Total											265.49		265.49
130.04.04.08.01 Low Voltage Power Total			14.80	20.00	19.84	19.92	19.92	19.92	20.48	20.80	195.90	50.21	265.49		667.28
130.04.04.08.02 Racks/Crates/Backplanes	EL2100 Racks/Crates/Backplanes - Conceptual design	BNL M&S CE from UN: Non Sr. Electrical Engineer	3.70	5.00	4.96	4.98	4.98	4.98	5.12	4.28					38.00
		BNL M&S CE from UN: Sr. Electrical Engineer	3.70	5.00	4.96	4.98	4.98	4.98	5.12	4.28					38.00
	EL2100 Racks/Crates/Backplanes - Conceptual design	Total	7.40	10.00	9.92	9.96	9.96	9.96	10.24	8.56					76.00
	EL2110 Racks/Crates/Backplanes - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer									36.80	123.20			160.00
		BNL M&S CE from UN: PCB Layout Tech									36.80	123.20			160.00
		BNL M&S CE from UN: Sr. Electrical Engineer									36.80	123.20			160.00
	EL2110 Racks/Crates/Backplanes - Design	Total									110.40	369.60			480.00
	EL2120 Racks/Crates/Backplanes - Prototype - v1	BNL M&S CE from UN: Electronics Technician									80.24				80.24
		BNL M&S CE from UN: Non Sr. Electrical Engineer									39.75				39.75
		BNL M&S CE from UN: Sr. Electrical Engineer									39.75				39.75
	EL2120 Racks/Crates/Backplanes - Prototype - v1	Total									159.74				159.74
	EL2130 Racks/Crates/Backplanes - Design - v2	BNL M&S CE from UN: Non Sr. Electrical Engineer									8.37	32.13			40.50
		BNL M&S CE from UN: PCB Layout Tech									8.37	32.13			40.50
		BNL M&S CE from UN: Sr. Electrical Engineer									8.37	32.13			40.50
	EL2130 Racks/Crates/Backplanes - Design - v2	Total									25.11	96.39			121.50
	EL2140 Racks/Crates/Backplanes - Prototype - v2	BNL M&S CE from UN: Electrical Technician										80.00			80.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer										40.00			40.00
		BNL M&S CE from UN: Sr. Electrical Engineer										40.00			40.00
	EL2140 Racks/Crates/Backplanes - Prototype - v2	Total										160.00			160.00
	EL2160 Racks/Crates/Backplanes - Production-Labor	BNL M&S CE from UN: Electrical Technician										131.43	398.57		530.00
		BNL M&S CE from UN: Non Sr. Electrical Engineer										44.64	135.36		180.00
		BNL M&S CE from UN: Sr. Electrical Engineer										14.88	45.12		60.00
	EL2160 Racks/Crates/Backplanes - Production-Labor	Total										190.95	579.05		770.00
130.04.04.08.02 Racks/Crates/Backplanes Total			7.40	10.00	9.92	9.96	9.96	9.96	10.24	118.96	554.45	447.34	579.05		1,767.24
130.04.04.08.03 Cooling	EL2180 Cooling - Conceptual design	BNL M&S CE from UN: Non Sr. Electrical Engineer	7.40	10.00	9.92	9.96	9.96	9.96	10.24	4.56					72.00
		BNL M&S CE from UN: Sr. Electrical Engineer	16.65	22.50	22.32	22.41	22.41	22.41	23.04	10.26					162.00
	EL2180 Cooling - Conceptual design	Total	24.05	32.50	32.24	32.37	32.37	32.37	33.28	14.82					234.00
	EL2190 Cooling - Design	BNL M&S CE from UN: Non Sr. Electrical Engineer									80.00				80.00
		BNL M&S CE from UN: Sr. Electrical Engineer									80.00				80.00
	EL2190 Cooling - Design	Total									160.00				160.00
	EL2200 Cooling - Prototype	BNL M&S CE from UN: Electronics Technician										39.75			39.75
		BNL M&S CE from UN: Non Sr. Electrical Engineer										39.75			39.75
	EL2200 Cooling - Prototype	Total										79.50			79.50
	EL2220 Cooling - Production	BNL M&S CE from UN: Electronics Technician											94.62	96.28	190.90
		BNL M&S CE from UN: Non Sr. Electrical Engineer											11.40	11.60	23.00
	EL2220 Cooling - Production	Total											106.02	107.88	213.90
130.04.04.08.03 Cooling Total			24.05	32.50	32.24	32.37	32.37	32.37	33.28	14.82	160.00	79.50	106.02	107.88	687.40
Grand Total			46.25	62.50	62.00	62.25	62.25	62.25	64.00	154.58	910.35	577.05	950.56	107.88	3,121.92

130.04.04.09 Electronics Installation and Commissioning (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY21	FY22	Grand Total
130.04.04.09 Electronics Installation an	EL2240 Physical installation UG	BNL M&S CE from UN: Electrical Technician	8,233	6,706	14,940
		BNL M&S CE from UN: Post Doc	5,182	4,221	9,403
		BNL M&S CE from UN: Travel	36,392	29,643	66,034
	EL2240 Physical installation UG	Total	49,807	40,570	90,377
	EL2250 Connection to DAQ	BNL M&S CE from UN: Post Doc	8,858	9,825	18,684
		BNL M&S CE from UN: Travel	12,548	13,918	26,466
	EL2250 Connection to DAQ	Total	21,406	23,744	45,150
	EL2260 Connection to PMTs	BNL M&S CE from UN: Electrical Technician	46,125	43,865	89,990
		BNL M&S CE from UN: Post Doc	9,567	9,098	18,665
		BNL M&S CE from UN: Travel	40,658	38,664	79,322
	EL2260 Connection to PMTs	Total	96,349	91,627	187,976
	EL2270 Verification	BNL M&S CE from UN: Electrical Technician	14,195	8,241	22,436
		BNL M&S CE from UN: Post Doc	23,598	13,699	37,297
		BNL M&S CE from UN: Travel	33,351	19,361	52,712
	EL2270 Verification	Total	71,144	41,301	112,445
	EL2290 Begin calibrations	BNL M&S CE from UN: Electronics Technician		8,860	8,860
		BNL M&S CE from UN: Post Doc		83,540	83,540
		BNL M&S CE from UN: Travel		35,148	35,148
	EL2290 Begin calibrations	Total		127,549	127,549
130.04.04.09 Electronics Installation and Commissioning Total			238,706	324,791	563,496
Grand Total			238,706	324,791	563,496

130.04.04.09 Electronics Installation and Commissioning - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY21	FY22	Grand Total
130.04.04.09 Electronics Installation an	EL2240 Physical installation UG	BNL M&S CE from UN: Electrical Technician	166.75	132.25	299.00
		BNL M&S CE from UN: Post Doc	84.09	66.70	150.79
	EL2240 Physical installation UG	Total	250.84	198.95	449.79
	EL2250 Connection to DAQ	BNL M&S CE from UN: Post Doc	143.75	155.25	299.00
	EL2250 Connection to DAQ	Total	143.75	155.25	299.00
	EL2260 Connection to PMTs	BNL M&S CE from UN: Electrical Technician	934.17	865.03	1,799.20
		BNL M&S CE from UN: Post Doc	155.25	143.75	299.00
	EL2260 Connection to PMTs	Total	1,089.42	1,008.78	2,098.20
	EL2270 Verification	BNL M&S CE from UN: Electrical Technician	287.49	162.51	450.00
		BNL M&S CE from UN: Post Doc	382.94	216.46	599.40
	EL2270 Verification	Total	670.43	378.97	1,049.40
	EL2290 Begin calibrations	BNL M&S CE from UN: Electronics Technician		120.00	120.00
		BNL M&S CE from UN: Post Doc		1,320.00	1,320.00
	EL2290 Begin calibrations	Total		1,440.00	1,440.00
130.04.04.09 Electronics Installation and Commissioning Total			2,154.44	3,181.95	5,336.39
Grand Total			2,154.44	3,181.95	5,336.39

130.04.05 Calibration - Total Cost (\$ Including Direct, Indirect & Escalation)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.01 Management and Safety	91,669	126,854	126,762	128,221	131,682	135,241	142,792	148,934	152,961	157,695	162,577	166,335	85,105	1,756,827
130.04.05.02 Water Transparency Monitoring						26,508	36,680	77,658	82,818	55,623	71,071	63,306	22,664	436,327
130.04.05.03 Photomultiplier Calibration		48,950	97,992	50,640			30,161	89,085	478,310	28,562	36,221	53,112	33,439	946,471
130.04.05.04 Energy Calibration	62,318	33,951	22,510	92,608	238,647	245,096	258,781	269,912	359,086	407,357	419,967	158,815		2,569,048
130.04.05.05 Particle Vertex and ID Calib.									3,238	26,913	51,351	48,930	24,802	155,233
130.04.05.07 Environmental Monitoring			4,372	61,133	63,157	64,861	80,356	90,526	83,391	151,767	147,575	55,418	15,128	817,683
Grand Total	153,988	209,754	251,636	332,602	433,487	471,706	548,770	676,114	1,159,803	827,916	888,761	545,916	181,137	6,681,588

130.04.05 Calibration - Labor (\$)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.01 Management and Safety	81,568	113,204	112,856	113,882	116,956	120,118	126,824	132,279	135,856	140,061	144,398	147,737	75,589	1,561,326
130.04.05.02 Water Transparency Monitoring								12,097	16,565	17,078	27,052	20,363	8,253	101,407
130.04.05.03 Photomultiplier Calibration		39,950	79,654	40,996			30,161	37,596	22,723	28,562	31,201	36,081	22,716	369,639
130.04.05.04 Energy Calibration	60,901	33,198	22,000	82,213	207,697	213,312	225,222	234,909	280,123	306,431	315,920	119,470		2,101,398
130.04.05.05 Particle Vertex and ID Calib.										2,647	6,982	7,143	4,469	21,241
130.04.05.07 Environmental Monitoring			2,252	8,286	8,510	8,740	9,228	9,625	9,885	17,863	19,368	10,667	2,644	107,069
Grand Total	142,470	186,352	216,761	245,377	333,163	342,170	391,435	426,506	465,152	512,641	544,922	341,459	113,672	4,262,079

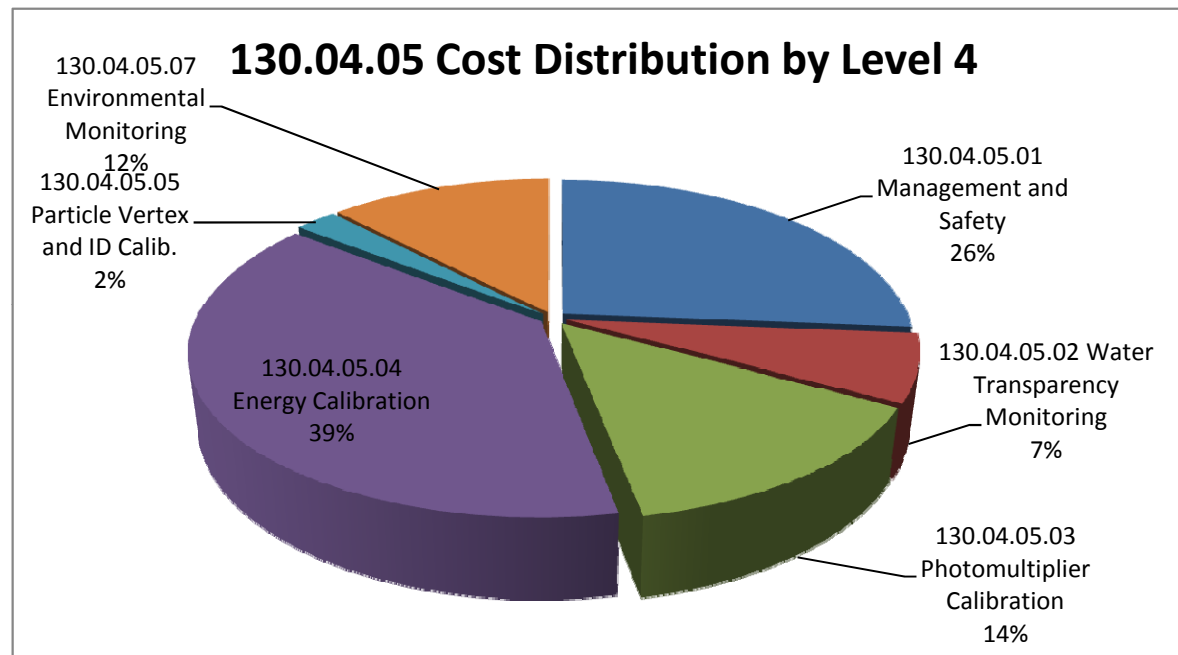
130.04.05 Calibration - Material (\$)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.01 Management and Safety	10,101	13,650	13,906	14,339	14,727	15,124	15,968	16,655	17,105	17,634	18,179	18,598	9,516	195,501
130.04.05.02 Water Transparency Monitoring						26,508	36,680	65,561	66,253	38,545	44,019	42,943	14,411	334,920
130.04.05.03 Photomultiplier Calibration		9,000	18,338	9,644				51,489	455,587		5,020	17,032	10,722	576,832
130.04.05.04 Energy Calibration	1,417	752	509	10,395	30,950	31,784	33,559	35,002	78,963	100,925	104,047	39,345		467,650
130.04.05.05 Particle Vertex and ID Calib.									3,238	24,266	44,369	41,786	20,333	133,992
130.04.05.07 Environmental Monitoring			2,120	52,846	54,647	56,120	71,127	80,901	73,506	133,904	128,206	44,752	12,484	710,613
Grand Total	11,518	23,402	34,874	87,225	100,324	129,537	157,334	249,608	694,651	315,275	343,839	204,456	67,465	2,419,509

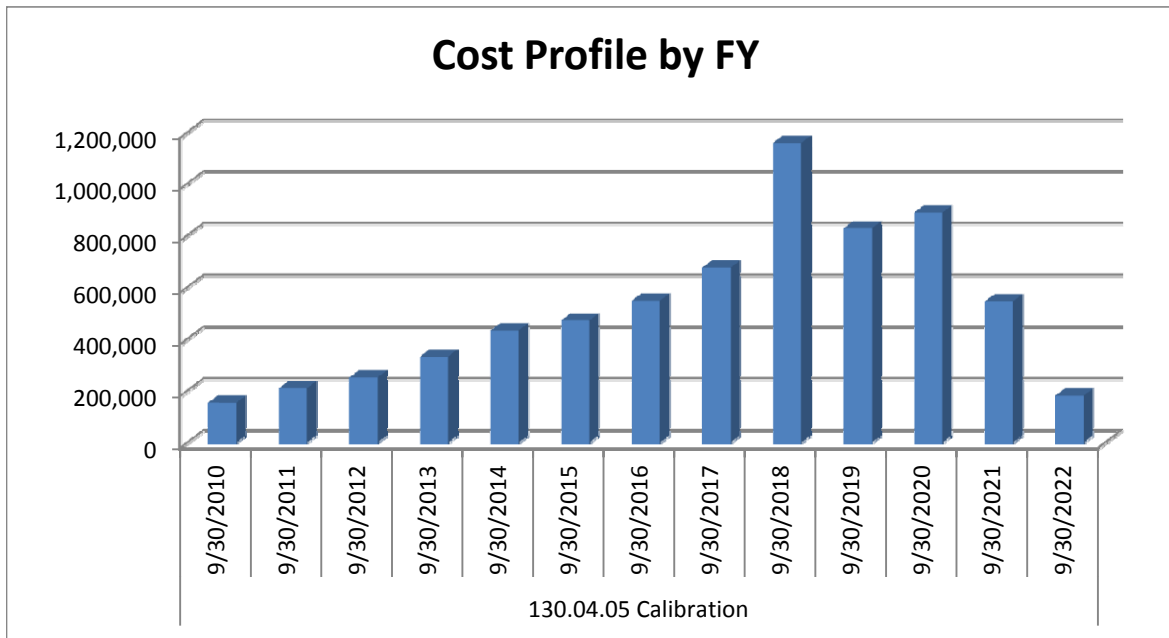
130.04.05 Calibration - FTEs

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.01 Management and Safety	0.18	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.13	3.10
130.04.05.02 Water Transparency Monitoring								0.90	1.21	1.21	1.42	1.00	0.36	6.10
130.04.05.03 Photomultiplier Calibration		0.87	1.72	0.88			1.04	1.50	1.60	2.07	2.44	3.28	2.02	17.41
130.04.05.04 Energy Calibration	0.69	0.37	0.25	1.46	3.86	3.86	3.97	4.01	6.00	6.88	6.81	2.39		40.54
130.04.05.05 Particle Vertex and ID Calib.									0.09	1.19	2.51	2.39	1.31	7.49
130.04.05.07 Environmental Monitoring			0.26	0.95	0.94	0.94	1.71	2.13	1.58	3.01	2.55	0.91	0.29	15.28
Grand Total	0.87	1.49	2.47	3.53	5.05	5.05	6.97	8.81	10.74	14.62	15.99	10.23	4.11	89.92

WBS	Cost
130.04.05.01 Management and Safety	1,756,827
130.04.05.02 Water Transparency Monitoring	436,327
130.04.05.03 Photomultiplier Calibration	946,471
130.04.05.04 Energy Calibration	2,569,048
130.04.05.05 Particle Vertex and ID Calib.	155,233
130.04.05.07 Environmental Monitoring	817,683
Grand Total	6,681,588

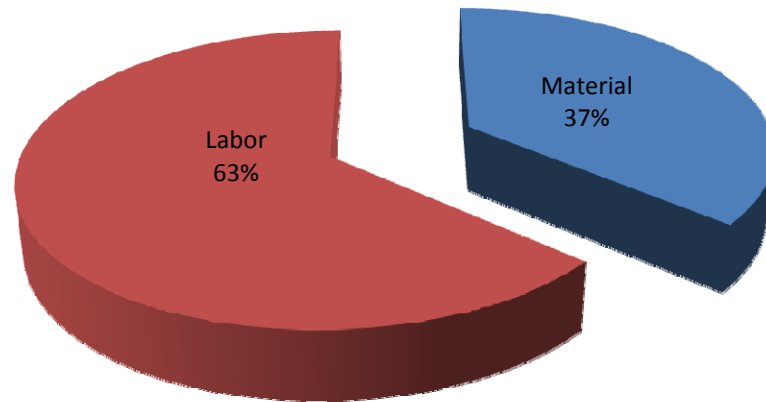


FY	Cost
130.04.05 Calibration	6,681,588
40,451	153,988
40,816	209,754
41,182	251,636
41,547	332,602
41,912	433,487
42,277	471,706
42,643	548,770
43,008	676,114
43,373	1,159,803
43,738	827,916
44,104	888,761
44,469	545,916
44,834	181,137
Grand Total	6,681,588



WBS	Cost
130.04.05 Calibration	6,681,588
Material	2,419,509
Labor	4,262,079
Grand Total	6,681,588

130.04.05 Labor Material Ratio



130.04.05.01 Management and Safety (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.01.01 Management	CL1690 Management, Los Alamos	BNL M&S CE Costs	414	560	571	588	604	620	655	683	702	723	746	763	390	8,021
		BNL M&S CE from LA: Sr. Scientist	70,253	97,500	97,200	98,084	100,731	103,455	109,231	113,929	117,010	120,631	124,367	127,242	65,102	1,344,736
		BNL M&S CE from LA: Travel	5,396	7,293	7,429	7,661	7,868	8,080	8,531	8,898	9,138	9,421	9,712	9,936	5,083	104,446
	CL1690 Management, Los Alamos	Tota	76,064	105,352	105,200	106,333	109,203	112,155	118,417	123,510	126,850	130,776	134,825	137,942	70,576	1,457,203
	CL1700 Management, ISU	BNL M&S CE from IS: Non Sr. Physicist/Scientist	11,315	15,704	15,655	15,798	16,224	16,663	17,593	18,350	18,846	19,429	20,031	20,494	10,487	216,590
		BNL M&S CE from IS: Travel	4,290	5,798	5,906	6,090	6,255	6,423	6,782	7,074	7,265	7,489	7,721	7,899	4,042	83,035
	CL1700 Management, ISU	Tota	15,605	21,501	21,562	21,888	22,479	23,086	24,375	25,424	26,111	26,919	27,752	28,393	14,529	299,624
130.04.05.01.01 Management Total			91,669	126,854	126,762	128,221	131,682	135,241	142,792	148,934	152,961	157,695	162,577	166,335	85,105	1,756,827
Grand Total			91,669	126,854	126,762	128,221	131,682	135,241	142,792	148,934	152,961	157,695	162,577	166,335	85,105	1,756,827

130.04.05.01 Management and Safety - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.01.01 Management	CL1690 Management, Los Alamos	BNL M&S CE from LA: Sr. Scientist	236.80	320.00	317.44	318.72	318.72	318.72	327.68	332.80	332.80	334.08	335.36	334.08	166.43	3,993.63
	CL1690 Management, Los Alamos	Tota	236.80	320.00	317.44	318.72	318.72	318.72	327.68	332.80	332.80	334.08	335.36	334.08	166.43	3,993.63
	CL1700 Management, ISU	BNL M&S CE from IS: Non Sr. Physicist/Scientist	133.20	180.00	178.56	179.28	179.28	179.28	184.32	187.20	187.20	187.92	188.64	187.92	93.63	2,246.43
	CL1700 Management, ISU	Tota	133.20	180.00	178.56	179.28	179.28	179.28	184.32	187.20	187.20	187.92	188.64	187.92	93.63	2,246.43
130.04.05.01.01 Management Total			370.00	500.00	496.00	498.00	498.00	498.00	512.00	520.00	520.00	522.00	524.00	522.00	260.06	6,240.06
Grand Total			370.00	500.00	496.00	498.00	498.00	498.00	512.00	520.00	520.00	522.00	524.00	522.00	260.06	6,240.06

130.04.05.02 Water Transparency Monitoring (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.02.01 In situ water monitoring	CL1750 In situ portable system	BNL M&S CE Costs						4,449	6,084	2,466	12,998
		BNL M&S CE from RP: Mechanical Designer						14,801	20,242	8,204	43,247
		BNL M&S CE from RP: Sr. Scientist						88	121	49	258
		BNL M&S CE from RP: Travel						1,669	2,282	925	4,876
	CL1750 In situ portable system	Total						21,006	28,729	11,644	61,378
	CL1745 In Situ Laser/LED system-Material	BNL M&S CE from UN: Materials & Services	26,508	36,680	38,257	28,864					130,309
	CL1745 In Situ Laser/LED system-Material	Total	26,508	36,680	38,257	28,864					130,309
	CL1740 In Situ Laser/LED system-Labor	BNL M&S CE from UN: Mechanical Technician			12,097	16,565	17,078	12,163			57,902
		BNL M&S CE from UN: Travel			4,081	5,589	5,762	4,103			19,535
	CL1740 In Situ Laser/LED system-Labor	Total			16,178	22,154	22,839	16,267			77,437
130.04.05.02.01 In situ water monitoring Total			26,508	36,680	54,435	51,017	22,839	37,273	28,729	11,644	269,124
130.04.05.02.02 External System	CL1760 External system-Material	BNL M&S CE Costs			19,757	27,054	27,891	28,754	29,417	9,376	142,248
	CL1760 External system-Material	Total			19,757	27,054	27,891	28,754	29,417	9,376	142,248
	CL1770 External system-Labor	BNL M&S CE from IR: Travel			3,466	4,746	4,893	5,044	5,161	1,645	24,954
	CL1770 External system-Labor	Total			3,466	4,746	4,893	5,044	5,161	1,645	24,954
130.04.05.02.02 External System Total					23,223	31,800	32,784	33,798	34,577	11,020	167,203
Grand Total			26,508	36,680	77,658	82,818	55,623	71,071	63,306	22,664	436,327

130.04.05.02 Water Transparency Monitoring - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.02.01 In situ water monitoring	CL1750 In situ portable system	BNL M&S CE from RP: Mechanical Designer				174.44	232.29	91.67	498.40
		BNL M&S CE from RP: Sr. Scientist				70.56	93.96	37.08	201.60
		BNL M&S CE from RP: Uncosted Post Doc				699.72	931.77	367.71	1,999.20
	CL1750 In situ portable system	Total				944.72	1,258.02	496.46	2,699.20
	CL1740 In Situ Laser/LED system-Labor	BNL M&S CE from UN: Mechanical Technician	163.80	218.40	219.24	152.04			753.48
		BNL M&S CE from UN: Uncosted Grad Student	434.85	579.80	582.03	403.63			2,000.31
		BNL M&S CE from UN: Uncosted Post Doc	651.30	868.40	871.74	604.54			2,995.98
	CL1740 In Situ Laser/LED system-Labor	Total	1,249.95	1,666.60	1,673.01	1,160.21			5,749.77
130.04.05.02.01 In situ water monitoring Total			1,249.95	1,666.60	1,673.01	2,104.93	1,258.02	496.46	8,448.97
130.04.05.02.02 External System	CL1770 External system-Labor	BNL M&S CE from IR: Uncosted Grad Student	442.65	590.20	592.47	594.74	592.47	183.87	2,996.40
		BNL M&S CE from IR: Uncosted Physicist/Scientist	118.95	158.60	159.21	159.82	159.21	49.41	805.20
	CL1770 External system-Labor	Total	561.60	748.80	751.68	754.56	751.68	233.28	3,801.60
130.04.05.02.02 External System Total			561.60	748.80	751.68	754.56	751.68	233.28	3,801.60
Grand Total			1,811.55	2,415.40	2,424.69	2,859.49	2,009.70	729.74	12,250.57

130.04.05.03 Photomultiplier Calibration (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.03.01 Timing and Pulse Height Calibration	CL1790 Conceptual design of system	BNL M&S CE from UN: Materials & Services	9,000	18,338	9,644								36,982
		BNL M&S CE from UN: Non Sr. Mechanical Engineer	39,950	79,654	40,996								160,599
	CL1790 Conceptual design of system	Total	48,950	97,992	50,640								197,582
	CL1810 Procurement of Components-Material	BNL M&S CE from UN: Materials & Services					51,489	455,587					507,077
	CL1810 Procurement of Components-Material	Total					51,489	455,587					507,077
	CL1800 Final Design of system	BNL M&S CE from UN: Non Sr. Mechanical Engineer				30,161	31,134						61,296
	CL1800 Final Design of system	Total				30,161	31,134						61,296
	CL1811 Procurement of Components-Labor	BNL M&S CE from UN: Non Sr. Mechanical Engineer					6,461	18,887					25,348
	CL1811 Procurement of Components-Labor	Total					6,461	18,887					25,348
	CL1820 Ex-situ assembly and testing	BNL M&S CE from UN: Non Sr. Mechanical Engineer						3,836	28,562	20,568			52,966
	CL1820 Ex-situ assembly and testing	Total						3,836	28,562	20,568			52,966
	CL1830 Installation	BNL M&S CE from UN: Non Sr. Mechanical Engineer								10,633	36,081	22,716	69,430
	CL1830 Installation	Total								10,633	36,081	22,716	69,430
130.04.05.03.01 Timing and Pulse Height Calibration Total			48,950	97,992	50,640	30,161	89,085	478,310	28,562	31,201	36,081	22,716	913,697
130.04.05.03.02 PMT Calibration Software	CL1840 PMT Calibration Software	BNL M&S CE from UN: Travel								5,020	17,032	10,722	32,774
	CL1840 PMT Calibration Software	Total								5,020	17,032	10,722	32,774
130.04.05.03.02 PMT Calibration Software Total										5,020	17,032	10,722	32,774
Grand Total			48,950	97,992	50,640	30,161	89,085	478,310	28,562	36,221	53,112	33,439	946,471

130.04.05.03 Photomultiplier Calibration - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.03.01 Timing and Pulse Height Calibration	CL1790 Conceptual design of system	BNL M&S CE from UN: Non Sr. Mechanical Engineer	722.50	1,433.44	734.06								2,890.00
		BNL M&S CE from UN: Uncosted Physicist/Scientist	515.00	1,021.76	523.24								2,060.00
		BNL M&S CE from UN: Uncosted Post Doc	500.00	992.00	508.00								2,000.00
	CL1790 Conceptual design of system	Total	1,737.50	3,447.20	1,765.30								6,950.00
	CL1800 Final Design of system	BNL M&S CE from UN: Non Sr. Mechanical Engineer				498.58	501.15						999.73
		BNL M&S CE from UN: Uncosted Physicist/Scientist				574.24	577.20						1,151.44
		BNL M&S CE from UN: Uncosted Post Doc				1,024.32	1,029.60						2,053.92
	CL1800 Final Design of system	Total				2,097.14	2,107.95						4,205.09
	CL1811 Procurement of Components-Labor	BNL M&S CE from UN: Non Sr. Mechanical Engineer					104.00	296.00					400.00
		BNL M&S CE from UN: Uncosted Physicist/Scientist					299.00	851.00					1,150.00
		BNL M&S CE from UN: Uncosted Post Doc					520.00	1,480.00					2,000.00
	CL1811 Procurement of Components-Labor	Total					923.00	2,627.00					3,550.00
	CL1820 Ex-situ assembly and testing	BNL M&S CE from UN: Non Sr. Mechanical Engineer						60.12	435.87	305.61			801.60
		BNL M&S CE from UN: Uncosted Physicist/Scientist						209.88	1,521.63	1,066.89			2,798.40
		BNL M&S CE from UN: Uncosted Post Doc						299.88	2,174.13	1,524.39			3,998.40
	CL1820 Ex-situ assembly and testing	Total						569.88	4,131.63	2,896.89			7,598.40
	CL1830 Installation	BNL M&S CE from UN: Non Sr. Mechanical Engineer								158.00	522.00	320.00	1,000.00
		BNL M&S CE from UN: Uncosted Physicist/Scientist								339.70	1,122.30	688.00	2,150.00
		BNL M&S CE from UN: Uncosted Post Doc								316.00	1,044.00	640.00	2,000.00
	CL1830 Installation	Total								813.70	2,688.30	1,648.00	5,150.00
130.04.05.03.01 Timing and Pulse Height Calibration Total			1,737.50	3,447.20	1,765.30	2,097.14	3,030.95	3,196.88	4,131.63	3,710.59	2,688.30	1,648.00	27,453.49
130.04.05.03.02 PMT Calibration Software	CL1840 PMT Calibration Software	BNL M&S CE from UN: Uncosted Physicist/Scientist								237.00	783.00	480.00	1,500.00
		BNL M&S CE from UN: Uncosted Post Doc								948.00	3,132.00	1,920.00	6,000.00
	CL1840 PMT Calibration Software	Total								1,185.00	3,915.00	2,400.00	7,500.00
130.04.05.03.02 PMT Calibration Software Total										1,185.00	3,915.00	2,400.00	7,500.00
Grand Total			1,737.50	3,447.20	1,765.30	2,097.14	3,030.95	3,196.88	4,131.63	4,895.59	6,603.30	4,048.00	34,953.49

130.04.05.04 Energy Calibration (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.05.04.01 High-energy calibration	CL1870 HE Calibration Accelerator/Muon Trade Study	BNL M&S CE Costs	1,417	582											1,999
		BNL M&S CE from LS: Post Doc	60,901	25,695											86,597
	CL1870 HE Calibration Accelerator/Muon Trade Study Total		62,318	26,277											88,596
130.04.05.04.01 High-energy calibration (100 MeV- ~1 GeV) Total			62,318	26,277											88,596
130.04.05.04.02 Low Energy Calibration	CL1900 Calibration Strategy and Source down select	BNL M&S CE Costs		170	509	350									1,030
		BNL M&S CE from LS: Post Doc		7,503	22,000	14,800									44,304
	CL1900 Calibration Strategy and Source down select Total			7,673	22,510	15,150									45,333
	CL1910 Preliminary and Final Design: Source, Container an	BNL M&S CE Costs				10,045	30,950	31,784	33,559	35,002	10,988				152,329
	CL1910 Preliminary and Final Design: Source, Container an Total					10,045	30,950	31,784	33,559	35,002	10,988				152,329
	CL1921 Source Production-Material	BNL M&S CE Costs									67,975	100,925	104,047	39,345	312,292
	CL1921 Source Production-Material Total										67,975	100,925	104,047	39,345	312,292
	CL1920 Source Production-Labor	BNL M&S CE from LS: Electrical Technician									51,765	76,860	79,240	29,966	237,831
		BNL M&S CE from LS: Mechanical Engineer									95,791	142,230	146,634	55,452	440,107
		BNL M&S CE from LS: Mechanical Technician									58,824	87,341	90,046	34,052	270,264
	CL1920 Source Production-Labor Total										206,381	306,431	315,920	119,470	948,202
	CL1911 Preliminary and Final Design: Source, Container an	BNL M&S CE from LS: Mechanical Engineer				44,593	137,389	141,104	148,982	155,390	48,780				676,238
		BNL M&S CE from LS: Mechanical Technician				22,820	70,308	72,208	76,240	79,519	24,963				346,058
	CL1911 Preliminary and Final Design: Source, Container an Total					67,413	207,697	213,312	225,222	234,909	73,743				1,022,295
130.04.05.04.02 Low Energy Calibration Total				7,673	22,510	92,608	238,647	245,096	258,781	269,912	359,086	407,357	419,967	158,815	2,480,452
Grand Total			62,318	33,951	22,510	92,608	238,647	245,096	258,781	269,912	359,086	407,357	419,967	158,815	2,569,048

130.04.05.04 Energy Calibration - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	Grand Total
130.04.05.04.01 High-energy calibration	CL1870 HE Calibration Accelerator/Muon Trade Study	BNL M&S CE from LS: Post Doc	1,417.10	582.18											1,999.28
	CL1870 HE Calibration Accelerator/Muon Trade Study Total		1,417.10	582.18											1,999.28
130.04.05.04.01 High-energy calibration (100 MeV- ~1 GeV) Total			1,417.10	582.18											1,999.28
130.04.05.04.02 Low Energy Calibration	CL1900 Calibration Strategy and Source down select	BNL M&S CE from LS: Post Doc		170.00	496.00	332.00									998.00
	CL1900 Calibration Strategy and Source down select Total			170.00	496.00	332.00									998.00
	CL1930 Software for Energy Calibration	BNL M&S CE from LS: Uncosted Grad Student				227.42	682.26	682.26	701.44	712.40	712.40	715.14	572.66		5,005.98
	CL1930 Software for Energy Calibration Total					227.42	682.26	682.26	701.44	712.40	712.40	715.14	572.66		5,005.98
	CL1920 Source Production-Labor	BNL M&S CE from LS: Electrical Technician									1,016.38	1,469.43	1,475.06	543.13	4,504.00
		BNL M&S CE from LS: Mechanical Engineer									1,128.31	1,631.25	1,637.50	602.94	5,000.00
		BNL M&S CE from LS: Mechanical Technician									1,353.97	1,957.50	1,965.00	723.53	6,000.00
		BNL M&S CE from LS: Uncosted Grad Student									3,384.92	4,893.75	4,912.50	1,808.83	15,000.00
		BNL M&S CE from LS: Uncosted Physicist/Scientist									790.72	1,143.18	1,147.56	422.54	3,504.00
		BNL M&S CE from LS: Uncosted Post Doc									1,353.97	1,957.50	1,965.00	723.53	6,000.00
	CL1920 Source Production-Labor Total										9,028.27	13,052.61	13,102.62	4,824.50	40,008.00
	CL1911 Preliminary and Final Design: Source, Container an	BNL M&S CE from LS: Mechanical Engineer				600.09	1,800.27	1,800.27	1,850.88	1,879.80	574.57				8,505.88
		BNL M&S CE from LS: Mechanical Technician				600.09	1,800.27	1,800.27	1,850.88	1,879.80	574.57				8,505.88
		BNL M&S CE from LS: Uncosted Grad Student				352.75	1,058.25	1,058.25	1,088.00	1,105.00	337.75				5,000.00
		BNL M&S CE from LS: Uncosted Physicist/Scientist				95.45	286.35	286.35	294.40	299.00	91.39				1,352.94
		BNL M&S CE from LS: Uncosted Post Doc				705.50	2,116.50	2,116.50	2,176.00	2,210.00	675.50				10,000.00
	CL1911 Preliminary and Final Design: Source, Container an Total					2,353.88	7,061.64	7,061.64	7,260.16	7,373.60	2,253.78				33,364.70
130.04.05.04.02 Low Energy Calibration Total				170.00	496.00	2,913.30	7,743.90	7,743.90	7,961.60	8,086.00	11,994.45	13,767.75	13,675.28	4,824.50	79,376.68
Grand Total			1,417.10	752.18	496.00	2,913.30	7,743.90	7,743.90	7,961.60	8,086.00	11,994.45	13,767.75	13,675.28	4,824.50	81,375.96

130.04.05.05 Particle Vertex and ID Calib. (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.05.01 High-energy Particle vt	CL1960 Cherenkov generating light pulser	BNL M&S CE Costs		7,083	18,685	19,116	11,960	56,844
		BNL M&S CE from DR: Mechanical Technician		2,647	6,982	7,143	4,469	21,241
		BNL M&S CE from DR: Travel		4,959	13,082	13,383	8,373	39,797
	CL1960 Cherenkov generating light pulser	Total		14,689	38,748	39,643	24,802	117,882
	CL1970 Naturally Occurring Events	BNL M&S CE from IS: Travel	3,238	12,224	12,602	9,287		37,351
	CL1970 Naturally Occurring Events	Total	3,238	12,224	12,602	9,287		37,351
130.04.05.05.01 High-energy Particle vtx and ID (>= 100 MeV) Total			3,238	26,913	51,351	48,930	24,802	155,233
Grand Total			3,238	26,913	51,351	48,930	24,802	155,233

130.04.05.05 Particle Vertex and ID Calib. - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.05.05.01 High-energy Particle vt	CL1960 Cherenkov generating light pulser	BNL M&S CE from DR: Mechanical Technician		65.28	167.68	167.04	101.76	501.76
		BNL M&S CE from DR: Uncosted Grad Student		780.30	2,004.30	1,996.65	1,216.35	5,997.60
		BNL M&S CE from DR: Uncosted Post Doc		845.58	2,171.98	2,163.69	1,318.11	6,499.36
	CL1960 Cherenkov generating light pulser	Total		1,691.16	4,343.96	4,327.38	2,636.22	12,998.72
	CL1970 Naturally Occurring Events	BNL M&S CE from IS: Uncosted Grad Student	68.16	250.56	251.52	180.48		750.72
		BNL M&S CE from IS: Uncosted Physicist/Scientist	13.49	49.59	49.78	35.72		148.58
		BNL M&S CE from IS: Uncosted Post Doc	104.37	383.67	385.14	276.36		1,149.54
	CL1970 Naturally Occurring Events	Total	186.02	683.82	686.44	492.56		2,048.84
130.04.05.05.01 High-energy Particle vtx and ID (>= 100 MeV) Total			186.02	2,374.98	5,030.40	4,819.94	2,636.22	15,047.56
Grand Total			186.02	2,374.98	5,030.40	4,819.94	2,636.22	15,047.56

130.04.05.07 Environmental Monitoring (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total	
130.04.05.07.01 Biologic Containment	CL2060 Monitor Microbes during construction, commissionin	BNL M&S CE Costs									11,491	14,194	6,814	32,499	
		BNL M&S CE from SD: Travel									2,297	2,837	1,362	6,497	
		CL2060 Monitor Microbes during construction, commissionin Total									13,788	17,032	8,176	38,996	
130.04.05.07.01 Biologic Containment Total															
											13,788	17,032	8,176	38,996	
130.04.05.07.02 Water Environment	CL2080 Water Level, pH, Temp, TDS, Res	BNL M&S CE Costs									47,973	26,980		74,953	
		BNL M&S CE from SD: Travel									7,995	4,496		12,492	
		CL2080 Water Level, pH, Temp, TDS, Res Total									55,968	31,477		87,445	
130.04.05.07.02 Water Environment	CL2090 Water Flow rate	BNL M&S CE Costs					10,178	16,371	8,601					35,150	
		BNL M&S CE from SD: Travel					1,695	2,727	1,433					5,855	
		CL2090 Water Flow rate Total					11,873	19,098	10,033					41,005	
130.04.05.07.02 Water Environment	CL2100 Radon monitoring: R&D and Construction-Material	BNL M&S CE Costs		44,873	46,459	47,711	50,375	52,542	53,961	55,630	57,351	10,341		419,243	
		CL2100 Radon monitoring: R&D and Construction-Material Total		44,873	46,459	47,711	50,375	52,542	53,961	55,630	57,351	10,341		419,243	
		130.04.05.07.02 Water Environment	CL2101 Radon monitoring: R&D and Construction-Labor	BNL M&S CE from SD: Mechanical Technician	2,252	8,286	8,510	8,740	9,228	9,625	9,885	10,191	8,943		75,661
BNL M&S CE from SD: Travel	2,120			7,973	8,189	8,409	8,879	9,261	9,511	9,805	8,604		72,751		
CL2101 Radon monitoring: R&D and Construction-Labor Total			4,372	16,260	16,699	17,150	18,107	18,886	19,396	19,996	17,547		148,412		
130.04.05.07.02 Water Environment Total			4,372	61,133	63,157	64,861	80,356	90,526	83,391	131,595	106,374	10,341		696,105	
130.04.05.07.03 Magnetic Field Measu	CL2110 Magnetic Field Measurement	BNL M&S CE Costs									7,813	10,618	10,863	2,693	31,986
		BNL M&S CE from SD: Mechanical Technician									7,671	10,426	10,667	2,644	31,408
		BNL M&S CE from SD: Travel									4,687	6,369	6,516	1,615	19,188
		CL2110 Magnetic Field Measurement Total									20,172	27,413	28,046	6,952	82,582
130.04.05.07.03 Magnetic Field Measurement Total										20,172	27,413	28,046	6,952	82,582	
Grand Total			4,372	61,133	63,157	64,861	80,356	90,526	83,391	151,767	147,575	55,418	15,128	817,683	

130.04.05.07 Environmental Monitoring - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total	
130.04.05.07.01 Biologic Containment	CL2060 Monitor Microbes during construction, commissionin	BNL M&S CE from SD: Uncosted Grad Student									362.39	435.87	203.74	1,002.00	
		BNL M&S CE from SD: Uncosted Physicist/Scientist									145.39	174.87	81.74	402.00	
		CL2060 Monitor Microbes during construction, commissionin Total									507.78	610.74	285.48	1,404.00	
130.04.05.07.01 Biologic Containment Total															
											507.78	610.74	285.48	1,404.00	
130.04.05.07.02 Water Environment	CL2080 Water Level, pH, Temp, TDS, Res	BNL M&S CE from SD: Uncosted Grad Student									2,583.84	1,414.96		3,998.80	
		BNL M&S CE from SD: Uncosted Physicist/Scientist								517.44	283.36		800.80		
		CL2080 Water Level, pH, Temp, TDS, Res Total									3,101.28	1,698.32		4,799.60	
130.04.05.07.02 Water Environment	CL2090 Water Flow rate	BNL M&S CE from SD: Uncosted Grad Student					1,188.56	1,861.60	952.28					4,002.44	
		BNL M&S CE from SD: Uncosted Physicist/Scientist					297.14	465.40	238.07					1,000.61	
		CL2090 Water Flow rate Total					1,485.70	2,327.00	1,190.35					5,003.05	
130.04.05.07.02 Water Environment	CL2101 Radon monitoring: R&D and Construction-Labor	BNL M&S CE from SD: Mechanical Technician	87.72	321.21	321.21	321.21	330.24	335.40	335.40	336.69	287.67		2,676.75		
		BNL M&S CE from SD: Uncosted Grad Student	255.68	936.24	936.24	936.24	962.56	977.60	977.60	981.36	838.48		7,802.00		
		BNL M&S CE from SD: Uncosted Physicist/Scientist	173.40	634.95	634.95	634.95	652.80	663.00	663.00	665.55	568.65		5,291.25		
CL2101 Radon monitoring: R&D and Construction-Labor Total			516.80	1,892.40	1,892.40	1,892.40	1,945.60	1,976.00	1,976.00	1,983.60	1,694.80		15,770.00		
130.04.05.07.02 Water Environment Total			516.80	1,892.40	1,892.40	1,892.40	3,431.30	4,303.00	3,166.35	5,084.88	3,393.12		25,572.65		
130.04.05.07.03 Magnetic Field Measu	CL2110 Magnetic Field Measurement	BNL M&S CE from SD: Mechanical Technician									253.44	335.36	334.08	80.64	1,003.52
		BNL M&S CE from SD: Uncosted Grad Student								675.18	893.42	890.01	214.83	2,673.44	
		CL2110 Magnetic Field Measurement Total								928.62	1,228.78	1,224.09	295.47	3,676.96	
130.04.05.07.03 Magnetic Field Measurement Total									928.62	1,228.78	1,224.09	295.47	3,676.96		
Grand Total			516.80	1,892.40	1,892.40	1,892.40	3,431.30	4,303.00	3,166.35	6,013.50	5,129.68	1,834.83	580.95	30,653.61	

130.04.06 Water System - Total Cost (\$ Including Direct, Indirect & Escalation)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.06.01 Water System Management and S	216,122	299,775	189,044	34,101	32,747	25,015	22,105	23,056	23,679	24,412	25,168	25,750	14,692	955,665
130.04.06.02 Fill System		39,333	20,304	26,213	68,461	39,359	41,556	42,067	4,527,628	83,362				4,888,284
130.04.06.03 Recirculation System		16,649	20,781	19,306	16,712	35,165	36,894	38,481	39,543	9,311,499	79,873			9,614,903
130.04.06.04 Water Shaft System		11,227	21,666	35,544	33,240	24,980	54							126,712
130.04.06.05 Sump System		4,479	61,977		32,164	8,461	7,145		30,480	73,985				218,691
130.04.06.07 Material Compatibility Testing	280,779	361,133	415,264	467,071	219,687	165,491	181,389	167,290	160,304	165,263	170,378	174,313	85,013	3,013,377
130.04.06.08 Water System Installation									57,632	88,781	202,279			348,692
Grand Total	496,902	732,597	729,037	582,235	403,012	298,471	289,144	270,894	4,839,265	9,747,302	477,697	200,063	99,705	19,166,324

130.04.06 Water System - Labor (\$)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.06.01 Water System Management and S	211,531	293,570	178,035	17,865	21,119	21,178	22,105	23,056	23,679	24,412	25,168	25,750	14,692	902,159
130.04.06.02 Fill System		39,333	17,026	21,460	59,382	34,943	36,894	38,701	8,000	69,800				325,540
130.04.06.03 Recirculation System		16,649	20,781	19,306	16,712	35,165	36,894	38,481	39,543	42,507	79,873			345,911
130.04.06.04 Water Shaft System		11,227	19,740	32,776	31,339	21,927	54							117,063
130.04.06.05 Sump System		4,479	55,815		25,665	8,461	7,145		25,692	67,765				195,022
130.04.06.07 Material Compatibility Testing	141,891	173,446	215,882	237,265	135,129	102,644	113,021	95,981	87,068	89,763	92,543	94,683	47,195	1,626,512
130.04.06.08 Water System Installation									46,062	70,959	156,530			273,552
Grand Total	353,422	538,705	507,278	328,672	289,347	224,319	216,114	196,220	230,044	365,207	354,114	120,432	61,887	3,785,760

130.04.06 Water System - Material (\$)

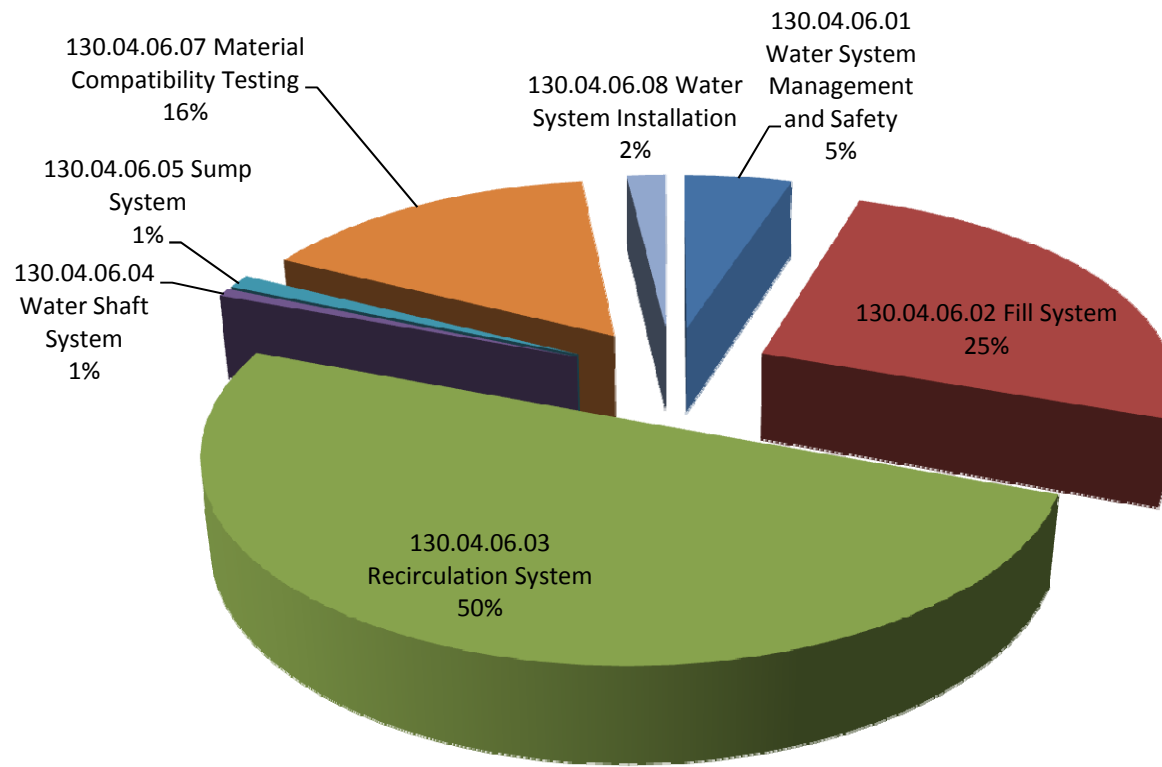
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.06.01 Water System Management and S	4,592	6,205	11,010	16,236	11,627	3,836								53,506
130.04.06.02 Fill System			3,279	4,753	9,079	4,415	4,662	3,366	4,519,628	13,562				4,562,743
130.04.06.03 Recirculation System										9,268,992				9,268,992
130.04.06.04 Water Shaft System			1,926	2,769	1,901	3,054								9,649
130.04.06.05 Sump System			6,162		6,499				4,788	6,219				23,669
130.04.06.07 Material Compatibility Testing	138,888	187,687	199,382	229,807	84,558	62,847	68,368	71,309	73,235	75,500	77,835	79,631	37,818	1,386,865
130.04.06.08 Water System Installation									11,569	17,822	45,749			75,140
Grand Total	143,480	193,892	221,758	253,564	113,665	74,152	73,030	74,675	4,609,221	9,382,096	123,584	79,631	37,818	15,380,564

130.04.06 Water System - FTEs

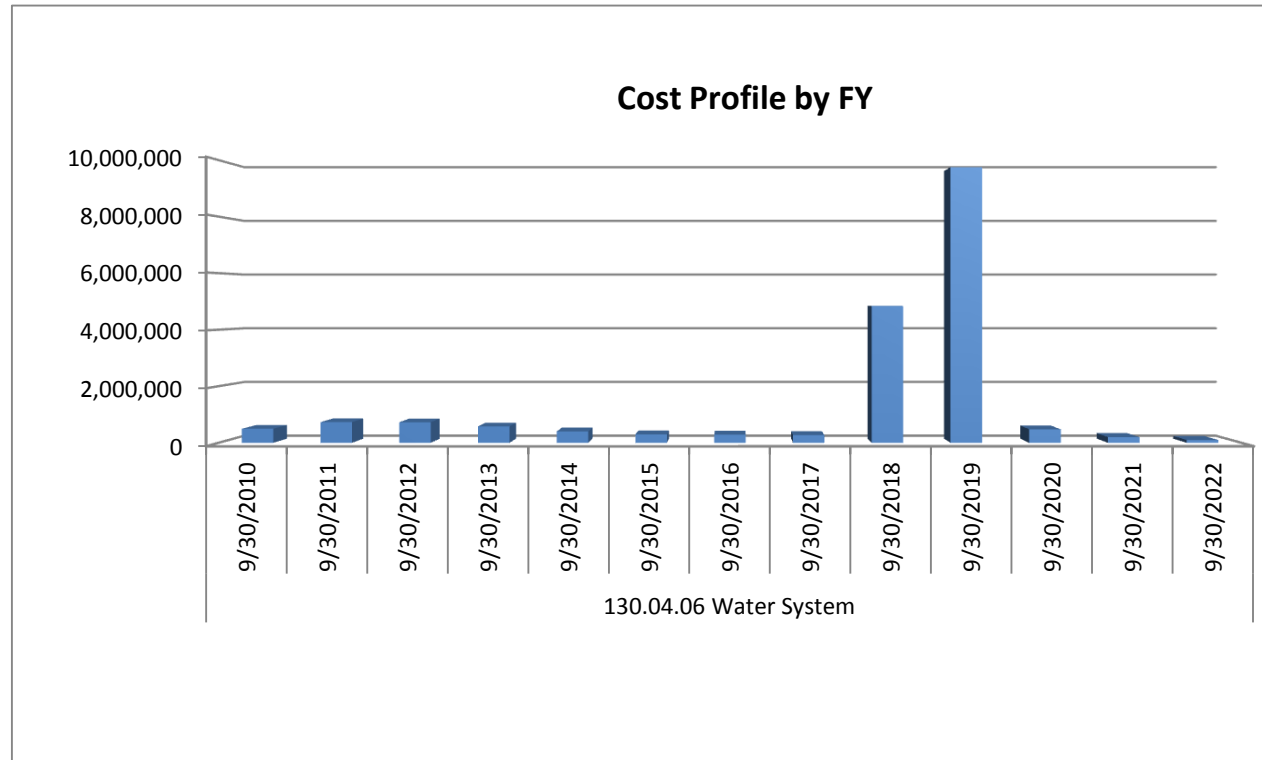
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.06.01 Water System Management and S	0.49	0.67	0.47	0.22	0.28	0.18	0.14	0.14	0.14	0.14	0.14	0.14	0.08	3.25
130.04.06.02 Fill System		0.18	0.19	0.26	0.70	0.41	0.42	0.41	0.08	0.73				3.39
130.04.06.03 Recirculation System		0.12	0.22	0.23	0.23	0.37	0.42	0.43	0.43	0.51	1.01			3.95
130.04.06.04 Water Shaft System		0.08	0.14	0.23	0.21	0.14	0.00							0.80
130.04.06.05 Sump System		0.03	0.39		0.17	0.06	0.05		0.16	0.40				1.25
130.04.06.07 Material Compatibility Testing	0.94	1.12	1.50	2.02	1.05	0.63	0.68	0.51	0.42	0.42	0.42	0.42	0.21	10.35
130.04.06.08 Water System Installation									0.40	0.60	1.40			2.40
Grand Total	1.43	2.20	2.90	2.96	2.64	1.80	1.71	1.49	1.64	2.82	2.97	0.56	0.29	25.40

WBS	Cost
130.04.06.01 Water System Management and Safety	955,665
130.04.06.02 Fill System	4,888,284
130.04.06.03 Recirculation System	9,614,903
130.04.06.04 Water Shaft System	126,712
130.04.06.05 Sump System	218,691
130.04.06.07 Material Compatibility Testing	3,013,377
130.04.06.08 Water System Installation	348,692
Grand Total	19,166,324

130.04.06 Cost Distribution at Level 4

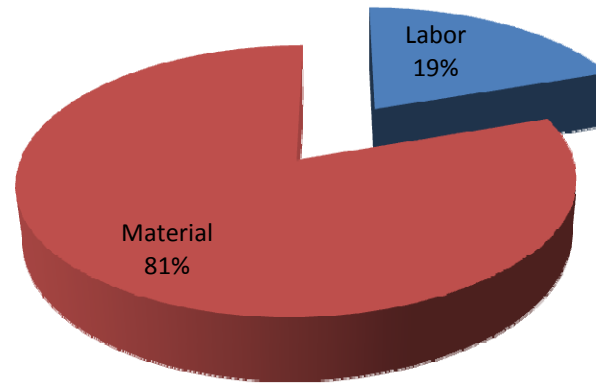


FY	Cost
130.04.06 Water System	19,166,324
FY10	496,902
FY11	732,597
FY12	729,037
FY13	582,235
FY14	403,012
FY15	298,471
FY16	289,144
FY17	270,894
FY18	4,839,265
FY19	9,747,302
FY20	477,697
FY21	200,063
FY22	99,705
Grand Total	19,166,324



WBS	Cost
130.04.06 Water System	
Labor	3,785,760
Material	15,380,564
Grand Total	19,166,324

130.04.06 Labor Material Ratio



130.04.06.01 Water System Management and Safety (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total	
130.04.06.01 Water System Manageme	WS1410 Conceptual Design and CD-1	BNL M&S CE Costs	766	1,035	617											2,417	
		BNL M&S CE from DK: Mechanical Engineer	5,892	8,177	4,766												18,835
		BNL M&S CE from DK: Travel	1,913	2,585	1,540												6,038
		BNL M&S CE from IR: Travel	1,913	2,585	1,540												6,038
		BNL M&S CE from LL: Administrative Support	7,461	10,354	6,035												23,850
		BNL M&S CE from LL: Post Doc	10,842	15,047	8,771												34,660
		BNL M&S CE from LL: Sr. Mechanical Engineer	162,118	224,994	131,144												518,257
		BNL M&S CE from LL: Sr. Scientist	25,218	34,998	20,400												80,616
	WS1410 Conceptual Design and CD-1	Total	216,122	299,775	174,812											690,710	
	WS1420 Preliminary Design and CD-2	BNL M&S CE Costs			563	1,004										1,567	
		BNL M&S CE from DK: Mechanical Engineer			6,918	12,084											19,002
		BNL M&S CE from DK: Travel			3,375	6,024											9,400
		BNL M&S CE from IR: Travel			3,375	6,024											9,400
	WS1420 Preliminary Design and CD-2	Total			14,232	25,137										39,369	
	WS1430 Final Design and CD-3B	BNL M&S CE Costs			407	1,486	490									2,383	
		BNL M&S CE from DK: Mechanical Engineer				5,781	21,119	6,969									33,869
		BNL M&S CE from DK: Travel				1,388	5,071	1,673									8,132
		BNL M&S CE from IR: Travel				1,388	5,071	1,673									8,132
	WS1430 Final Design and CD-3B	Total				8,964	32,747	10,805								52,516	
	WS1440 Procurement, Construction, and Installation	BNL M&S CE from DK: Mechanical Engineer						14,209	22,105	23,056	23,679	24,412	25,168	25,750	14,692	173,070	
	WS1440 Procurement, Construction, and Installation	Total						14,209	22,105	23,056	23,679	24,412	25,168	25,750	14,692	173,070	
130.04.06.01 Water System Management and Safety Total			216,122	299,775	189,044	34,101	32,747	25,015	22,105	23,056	23,679	24,412	25,168	25,750	14,692	955,665	
Grand Total			216,122	299,775	189,044	34,101	32,747	25,015	22,105	23,056	23,679	24,412	25,168	25,750	14,692	955,665	

130.04.06.01 Water System Management and Safety - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total	
130.04.06.01 Water System Manageme	WS1410 Conceptual Design and CD-1	BNL M&S CE from DK: Mechanical Engineer	85.10	115.00	66.70											266.80	
		BNL M&S CE from DK: Uncosted Physicist/Scientist	42.55	57.50	33.35												133.40
		BNL M&S CE from IR: Uncosted Physicist/Scientist	42.55	57.50	33.35												133.40
		BNL M&S CE from LL: Administrative Support	66.60	90.00	52.20												208.80
		BNL M&S CE from LL: Post Doc	98.05	132.50	76.85												307.40
		BNL M&S CE from LL: Sr. Mechanical Engineer	586.45	792.50	459.65												1,838.60
		BNL M&S CE from LL: Sr. Scientist	72.15	97.50	56.55												226.20
			WS1410 Conceptual Design and CD-1	Total	993.45	1,342.50	778.65										
	WS1420 Preliminary Design and CD-2	BNL M&S CE from DK: Mechanical Engineer			96.82	168.26										265.08	
		BNL M&S CE from DK: Uncosted Physicist/Scientist			32.96	57.28										90.24	
		BNL M&S CE from IR: Uncosted Physicist/Scientist			32.96	57.28										90.24	
	WS1420 Preliminary Design and CD-2	Total			162.74	282.82										445.56	
	WS1430 Final Design and CD-3B	BNL M&S CE from DK: Mechanical Engineer				80.50	286.35	92.00								458.85	
		BNL M&S CE from DK: Uncosted Physicist/Scientist				39.20	139.44	44.80								223.44	
		BNL M&S CE from IR: Uncosted Physicist/Scientist				39.20	139.44	44.80								223.44	
	WS1430 Final Design and CD-3B	Total				158.90	565.23	181.60								905.73	
	WS1440 Procurement, Construction, and Installation	BNL M&S CE from DK: Mechanical Engineer						187.59	284.16	288.60	288.60	289.71	290.82	289.71	160.95	2,080.14	
	WS1440 Procurement, Construction, and Installation	Total						187.59	284.16	288.60	288.60	289.71	290.82	289.71	160.95	2,080.14	
130.04.06.01 Water System Management and Safety Total			993.45	1,342.50	941.39	441.72	565.23	369.19	284.16	288.60	288.60	289.71	290.82	289.71	160.95	6,546.03	
Grand Total			993.45	1,342.50	941.39	441.72	565.23	369.19	284.16	288.60	288.60	289.71	290.82	289.71	160.95	6,546.03	

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Grand Total
	WS1530 CD-1 Review	BNL M&S CE from DK: Mechanical Engineer		6.99								6.99
	WS1530 CD-1 Review	Total		6.99								6.99
	WS1540 Monitor Design/Interfaces/Integration through CD-2	BNL M&S CE from DK: Mechanical Engineer		143.75	126.50							270.25
		BNL M&S CE from IR: Uncosted Physicist/Scientist		143.75	126.50							270.25
	WS1540 Monitor Design/Interfaces/Integration through CD-2 Total			287.50	253.00							540.50
	WS1550 Interim Review before CD-2	BNL M&S CE from DK: Mechanical Engineer			68.01							68.01
	WS1550 Interim Review before CD-2	Total			68.01							68.01
	WS1560 CD-2 Review	BNL M&S CE from DK: Mechanical Engineer			6.99							6.99
	WS1560 CD-2 Review	Total			6.99							6.99
	WS1570 Monitor Design/Interfaces/Integration through CD-3	BNL M&S CE from DK: Mechanical Engineer		84.36	234.84							319.20
		BNL M&S CE from IR: Uncosted Physicist/Scientist		84.36	234.84							319.20
	WS1570 Monitor Design/Interfaces/Integration through CD-3 Total			168.72	469.68							638.40
	WS1580 Interim Review before CD-3B	BNL M&S CE from DK: Mechanical Engineer				102.00						102.00
	WS1580 Interim Review before CD-3B	Total				102.00						102.00
	WS1590 CD-3B Review	BNL M&S CE from DK: Mechanical Engineer				6.99						6.99
	WS1590 CD-3B Review	Total				6.99						6.99
	WS1600 Final Design/Interfaces/Integration	BNL M&S CE from DK: Mechanical Engineer		11.34	403.38	403.38	414.72	291.60				1,524.42
		BNL M&S CE from IR: Uncosted Physicist/Scientist		10.29	366.03	366.03	376.32	263.13				1,381.80
		Electrical Engineer P2		1.47	52.29	52.29	53.76	37.59				197.40
	WS1600 Final Design/Interfaces/Integration	Total		23.10	821.70	821.70	844.80	592.32				3,103.62
	WS1610 Final Design Package and RFQ	BNL M&S CE from DK: Mechanical Engineer						151.20	18.90			170.10
		BNL M&S CE from IR: Uncosted Physicist/Scientist						88.80	11.10			99.90
	WS1610 Final Design Package and RFQ	Total						240.00	30.00			270.00
	WS1630 Procurement of system	BNL M&S CE from DK: Mechanical Engineer							26.00	274.00		300.00
		BNL M&S CE from IR: Uncosted Physicist/Scientist							26.00	274.00		300.00
	WS1630 Procurement of system	Total							52.00	548.00		600.00
	WS1640 Fabrication	BNL M&S CE from DK: Mechanical Engineer							34.71	365.79		400.50
		BNL M&S CE from IR: General Labor							34.71	365.79		400.50
		BNL M&S CE from IR: Uncosted Physicist/Scientist							17.68	186.32		204.00
	WS1640 Fabrication	Total							87.10	917.90		1,005.00
130.04.06.02 Fill System Total			369.87	382.02	519.82	1,400.37	821.70	844.80	832.32	169.10	1,465.90	6,805.90
Grand Total			369.87	382.02	519.82	1,400.37	821.70	844.80	832.32	169.10	1,465.90	6,805.90

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	Grand Total
	WS1760 Monitor Design/Interfaces/Integration through CD-3	BNL M&S CE from DK: Mechanical Engineer			67.34	226.59	25.48						319.41
		BNL M&S CE from IR: Uncosted Physicist/Scientist			67.34	226.59	25.48						319.41
	WS1760 Monitor Design/Interfaces/Integration through CD-3 Total				134.68	453.18	50.96						638.82
	WS1770 Interim Review before CD-3B	BNL M&S CE from DK: Mechanical Engineer					102.00						102.00
	WS1770 Interim Review before CD-3B Total						102.00						102.00
	WS1780 CD-3B Review	BNL M&S CE from DK: Mechanical Engineer					6.99						6.99
	WS1780 CD-3B Review Total						6.99						6.99
	WS1790 Final Design/Interfaces/Integration	BNL M&S CE from DK: Mechanical Engineer					288.36	414.72	421.20	400.14			1,524.42
		BNL M&S CE from IR: Uncosted Physicist/Scientist					261.66	376.32	382.20	361.62			1,381.80
		Electrical Engineer P2					37.38	53.76	54.60	51.66			197.40
	WS1790 Final Design/Interfaces/Integration Total						587.40	844.80	858.00	813.42			3,103.62
	WS1800 Final Design Package and RFQ	BNL M&S CE from DK: Mechanical Engineer								24.57	145.53		170.10
		BNL M&S CE from IR: Uncosted Physicist/Scientist								14.43	85.47		99.90
	WS1800 Final Design Package and RFQ Total									39.00	231.00		270.00
	WS1820 Procurement of system	BNL M&S CE from DK: Mechanical Engineer									84.00	216.00	300.00
		BNL M&S CE from IR: Uncosted Physicist/Scientist									84.00	216.00	300.00
	WS1820 Procurement of system Total										168.00	432.00	600.00
	WS1830 Fabrication	BNL M&S CE from DK: Mechanical Engineer									112.14	288.36	400.50
		BNL M&S CE from IR: General Labor									112.14	288.36	400.50
		BNL M&S CE from IR: Uncosted Physicist/Scientist									57.12	146.88	204.00
		BNL M&S CE from UN: General Labor									336.00	864.00	1,200.00
	WS1830 Fabrication Total										617.40	1,587.60	2,205.00
130.04.06.03 Recirculation System Total			234.16	434.57	462.67	453.18	747.35	844.80	858.00	852.42	1,016.40	2,019.60	7,923.15
Grand Total			234.16	434.57	462.67	453.18	747.35	844.80	858.00	852.42	1,016.40	2,019.60	7,923.15

130.04.06.04 Water Shaft System (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY14	FY15	FY16	Grand Total
130.04.06.04 Water Shaft System	WS1870 Interface Documents	BNL M&S CE from DK: Mechanical Engineer	2,403						2,403
	WS1870 Interface Documents	Total	2,403						2,403
	WS1880 Integration Plan and Conventional Facilities	BNL M&S CE from DK: Mechanical Engineer	8,824	3,651					12,475
	WS1880 Integration Plan and Conventional Facilities	Total	8,824	3,651					12,475
	WS1890 Prepare for CD-1 Review	BNL M&S CE from DK: Mechanical Engineer		1,229					1,229
	WS1890 Prepare for CD-1 Review	Total		1,229					1,229
	WS1900 CD-1 Review	BNL M&S CE from DK: Mechanical Engineer		499					499
	WS1900 CD-1 Review	Total		499					499
	WS1920 Ross/Yates Shaft Renovations	BNL M&S CE from DK: Mechanical Engineer		2,481	2,503	2,571	2,641	54	10,250
	WS1920 Ross/Yates Shaft Renovations	Total		2,481	2,503	2,571	2,641	54	10,250
	WS1930 Shaft piping design	BNL M&S CE from DK: Mechanical Engineer		11,879	16,715				28,594
		BNL M&S CE from DK: Travel		1,926	2,769				4,694
	WS1930 Shaft piping design	Total		13,805	19,484				33,289
	WS1940 Design Package review	BNL M&S CE from DK: Mechanical Engineer			4,883				4,883
	WS1940 Design Package review	Total			4,883				4,883
	WS1950 Design package ready to combine with shaft piping	BNL M&S CE from DK: Mechanical Engineer			496				496
	WS1950 Design package ready to combine with shaft piping	Total			496				496
	WS1960 Procurement of Shaft piping material	BNL M&S CE from DK: Mechanical Engineer			8,178	17,444			25,623
	WS1960 Procurement of Shaft piping material	Total			8,178	17,444			25,623
	WS1970 Water Shaft System Delivery	BNL M&S CE from DK: Mechanical Engineer				2,522			2,522
	WS1970 Water Shaft System Delivery	Total				2,522			2,522
	WS1980 Water Shaft System Installation	BNL M&S CE from DK: Mechanical Engineer				8,802	14,139		22,941
		BNL M&S CE from DK: Travel				1,901	3,054		4,955
	WS1980 Water Shaft System Installation	Total				10,703	17,193		27,895
	WS1990 Water Shaft System Testing	BNL M&S CE from DK: Mechanical Engineer					5,147		5,147
	WS1990 Water Shaft System Testing	Total					5,147		5,147
130.04.06.04 Water Shaft System Total			11,227	21,666	35,544	33,240	24,980	54	126,712
Grand Total			11,227	21,666	35,544	33,240	24,980	54	126,712

130.04.06.04 Water Shaft System - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY14	FY15	FY16	Grand Total
130.04.06.04 Water Shaft System	WS1870 Interface Documents	BNL M&S CE from DK: Mechanical Engineer	33.80						33.80
	WS1870 Interface Documents	Total	33.80						33.80
	WS1880 Integration Plan and Conventional Facilities	BNL M&S CE from DK: Mechanical Engineer	124.10	51.10					175.20
	WS1880 Integration Plan and Conventional Facilities	Total	124.10	51.10					175.20
	WS1890 Prepare for CD-1 Review	BNL M&S CE from DK: Mechanical Engineer		17.20					17.20
	WS1890 Prepare for CD-1 Review	Total		17.20					17.20
	WS1900 CD-1 Review	BNL M&S CE from DK: Mechanical Engineer		6.99					6.99
	WS1900 CD-1 Review	Total		6.99					6.99
	WS1920 Ross/Yates Shaft Renovations	BNL M&S CE from DK: Mechanical Engineer		34.72	34.86	34.86	34.86	0.70	140.00
	WS1920 Ross/Yates Shaft Renovations	Total		34.72	34.86	34.86	34.86	0.70	140.00
	WS1930 Shaft piping design	BNL M&S CE from DK: Mechanical Engineer		166.25	232.75				399.00
	WS1930 Shaft piping design	Total		166.25	232.75				399.00
	WS1940 Design Package review	BNL M&S CE from DK: Mechanical Engineer			68.00				68.00
	WS1940 Design Package review	Total			68.00				68.00
	WS1950 Design package ready to combine with shaft piping	BNL M&S CE from DK: Mechanical Engineer			6.90				6.90
	WS1950 Design package ready to combine with shaft piping	Total			6.90				6.90
	WS1960 Procurement of Shaft piping material	BNL M&S CE from DK: Mechanical Engineer			113.88	236.52			350.40
	WS1960 Procurement of Shaft piping material	Total			113.88	236.52			350.40
	WS1970 Water Shaft System Delivery	BNL M&S CE from DK: Mechanical Engineer				34.20			34.20
	WS1970 Water Shaft System Delivery	Total				34.20			34.20

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY13	FY14	FY15	FY16	Grand Total
130.04.06.04 Water Shaft System	WS1980 Water Shaft System Installation	BNL M&S CE from DK: Mechanical Engineer				119.34	186.66		306.00
	WS1980 Water Shaft System Installation	Total				119.34	186.66		306.00
	WS1990 Water Shaft System Testing	BNL M&S CE from DK: Mechanical Engineer					67.95		67.95
	WS1990 Water Shaft System Testing	Total					67.95		67.95
130.04.06.04 Water Shaft System Total			157.90	276.26	456.39	424.92	289.47	0.70	1,605.64
Grand Total			157.90	276.26	456.39	424.92	289.47	0.70	1,605.64

130.04.06.05 Sump System (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY14	FY15	FY16	FY18	FY19	Grand Total
130.04.06.05 Sump System	WS2010 Water Sump System - Conceptual design	BNL M&S CE from DK: Mechanical Engineer	4,479	5,225						9,704
	WS2010 Water Sump System - Conceptual design Total		4,479	5,225						9,704
	WS2020 Water Sump System - Preliminary Design	BNL M&S CE from DK: Mechanical Engineer		50,590						50,590
		BNL M&S CE from DK: Travel		6,162						6,162
	WS2020 Water Sump System - Preliminary Design Total			56,752						56,752
	WS2030 Water Sump System - Final design	BNL M&S CE from DK: Mechanical Engineer			20,650					20,650
		BNL M&S CE from DK: Travel			6,499					6,499
	WS2030 Water Sump System - Final design Total				27,150					27,150
	WS2050 Water Sump System - Procurement and contracts	BNL M&S CE from DK: Mechanical Engineer			5,015					5,015
	WS2050 Water Sump System - Procurement and contracts Total				5,015					5,015
	WS2060 Water Sump System - Fabrication	BNL M&S CE from DK: Mechanical Engineer				8,461	7,145			15,606
	WS2060 Water Sump System - Fabrication Total					8,461	7,145			15,606
	WS2080 Ready for Sump System Installation	BNL M&S CE from DK: Mechanical Engineer						25,692	33,374	59,066
		BNL M&S CE from DK: Travel						4,788	6,219	11,007
	WS2080 Ready for Sump System Installation Total							30,480	39,594	70,073
	WS2090 Sump System Testing	BNL M&S CE from DK: Mechanical Engineer							34,391	34,391
	WS2090 Sump System Testing Total								34,391	34,391
130.04.06.05 Sump System Total			4,479	61,977	32,164	8,461	7,145	30,480	73,985	218,691
Grand Total			4,479	61,977	32,164	8,461	7,145	30,480	73,985	218,691

130.04.06.05 Sump System - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY11	FY12	FY14	FY15	FY16	FY18	FY19	Grand Total
130.04.06.05 Sump System	WS2010 Water Sump System - Conceptual design	BNL M&S CE from DK: Mechanical Engineer	63.00	73.12						136.12
	WS2010 Water Sump System - Conceptual design Total		63.00	73.12						136.12
	WS2020 Water Sump System - Preliminary Design	BNL M&S CE from DK: Mechanical Engineer		708.00						708.00
	WS2020 Water Sump System - Preliminary Design Total			708.00						708.00
	WS2030 Water Sump System - Final design	BNL M&S CE from DK: Mechanical Engineer			279.99					279.99
	WS2030 Water Sump System - Final design Total				279.99					279.99
	WS2050 Water Sump System - Procurement and contracts	BNL M&S CE from DK: Mechanical Engineer			67.99					67.99
	WS2050 Water Sump System - Procurement and contracts Total				67.99					67.99
	WS2060 Water Sump System - Fabrication	BNL M&S CE from DK: Mechanical Engineer				111.70	91.85			203.55
	WS2060 Water Sump System - Fabrication Total					111.70	91.85			203.55
	WS2080 Ready for Sump System Installation	BNL M&S CE from DK: Mechanical Engineer						313.13	396.07	709.20
	WS2080 Ready for Sump System Installation Total							313.13	396.07	709.20
	WS2090 Sump System Testing	BNL M&S CE from DK: Mechanical Engineer							408.14	408.14
	WS2090 Sump System Testing Total								408.14	408.14
130.04.06.05 Sump System Total			63.00	781.12	347.98	111.70	91.85	313.13	804.21	2,512.99
Grand Total			63.00	781.12	347.98	111.70	91.85	313.13	804.21	2,512.99

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.06.07.01 Materials Testing Scope	WS2160 Establish procedures for pre-cleaning and aging Total		100.20													100.20
	WS2180 Develop list of pre-qualified materials compatible	Mechanical Technician T2			159.89											159.89
	WS2180 Develop list of pre-qualified materials compatible Total				159.89											159.89
	WS2200 Develop Kinetics Modeling	Mechanical Technician T2	66.75	93.45												160.20
	WS2200 Develop Kinetics Modeling Total		66.75	93.45												160.20
	WS2220 Absolute Attenuation - Gd Option [UCI]	BNL M&S CE from IR: Post Doc	333.00	450.00	446.40	448.20	122.40									1,800.00
		BNL M&S CE from IR: Uncosted Physicist/Scientist	83.25	112.50	111.60	112.05	30.60									450.00
	WS2220 Absolute Attenuation - Gd Option [UCI] Total		416.25	562.50	558.00	560.25	153.00									2,250.00
	WS2165 Chemical Analysis & Small Scale Testing Engineerin	Mechanical Technician T2	575.35	777.50	771.28	774.39	205.26									3,103.78
		Post Doc R2	516.15	697.50	691.92	694.71	181.35									2,781.63
		Project Manager S4	92.50	125.00	124.00	124.50	33.00									499.00
	WS2165 Chemical Analysis & Small Scale Testing Engineerin Total		1,184.00	1,600.00	1,587.20	1,593.60	419.61									6,384.41
130.04.06.07.01 Materials Testing Scope Definition Total			1,927.00	2,255.95	2,305.09	2,153.85	572.61									9,214.50
130.04.06.07.02 Literature Search	WS2240 In lab aging tests	Mechanical Technician T2			169.68	502.98	325.22									997.88
		Post Doc R2			68.04	201.69	130.41									400.14
	WS2240 In lab aging tests Total				237.72	704.67	455.63									1,398.02
	WS2340 Test and down select pre-qualified materials for t	Mechanical Technician T2			296.52	303.58										600.10
	WS2340 Test and down select pre-qualified materials for t Total				296.52	303.58										600.10
	WS2350 Testing materials for other systems: cables, pipes	Uncosted Post Doc			169.68	502.98	325.22									997.88
	WS2350 Testing materials for other systems: cables, pipes Total				169.68	502.98	325.22									997.88
130.04.06.07.02 Literature Search Total					703.92	1,511.23	780.85									2,996.00
130.04.06.07.03 Compilation/Distillation	WS2380 Selection of liner material	Sr. Scientist S3					100.05									100.05
	WS2380 Selection of liner material Total						100.05									100.05
	WS2390 Final tests of liner materials	Mechanical Technician T2				125.66	174.46									300.12
		Post Doc R2				251.32	348.92									600.24
	WS2390 Final tests of liner materials Total					376.98	523.38									900.36
	WS2400 Prepare for CD-3 review	Sr. Scientist S3					99.96									99.96
	WS2400 Prepare for CD-3 review Total						99.96									99.96
130.04.06.07.03 Compilation/Distillation of Results Total						376.98	723.39									1,100.37
130.04.06.07.04 Materials Testing/Study	WS2410 In lab aging tests	Mechanical Technician T2						276.08	296.96	301.60	301.60	302.76	303.92	302.76	208.80	2,294.48
	WS2410 In lab aging tests Total							276.08	296.96	301.60	301.60	302.76	303.92	302.76	208.80	2,294.48
	WS2420 Data Analysis	Post Doc R2					24.99	126.99	130.56	132.60	132.60	133.11	133.62	133.11	51.51	999.09
	WS2420 Data Analysis Total						24.99	126.99	130.56	132.60	132.60	133.11	133.62	133.11	51.51	999.09
	WS2430 QA/QC of selected vendors	Post Doc R2						126.14	135.68	137.80	137.80	138.33	138.86	138.33	54.06	1,007.00
		Sr. Scientist S3						249.90	268.80	273.00	273.00	274.05	275.10	274.05	107.10	1,995.00
	WS2430 QA/QC of selected vendors Total							376.04	404.48	410.80	410.80	412.38	413.96	412.38	161.16	3,002.00
	WS2440 Final compilation of the materials database	Post Doc R2						490.28	527.36	181.28						1,198.92
	WS2440 Final compilation of the materials database Total							490.28	527.36	181.28						1,198.92
130.04.06.07.04 Materials Testing/Study Total							24.99	1,269.39	1,359.36	1,026.28	845.00	848.25	851.50	848.25	421.47	7,494.49
Grand Total			1,927.00	2,255.95	3,009.01	4,042.06	2,101.84	1,269.39	1,359.36	1,026.28	845.00	848.25	851.50	848.25	421.47	20,805.36

130.04.06.08 Water System Installation (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY18	FY19	FY20	Grand Total
130.04.06.08 Water System Installation	WS2250 Prepare CF Design for water system surface	BNL M&S CE from DK: Mechanical Engineer	19,731	30,395		50,126
		BNL M&S CE from DK: Travel	2,892	4,456		7,348
		BNL M&S CE from IR: Post Doc	3,300	5,084		8,384
		BNL M&S CE from IR: Travel	2,892	4,456		7,348
	WS2250 Prepare CF Design for water system surface	Total	28,816	44,391		73,207
	WS2260 Prepare CF Design for water system UG	BNL M&S CE from DK: Mechanical Engineer	19,731	30,395		50,126
		BNL M&S CE from DK: Travel	2,892	4,456		7,348
		BNL M&S CE from IR: Post Doc	3,300	5,084		8,384
		BNL M&S CE from IR: Travel	2,892	4,456		7,348
	WS2260 Prepare CF Design for water system UG	Total	28,816	44,391		73,207
	WS2280 Fill System delivery	BNL M&S CE from DK: Mechanical Engineer			5,876	5,876
		BNL M&S CE from DK: Travel			1,906	1,906
	WS2280 Fill System delivery	Total			7,782	7,782
	WS2290 Fill System Installation	BNL M&S CE from DK: Mechanical Engineer			17,654	17,654
		BNL M&S CE from DK: Travel			3,812	3,812
		BNL M&S CE from IR: Post Doc			8,806	8,806
		BNL M&S CE from IR: Travel			5,719	5,719
	WS2290 Fill System Installation	Total			35,992	35,992
	WS2300 Fill System Testing	BNL M&S CE from DK: Mechanical Engineer			11,761	11,761
		BNL M&S CE from DK: Travel			3,812	3,812
		BNL M&S CE from IR: Post Doc			12,523	12,523
		BNL M&S CE from IR: Travel			7,625	7,625
	WS2300 Fill System Testing	Total			35,721	35,721
	WS2310 Recirculation System delivery	BNL M&S CE from DK: Mechanical Engineer			5,876	5,876
		BNL M&S CE from DK: Travel			1,906	1,906
	WS2310 Recirculation System delivery	Total			7,782	7,782
	WS2320 Recirculation System Installation	BNL M&S CE from DK: Mechanical Engineer			17,654	17,654
		BNL M&S CE from DK: Travel			3,812	3,812
		BNL M&S CE from IR: Post Doc			26,419	26,419
		BNL M&S CE from IR: Travel			5,719	5,719
	WS2320 Recirculation System Installation	Total			53,604	53,604
	WS2330 Recirculation System Testing	BNL M&S CE from DK: Mechanical Engineer			23,535	23,535
		BNL M&S CE from DK: Travel			3,812	3,812
		BNL M&S CE from IR: Post Doc			26,425	26,425
		BNL M&S CE from IR: Travel			7,625	7,625
	WS2330 Recirculation System Testing	Total			61,397	61,397
130.04.06.08 Water System Installation Total			57,632	88,781	202,279	348,692
Grand Total			57,632	88,781	202,279	348,692

130.04.06.08 Water System Installation - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY18	FY19	FY20	Grand Total
130.04.06.08 Water System Installation	WS2250 Prepare CF Design for water system surface	BNL M&S CE from DK: Mechanical Engineer	240.48	360.72		601.20
		BNL M&S CE from IR: Post Doc	80.64	120.96		201.60
		BNL M&S CE from IR: Uncosted Physicist/Scientist	80.64	120.96		201.60
	WS2250 Prepare CF Design for water system surface	Total	401.76	602.64		1,004.40
	WS2260 Prepare CF Design for water system UG	BNL M&S CE from DK: Mechanical Engineer	240.48	360.72		601.20
		BNL M&S CE from IR: Post Doc	80.64	120.96		201.60
		BNL M&S CE from IR: Uncosted Physicist/Scientist	80.64	120.96		201.60
	WS2260 Prepare CF Design for water system UG	Total	401.76	602.64		1,004.40
	WS2280 Fill System delivery	BNL M&S CE from DK: Mechanical Engineer			67.90	67.90

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY18	FY19	FY20	Grand Total
	WS2280 Fill System delivery	Total			67.90	67.90
	WS2290 Fill System Installation	BNL M&S CE from DK: Mechanical Engineer			204.00	204.00
		BNL M&S CE from IR: Post Doc			204.00	204.00
	WS2290 Fill System Installation	Total			408.00	408.00
	WS2300 Fill System Testing	BNL M&S CE from DK: Mechanical Engineer			135.90	135.90
		BNL M&S CE from IR: Post Doc			290.10	290.10
	WS2300 Fill System Testing	Total			426.00	426.00
	WS2310 Recirculation System delivery	BNL M&S CE from DK: Mechanical Engineer			67.90	67.90
	WS2310 Recirculation System delivery	Total			67.90	67.90
	WS2320 Recirculation System Installation	BNL M&S CE from DK: Mechanical Engineer			204.00	204.00
		BNL M&S CE from IR: Post Doc			612.00	612.00
	WS2320 Recirculation System Installation	Total			816.00	816.00
	WS2330 Recirculation System Testing	BNL M&S CE from DK: Mechanical Engineer			271.95	271.95
		BNL M&S CE from IR: Post Doc			612.15	612.15
		BNL M&S CE from IR: Uncosted Physicist/Scientist			136.15	136.15
	WS2330 Recirculation System Testing	Total			1,020.25	1,020.25
130.04.06.08 Water System Installation Total			803.52	1,205.28	2,806.05	4,814.85
Grand Total			803.52	1,205.28	2,806.05	4,814.85

130.04.07 Computing - Total Cost (\$ Including Direct, Indirect & Escalation)

Sum of VALUE														
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.07.02 Online Computing	69,630	96,444	122,428	66,995	178,079	322,090	416,201	434,103	445,840	459,638	473,869	484,822	239,944	3,810,082
130.04.07.03 Offline Computing			57,550	114,452	117,541	120,719	127,459	132,941	58,290					728,951
130.04.07.04 Infrastructure				160,493	222,442	228,454	241,209	251,584	415,465	496,757	512,133	477,933	205,366	3,211,838
130.04.07.01 Management and Safety	2,285	3,088	3,146	3,244	3,332	3,421	3,612	3,768	3,870	3,989	4,113	16,633	9,465	63,966
Grand Total	71,915	99,532	183,124	345,184	521,394	674,683	788,482	822,396	923,465	960,384	990,115	979,389	454,775	7,814,836

130.04.07 Computing - Labor (\$)

Sum of VALUE														
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.07.02 Online Computing	64,398	89,374	108,448	58,601	156,615	283,455	366,294	382,049	392,379	404,524	417,051	426,693	211,226	3,361,109
130.04.07.03 Offline Computing			54,099	107,448	110,348	113,331	119,659	124,806	54,723					684,413
130.04.07.04 Infrastructure				147,345	200,201	205,613	217,093	226,431	298,391	331,232	341,489	306,603	98,868	2,373,267
Grand Total	64,398	89,374	162,547	313,393	467,164	602,399	703,046	733,286	745,494	735,757	758,540	733,297	310,094	6,418,789

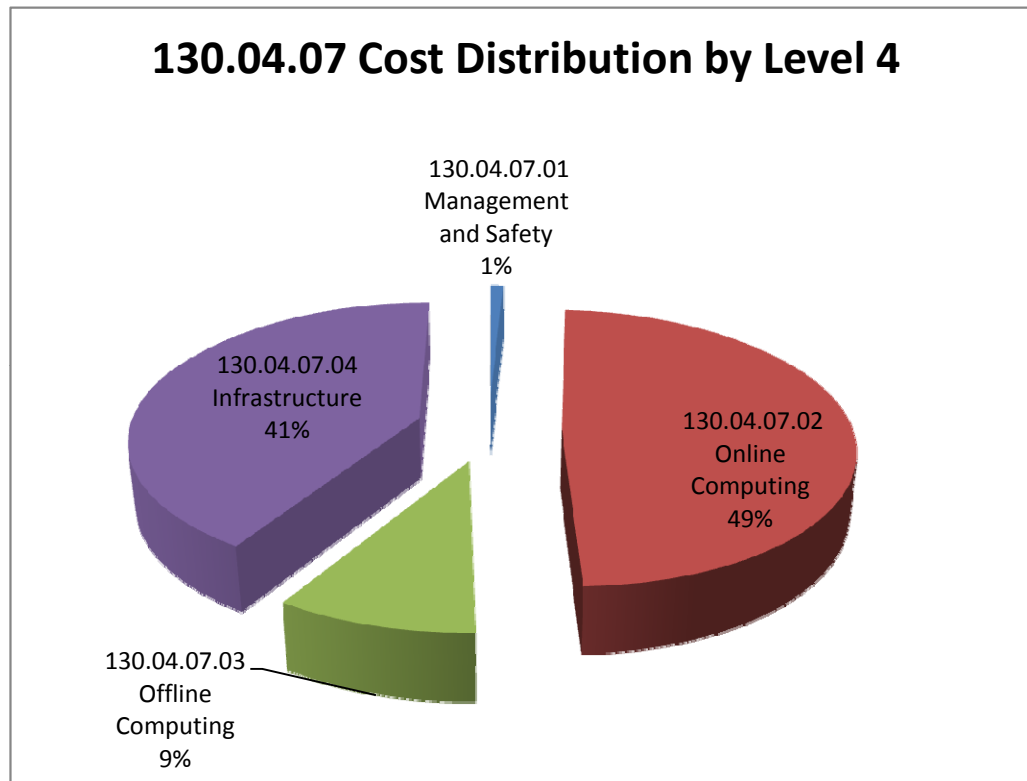
130.04.07 Computing - Material (\$)

Sum of VALUE														
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.07.02 Online Computing	5,232	7,070	13,980	8,394	21,464	38,635	49,907	52,054	53,460	55,113	56,818	58,129	28,717	448,973
130.04.07.03 Offline Computing			3,451	7,004	7,193	7,387	7,800	8,135	3,567					44,538
130.04.07.04 Infrastructure				13,149	22,241	22,841	24,116	25,153	117,074	165,525	170,644	171,330	106,498	838,571
130.04.07.01 Management and Safety	2,285	3,088	3,146	3,244	3,332	3,421	3,612	3,768	3,870	3,989	4,113	16,633	9,465	63,966
Grand Total	7,517	10,158	20,577	31,790	54,230	72,284	85,436	89,110	177,971	224,627	231,574	246,092	144,681	1,396,048

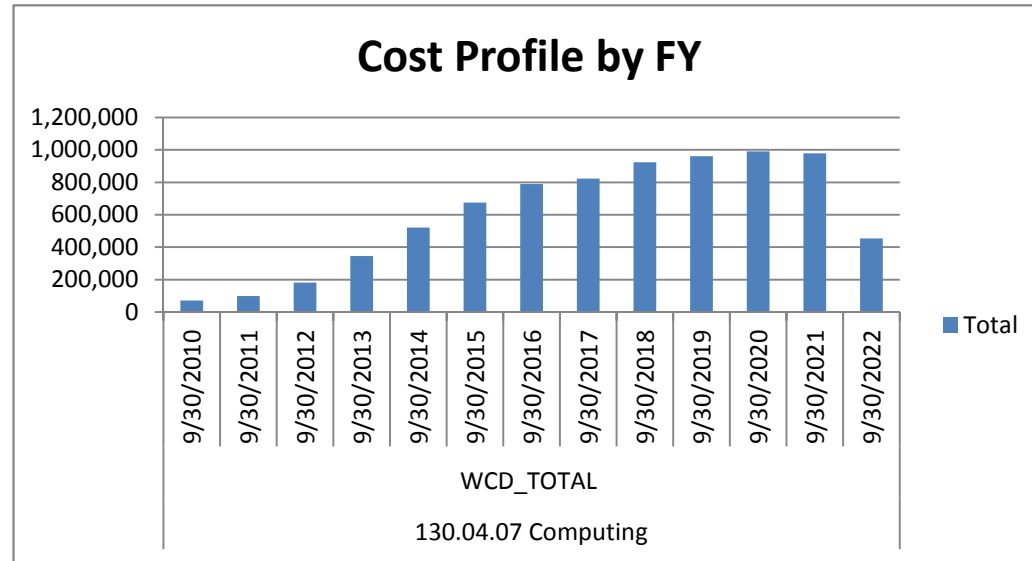
130.04.07 Computing - FTE

Sum of VALUE														
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.07.02 Online Computing	0.30	0.41	0.51	0.27	0.71	1.28	1.62	1.63	1.65	1.65	1.65	1.64	0.79	14.12
130.04.07.03 Offline Computing			0.52	1.04	1.04	1.04	1.04	1.03	0.52					6.22
130.04.07.04 Infrastructure			0.60	0.87	1.03	1.03	1.06	1.07	1.42	1.55	1.55	1.53	0.73	12.43
Grand Total	0.30	0.41	1.63	2.18	2.77	3.35	3.71	3.73	3.59	3.20	3.20	3.17	1.52	32.77

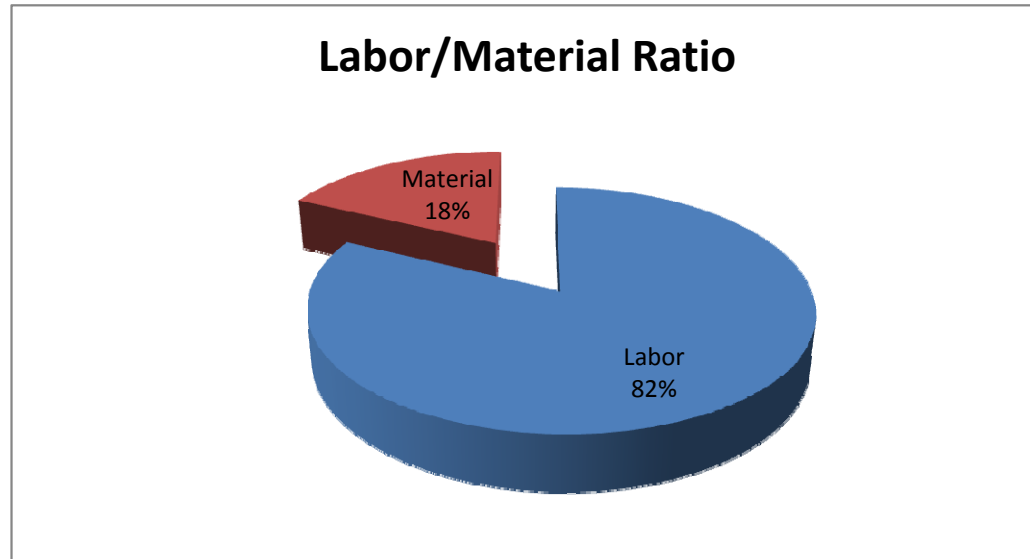
WBS	Cost
130.04.07 Computing	7,814,836
130.04.07.01 Management and Safety	63,966
130.04.07.02 Online Computing	3,810,082
130.04.07.03 Offline Computing	728,951
130.04.07.04 Infrastructure	3,211,838
Grand Total	7,814,836



FY	Cost
130.04.07 Computing	7,814,836
WCD_TOTAL	7,814,836
9/30/2010	71,915
9/30/2011	99,532
9/30/2012	183,124
9/30/2013	345,184
9/30/2014	521,394
9/30/2015	674,683
9/30/2016	788,482
9/30/2017	822,396
9/30/2018	923,465
9/30/2019	960,384
9/30/2020	990,115
9/30/2021	979,389
9/30/2022	454,775
Grand Total	7,814,836



WBS	Cost
130.04.07 Computing	
Labor	6,418,789
Material	1,396,048
Total	7,814,836



130.04.07.01 Management and Safety (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total	
130.04.07.01.01 Management	CP9610 Management	BNL M&S CS Travel	2,285	3,088	3,146	3,244	3,332	3,421	3,612	3,768	3,870	3,989	4,113	4,207	1,738	43,813	
	CP9610 Management	Total	2,285	3,088	3,146	3,244	3,332	3,421	3,612	3,768	3,870	3,989	4,113	4,207	1,738	43,813	
130.04.07.01.01 Management Total			2,285	3,088	3,146	3,244	3,332	3,421	3,612	3,768	3,870	3,989	4,113	4,207	1,738	43,813	
130.04.07.01.02 Safety	CP9650 Ensure Cyber Security of Computing Systems	BNL M&S CS Travel													12,426	7,727	20,153
	CP9650 Ensure Cyber Security of Computing Systems	Total													12,426	7,727	20,153
130.04.07.01.02 Safety Total															12,426	7,727	20,153
Grand Total			2,285	3,088	3,146	3,244	3,332	3,421	3,612	3,768	3,870	3,989	4,113	4,207	16,633	9,465	63,966

130.04.07.01 Management and Safety - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total	
130.04.07.01.01 Management	CP9610 Management	Uncosted Physicist/Scientist	127.65	172.50	171.12	171.81	171.81	171.81	176.64	179.40	179.40	180.09	180.78	180.09	72.45	2,135.55	
	CP9610 Management	Total	127.65	172.50	171.12	171.81	171.81	171.81	176.64	179.40	179.40	180.09	180.78	180.09	72.45	2,135.55	
130.04.07.01.01 Management Total			127.65	172.50	171.12	171.81	171.81	171.81	176.64	179.40	179.40	180.09	180.78	180.09	72.45	2,135.55	
130.04.07.01.02 Safety	CP9650 Ensure Cyber Security of Computing Systems	Uncosted Physicist/Scientist													63.22	38.28	101.50
	CP9650 Ensure Cyber Security of Computing Systems	Total													63.22	38.28	101.50
	CP9620 Develop Preliminary Cyber Security Plan	Uncosted Physicist/Scientist			71.40	28.35											99.75
	CP9620 Develop Preliminary Cyber Security Plan	Total			71.40	28.35											99.75
	CP9630 Revise cyber security of computing systems	Uncosted Physicist/Scientist						32.30	66.50								98.80
	CP9630 Revise cyber security of computing systems	Total						32.30	66.50								98.80
	CP9640 Finalize Cyber Security Plan	Uncosted Physicist/Scientist											82.46	16.34			98.80
	CP9640 Finalize Cyber Security Plan	Total											82.46	16.34			98.80
130.04.07.01.02 Safety Total					71.40	28.35		32.30	66.50				82.46	79.56	38.28		398.85
Grand Total			127.65	172.50	242.52	200.16	171.81	204.11	243.14	179.40	179.40	180.09	263.24	259.65	110.73		2,534.40

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.07.02.04 RunControl	CP9990 Testing & R&D for Final Design	BNL M&S CE from MA: Computing Services Specialist				780	18,132	2,169								21,081
		BNL M&S CE from MA: Travel				120	2,800	335								3,255
	CP9990 Testing & R&D for Final Design	Total				900	20,932	2,504								24,336
130.04.07.02.04 RunControl Total			10,265	14,206	19,182	8,583	20,932	47,673	62,501	65,189	66,952	69,024	71,162	72,807	35,812	564,287
Grand Total			69,630	96,444	122,428	66,995	178,079	322,090	416,201	434,103	445,840	459,638	473,869	484,822	239,944	3,810,082

130.04.07.02 Online Computing - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.07.02.01 Raw Data Handling	CP9660 Conceptual Design	BNL M&S CE from MA: Computing Services Specialist	131.35	177.50	42.60											351.45
	CP9660 Conceptual Design	Total	131.35	177.50	42.60											351.45
	CP9670 Testing and R&D for Preliminary Design	BNL M&S CE from MA: Computing Services Specialist			163.56	100.05										263.61
		BNL M&S CE from MA: Mechanical Designer			28.20	17.25										45.45
	CP9670 Testing and R&D for Preliminary Design	Total			191.76	117.30										309.06
	CP9690 Testing & R&D for Final Design	BNL M&S CE from MA: Computing Services Specialist				13.31	301.29	35.09								349.69
		BNL M&S CE from MA: Mechanical Designer				1.76	39.84	4.64								46.24
	CP9690 Testing & R&D for Final Design	Total				15.07	341.13	39.73								395.93
	CP9710 Final System Development Work post CD-3	BNL M&S CE from MA: Computing Services Specialist						421.80	568.32	577.20	577.20	579.42	581.64	579.42	277.50	4,162.50
		BNL M&S CE from MA: Electronics Technician						17.10	23.04	23.40	23.40	23.49	23.58	23.49	11.25	168.75
		BNL M&S CE from MA: General Labor						32.30	43.52	44.20	44.20	44.37	44.54	44.37	21.25	318.75
		BNL M&S CE from MA: Mechanical Designer						13.30	17.92	18.20	18.20	18.27	18.34	18.27	8.75	131.25
	CP9710 Final System Development Work post CD-3	Total						484.50	652.80	663.00	663.00	665.55	668.10	665.55	318.75	4,781.25
130.04.07.02.01 Raw Data Handling Total			131.35	177.50	234.36	132.37	341.13	524.23	652.80	663.00	663.00	665.55	668.10	665.55	318.75	5,837.69
130.04.07.02.02 Prompt/Online Process	CP9760 Conceptual Design	BNL M&S CE from MA: Computing Services Specialist	131.35	177.50	42.60											351.45
	CP9760 Conceptual Design	Total	131.35	177.50	42.60											351.45
	CP9770 Testing and R&D for Preliminary Design	BNL M&S CE from MA: Computing Services Specialist			161.68	100.62										262.30
		BNL M&S CE from MA: Mechanical Designer			15.04	9.36										24.40
	CP9770 Testing and R&D for Preliminary Design	Total			176.72	109.98										286.70
	CP9790 Testing & R&D for Final Design	BNL M&S CE from MA: Computing Services Specialist				13.31	301.29	35.09								349.69
		BNL M&S CE from MA: Mechanical Designer				0.88	19.92	2.32								23.12
	CP9790 Testing & R&D for Final Design	Total				14.19	321.21	37.41								372.81
	CP9810 Final System Development Work post CD-3	BNL M&S CE from MA: Computing Services Specialist						894.90	1,205.76	1,224.60	1,224.60	1,229.31	1,234.02	1,229.31	598.17	8,840.67
		BNL M&S CE from MA: Electronics Technician						17.10	23.04	23.40	23.40	23.49	23.58	23.49	11.43	168.93
		BNL M&S CE from MA: General Labor						47.50	64.00	65.00	65.00	65.25	65.50	65.25	31.75	469.25
		BNL M&S CE from MA: Mechanical Designer						9.50	12.80	13.00	13.00	13.05	13.10	13.05	6.35	93.85
	CP9810 Final System Development Work post CD-3	Total						969.00	1,305.60	1,326.00	1,326.00	1,331.10	1,336.20	1,331.10	647.70	9,572.70
130.04.07.02.02 Prompt/Online Processing Total			131.35	177.50	219.32	124.17	321.21	1,006.41	1,305.60	1,326.00	1,326.00	1,331.10	1,336.20	1,331.10	647.70	10,583.66
130.04.07.02.03 Data Quality Monitoring	CP9860 Conceptual Design	BNL M&S CE from MA: Computing Services Specialist	262.70	355.00	85.20											702.90
	CP9860 Conceptual Design	Total	262.70	355.00	85.20											702.90
	CP9870 Testing and R&D for Preliminary Design	BNL M&S CE from MA: Computing Services Specialist			323.36	197.80										521.16
	CP9870 Testing and R&D for Preliminary Design	Total			323.36	197.80										521.16
	CP9890 Testing & R&D for Final Design	BNL M&S CE from MA: Computing Services Specialist				26.40	597.60	69.60								693.60
	CP9890 Testing & R&D for Final Design	Total				26.40	597.60	69.60								693.60
	CP9910 Final System Development Work post CD-3	BNL M&S CE from MA: Computing Services Specialist						530.10	714.24	725.40	725.40	728.19	730.98	728.19	348.75	5,231.25
		BNL M&S CE from MA: General Labor						22.80	30.72	31.20	31.20	31.32	31.44	31.32	15.00	225.00
	CP9910 Final System Development Work post CD-3	Total						552.90	744.96	756.60	756.60	759.51	762.42	759.51	363.75	5,456.25
130.04.07.02.03 Data Quality Monitoring Total			262.70	355.00	408.56	224.20	597.60	622.50	744.96	756.60	756.60	759.51	762.42	759.51	363.75	7,373.91
130.04.07.02.04 RunControl	CP10010 Final System Development Work post CD-3	BNL M&S CE from MA: Computing Services Specialist						389.50	524.80	533.00	533.00	535.05	537.10	535.05	256.25	3,843.75
		BNL M&S CE from MA: General Labor						11.40	15.36	15.60	15.60	15.66	15.72	15.66	7.50	112.50
	CP10010 Final System Development Work post CD-3	Total						400.90	540.16	548.60	548.60	550.71	552.82	550.71	263.75	3,956.25
	CP9960 Conceptual Design	BNL M&S CE from MA: Computing Services Specialist	86.95	117.50	28.20											232.65
	CP9960 Conceptual Design	Total	86.95	117.50	28.20											232.65
	CP9970 Testing and R&D for Preliminary Design	BNL M&S CE from MA: Computing Services Specialist			125.96	60.97										186.93
	CP9970 Testing and R&D for Preliminary Design	Total			125.96	60.97										186.93
	CP9990 Testing & R&D for Final Design	BNL M&S CE from MA: Computing Services Specialist				7.15	161.85	18.85								187.85
	CP9990 Testing & R&D for Final Design	Total				7.15	161.85	18.85								187.85
130.04.07.02.04 RunControl Total			86.95	117.50	154.16	68.12	161.85	419.75	540.16	548.60	548.60	550.71	552.82	550.71	263.75	4,563.68
Grand Total			612.35	827.50	1,016.40	548.86	1,421.79	2,572.89	3,243.52	3,294.20	3,294.20	3,306.87	3,319.54	3,306.87	1,593.95	28,358.94

130.04.07.03 Offline Computing (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Grand Total
130.04.07.03.02 Reconstruction	CP10270 Implement/tune SK/MB algorithms	BNL M&S CE from UN: Computer Professional	54,099	107,448	110,348	113,331	119,659	124,806	54,723	684,413
		BNL M&S CE from UN: Travel	3,451	7,004	7,193	7,387	7,800	8,135	3,567	44,538
	CP10270 Implement/tune SK/MB algorithms	Total	57,550	114,452	117,541	120,719	127,459	132,941	58,290	728,951
130.04.07.03.02 Reconstruction Total			57,550	114,452	117,541	120,719	127,459	132,941	58,290	728,951
Grand Total			57,550	114,452	117,541	120,719	127,459	132,941	58,290	728,951

130.04.07.03 Offline Computing - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Grand Total
130.04.07.03.02 Reconstruction	CP10270 Implement/tune SK/MB algorithms	BNL M&S CE from UN: Computer Professional	1,048.32	2,071.68	2,071.68	2,071.68	2,129.92	2,163.20	923.52	12,480.00
	CP10270 Implement/tune SK/MB algorithms	Total	1,048.32	2,071.68	2,071.68	2,071.68	2,129.92	2,163.20	923.52	12,480.00
130.04.07.03.02 Reconstruction Total			1,048.32	2,071.68	2,071.68	2,071.68	2,129.92	2,163.20	923.52	12,480.00
Grand Total			1,048.32	2,071.68	2,071.68	2,071.68	2,129.92	2,163.20	923.52	12,480.00

130.04.07.04 Infrastructure (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.07.04.01 Framework	CP10350 Framework - Support	BNL M&S CS PO Purchases	5,182	6,107	6,272	6,622	6,907	7,094	7,313	7,539	6,088		59,124
		Computing Support Personnel A4	136,383	160,719	165,064	174,280	181,776	186,691	192,469	198,429	160,236		1,556,046
	CP10350 Framework - Support	Total	141,565	166,826	171,336	180,902	188,683	193,785	199,782	205,969	166,323		1,615,170
	CP10360 Framework - Maintenance	BNL M&S CS PO Purchases	5,182	6,107	6,272	6,622	6,907	7,094	7,313	7,539	6,088		59,124
	CP10360 Framework - Maintenance	Total	5,182	6,107	6,272	6,622	6,907	7,094	7,313	7,539	6,088		59,124
130.04.07.04.01 Framework Total			146,747	172,933	177,607	187,524	195,590	200,878	207,095	213,508	172,411		1,674,294
130.04.07.04.02 Support Applications	CP10400 Support Applications Maintenance	BNL M&S CS Travel						3,665	4,656	4,800	4,910	3,323	21,354
	CP10400 Support Applications Maintenance	Total						3,665	4,656	4,800	4,910	3,323	21,354
	CP10390 Support Applications Labor	Computing Support Personnel A4						72,011	91,481	94,314	96,494	65,309	419,609
	CP10390 Support Applications Labor	Total						72,011	91,481	94,314	96,494	65,309	419,609
130.04.07.04.02 Support Applications Total								75,676	96,136	99,113	101,405	68,632	440,963
130.04.07.04.03 Data Archival	CP10460 Data Archival Maintenance	BNL M&S CS PO Purchases	2,784	10,027	10,297	10,872	11,339	2,105					47,423
	CP10460 Data Archival Maintenance	Total	2,784	10,027	10,297	10,872	11,339	2,105					47,423
	CP10450 Data Archival Labor Support	Computing Support Personnel A4	10,962	39,482	40,550	42,814	44,655	8,291					186,753
	CP10450 Data Archival Labor Support	Total	10,962	39,482	40,550	42,814	44,655	8,291					186,753
130.04.07.04.03 Data Archival Total			13,746	49,509	50,846	53,685	55,995	10,396					234,177
130.04.07.04.04 Hardware	CP10500 Hardware Labor Support	Computing Support Personnel A4						31,398	47,282	48,746	49,873	33,559	210,859
	CP10500 Hardware Labor Support	Total						31,398	47,282	48,746	49,873	33,559	210,859
	CP10510 CPU Purchase	BNL M&S CS Laboratory Equipment						97,117	146,243	150,766	154,244	103,175	651,545
	CP10510 CPU Purchase	Total						97,117	146,243	150,766	154,244	103,175	651,545
130.04.07.04.04 Hardware Total								128,515	193,525	199,512	204,117	136,734	862,404
Grand Total			160,493	222,442	228,454	241,209	251,584	415,465	496,757	512,133	477,933	205,366	3,211,838

130.04.07.04 Infrastructure - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.07.04.01 Framework	CP10350 Framework - Support	Computing Support Personnel A4	1,625.33	1,865.01	1,865.01	1,917.44	1,947.40	1,947.40	1,954.89	1,962.38	1,542.94		16,627.80
	CP10350 Framework - Support	Total	1,625.33	1,865.01	1,865.01	1,917.44	1,947.40	1,947.40	1,954.89	1,962.38	1,542.94		16,627.80
130.04.07.04.01 Framework Total			1,625.33	1,865.01	1,865.01	1,917.44	1,947.40	1,947.40	1,954.89	1,962.38	1,542.94		16,627.80
130.04.07.04.02 Support Applications	CP10390 Support Applications Labor	Computing Support Personnel A4						751.16	929.16	932.72	929.16	612.32	4,154.52
	CP10390 Support Applications Labor	Total						751.16	929.16	932.72	929.16	612.32	4,154.52
130.04.07.04.02 Support Applications Total								751.16	929.16	932.72	929.16	612.32	4,154.52
130.04.07.04.03 Data Archival	CP10450 Data Archival Labor Support	Computing Support Personnel A4	130.64	458.16	458.16	471.04	478.40	86.48					2,082.88
	CP10450 Data Archival Labor Support	Total	130.64	458.16	458.16	471.04	478.40	86.48					2,082.88
130.04.07.04.03 Data Archival Total			130.64	458.16	458.16	471.04	478.40	86.48					2,082.88
130.04.07.04.04 Hardware	CP10500 Hardware Labor Support	Computing Support Personnel A4						327.52	480.24	482.08	480.24	314.64	2,084.72
	CP10500 Hardware Labor Support	Total						327.52	480.24	482.08	480.24	314.64	2,084.72
130.04.07.04.04 Hardware Total								327.52	480.24	482.08	480.24	314.64	2,084.72
Grand Total			1,755.97	2,323.17	2,323.17	2,388.48	2,425.80	3,112.56	3,364.29	3,377.18	2,952.34	926.96	24,949.92

130.04.08 Integration, Installation and Safety Systems - Total Cost (\$ Including Direct, Indirect & Escalation)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.01 Management	114,134	158,400	122,142	144,878	147,675	153,437	182,590	181,413	186,318	192,085	198,033	202,611	133,324	2,117,038
130.04.08.02 Integration	188,228	261,230	248,074	204,420	165,314	131,283	89,597	91,193	93,658	96,557	99,547	101,849	69,734	1,840,684
130.04.08.03 Installation Planning & Support					17,339	48,967	855,507	917,757	1,982,158	950,649	5,629,581	11,131,354	886,430	22,419,742
130.04.08.04 Safety Systems	130,337	154,716	92,030	35,375	36,329	37,310	76,521	81,286	83,483	86,066	88,730	90,780	62,870	1,055,834
Grand Total	432,700	574,346	462,246	384,672	366,656	370,997	1,204,215	1,271,648	2,345,617	1,325,358	6,015,892	11,526,594	1,152,358	27,433,298

130.04.08 Integration, Installation and Safety Systems - Labor (\$)

WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.01 Management	114,134	158,400	122,142	144,878	147,675	153,437	182,590	181,413	186,318	192,085	198,033	202,611	133,324	2,117,038
130.04.08.02 Integration	188,228	261,230	248,074	204,420	165,314	131,283	89,597	91,193	93,658	96,557	99,547	101,849	69,734	1,840,684
130.04.08.03 Installation Planning & Support							64,887	43,102	71,347	24,609	353,660	586,872	56,114	1,200,590
130.04.08.04 Safety Systems	121,315	142,195	79,273	22,220	22,820	23,437	56,449	60,082	61,707	63,617	65,587	67,103	46,472	832,276
Grand Total	423,677	561,824	449,489	371,518	335,808	308,157	393,523	375,789	413,029	376,867	716,827	958,435	305,644	5,990,588

130.04.08 Integration, Installation and Safety Systems - Material (\$)

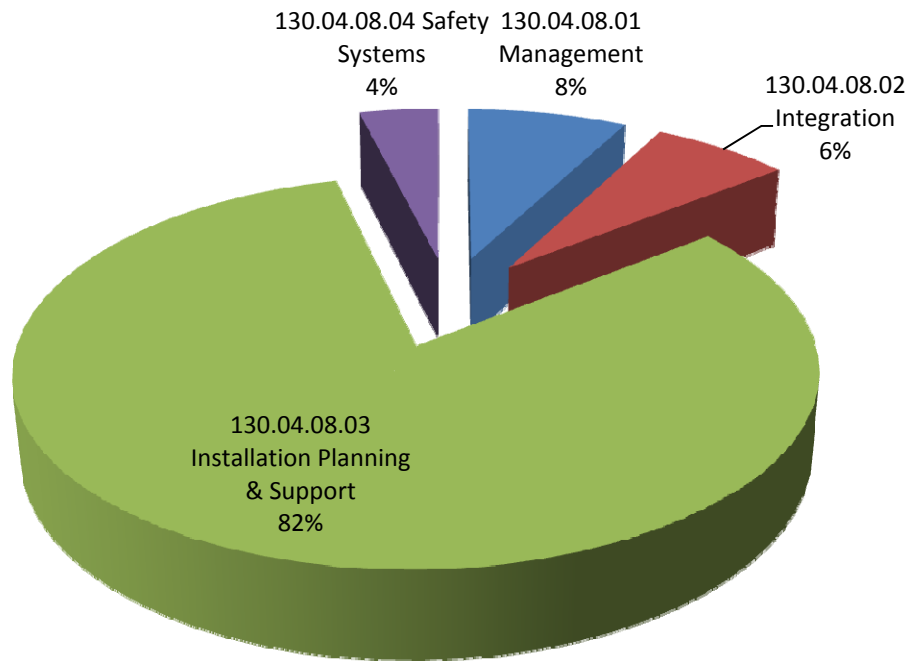
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.03 Installation Planning & Support					17,339	48,967	790,620	874,655	1,910,812	926,041	5,275,921	10,544,482	830,316	21,219,152
130.04.08.04 Safety Systems	9,023	12,522	12,757	13,154	13,509	13,873	20,072	21,204	21,776	22,450	23,144	23,677	16,398	223,558
Grand Total	9,023	12,522	12,757	13,154	30,847	62,840	810,692	895,859	1,932,588	948,491	5,299,065	10,568,159	846,714	21,442,710

130.04.08 Integration, Installation and Safety Systems - FTEs

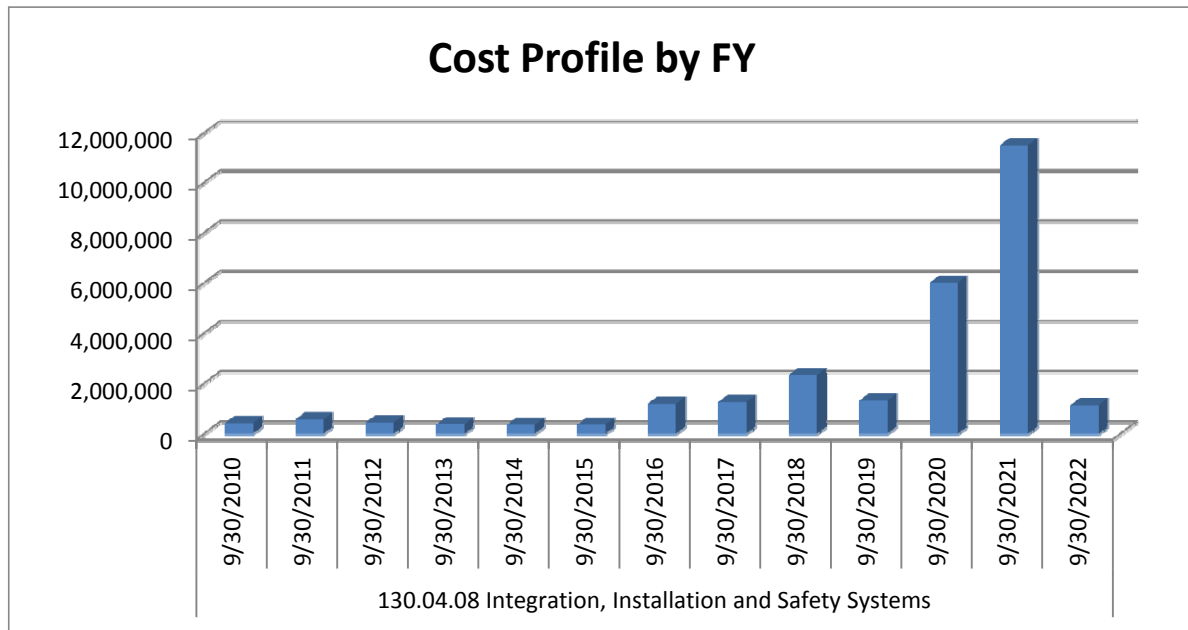
WBS L4	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.01 Management	0.48	0.67	0.52	0.68	0.65	0.70	0.85	0.83	0.83	0.84	0.84	0.83	0.53	9.24
130.04.08.02 Integration	0.69	0.95	0.94	0.92	0.75	0.59	0.43	0.43	0.44	0.44	0.44	0.43	0.29	7.75
130.04.08.03 Installation Planning & Support							0.38	0.24	0.40	0.13	1.84	2.97	0.28	6.24
130.04.08.04 Safety Systems	0.49	0.57	0.32	0.10	0.10	0.10	0.25	0.26	0.26	0.26	0.26	0.26	0.18	3.40
Grand Total	1.66	2.18	1.78	1.70	1.51	1.39	1.91	1.76	1.93	1.67	3.37	4.50	1.28	26.64

WBS	Cost
130.04.08.01 Management	2,117,038
130.04.08.02 Integration	1,840,684
130.04.08.03 Installation Planning & Support	22,419,742
130.04.08.04 Safety Systems	1,055,834
Grand Total	27,433,298

130.04.08 Cost Distribution at Level 4

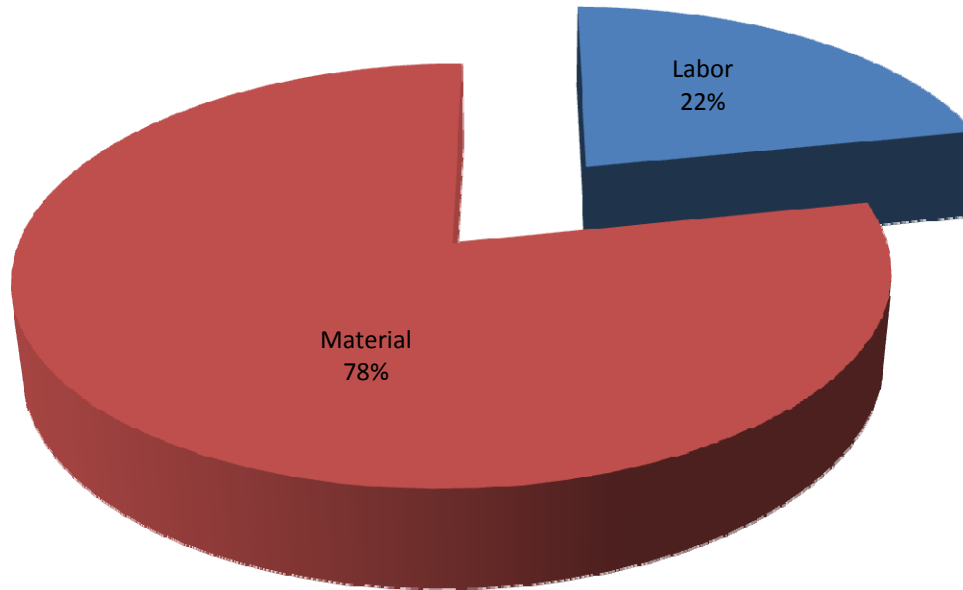


FY	Cost
130.04.08 Integration, Installation and Safety Systems	27,433,298
9/30/2010	432,700
9/30/2011	574,346
9/30/2012	462,246
9/30/2013	384,672
9/30/2014	366,656
9/30/2015	370,997
9/30/2016	1,204,215
9/30/2017	1,271,648
9/30/2018	2,345,617
9/30/2019	1,325,358
9/30/2020	6,015,892
9/30/2021	11,526,594
9/30/2022	1,152,358
Grand Total	27,433,298



WBS	Cost
130.04.08 Integration, Installation and Safety Systems	27,433,298
Labor	5,990,588
Material	21,442,710
Grand Total	27,433,298

130.04.08 Labor Material Ratio



130.04.08.01 Management (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.01 Management	IIS0010 Conceptual Design Phase	Mechanical Engineer P2	30,042	41,694	24,638											96,374
		Mechanical Engineer P5	50,731	70,406	41,604											162,741
	IIS0010 Conceptual Design Phase	Total	80,773	112,100	66,242											259,115
	IIS0020 Preliminary Design Phase	Mechanical Engineer P2			14,907	53,885	11,112									79,905
		Mechanical Engineer P5			25,173	90,992	18,765									134,930
	IIS0020 Preliminary Design Phase	Total			40,080	144,878	29,877									214,835
	IIS0030 Final Design Phase	Mechanical Engineer P2					37,073	19,899								56,972
		Mechanical Engineer P5					80,724	43,328								124,053
	IIS0030 Final Design Phase	Total					117,797	63,227								181,024
	IIS0040 Construction Phase (post CD-3)	Mechanical Engineer P2					46,239	83,836	87,442	89,807	92,586	95,454	97,660	64,561		657,586
		Mechanical Engineer P5					43,972	79,726	83,155	85,403	88,047	90,773	92,872	61,395		625,343
	IIS0040 Construction Phase (post CD-3)	Total					90,210	163,562	170,597	175,210	180,633	186,227	190,532	125,956		1,282,929
	IIS0050 Installation Planning and Scheduling	Mechanical Engineer P2	33,361	46,300	15,820											95,481
	IIS0050 Installation Planning and Scheduling	Total	33,361	46,300	15,820											95,481
	IIS0060 Review of Rigging and Hoisting Practices and Moni	Mechanical Engineer P2							3,446							3,446
		Mechanical Engineer P5							5,820							5,820
	IIS0060 Review of Rigging and Hoisting Practices and Moni Total								9,266							9,266
	IIS0070 Implementation of Rigging and Hoisting Pracedures	Mechanical Engineer P2							9,762	10,815	11,108	11,451	11,806	12,079	7,367	74,389
	IIS0070 Implementation of Rigging and Hoisting Pracedures Total								9,762	10,815	11,108	11,451	11,806	12,079	7,367	74,389
130.04.08.01 Management Total			114,134	158,400	122,142	144,878	147,675	153,437	182,590	181,413	186,318	192,085	198,033	202,611	133,324	2,117,038
Grand Total			114,134	158,400	122,142	144,878	147,675	153,437	182,590	181,413	186,318	192,085	198,033	202,611	133,324	2,117,038

130.04.08.01 Management - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.01 Management	IIS0010 Conceptual Design Phase	Mechanical Engineer P2	318.20	430.00	252.84											1,001.04
		Mechanical Engineer P5	318.20	430.00	252.84											1,001.04
	IIS0010 Conceptual Design Phase	Total	636.40	860.00	505.68											2,002.08
	IIS0020 Preliminary Design Phase	Mechanical Engineer P2			184.96	677.28	136.00									998.24
		Mechanical Engineer P5			184.96	677.28	136.00									998.24
	IIS0020 Preliminary Design Phase	Total			369.92	1,354.56	272.00									1,996.48
	IIS0030 Final Design Phase	Mechanical Engineer P2					453.72	237.12								690.84
		Mechanical Engineer P5					585.06	305.76								890.82
	IIS0030 Final Design Phase	Total					1,038.78	542.88								1,581.66
	IIS0040 Construction Phase (post CD-3)	Mechanical Engineer P2						551.00	972.80	988.00	988.00	991.80	995.60	991.80	638.40	7,117.40
		Mechanical Engineer P5						310.30	547.84	556.40	556.40	558.54	560.68	558.54	359.52	4,008.22
	IIS0040 Construction Phase (post CD-3)	Total						861.30	1,520.64	1,544.40	1,544.40	1,550.34	1,556.28	1,550.34	997.92	11,125.62
	IIS0050 Installation Planning and Scheduling	Mechanical Engineer P2	353.35	477.50	162.35											993.20
	IIS0050 Installation Planning and Scheduling	Total	353.35	477.50	162.35											993.20
	IIS0060 Review of Rigging and Hoisting Practices and Moni	Mechanical Engineer P2								39.99						39.99
		Mechanical Engineer P5								39.99						39.99
	IIS0060 Review of Rigging and Hoisting Practices and Moni Total									79.98						79.98
	IIS0070 Implementation of Rigging and Hoisting Pracedures	Mechanical Engineer P2							113.27	122.20	122.20	122.67	123.14	122.67	72.85	799.00
	IIS0070 Implementation of Rigging and Hoisting Pracedures Total								113.27	122.20	122.20	122.67	123.14	122.67	72.85	799.00
130.04.08.01 Management Total			989.75	1,337.50	1,037.95	1,354.56	1,310.78	1,404.18	1,713.89	1,666.60	1,666.60	1,673.01	1,679.42	1,673.01	1,070.77	18,578.02
Grand Total			989.75	1,337.50	1,037.95	1,354.56	1,310.78	1,404.18	1,713.89	1,666.60	1,666.60	1,673.01	1,679.42	1,673.01	1,070.77	18,578.02

130.04.08.02 Integration (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.02.01 Mechanical Systems Interface	IIS0080 3-D Interface Control	Mechanical Engineer P5	12,093	16,783	15,938	13,716	14,086	14,467	15,275	15,932	16,362	16,869	17,391	17,793	12,183	198,886
	IIS0080 3-D Interface Control	Total	12,093	16,783	15,938	13,716	14,086	14,467	15,275	15,932	16,362	16,869	17,391	17,793	12,183	198,886
	IIS0090 Mechanical Services	Mechanical Engineer P2	7,161	9,939	9,438	8,122	8,342	8,567	9,046	9,435	9,690	9,990	10,299	10,537	7,215	117,779
	IIS0090 Mechanical Services	Total	7,161	9,939	9,438	8,122	8,342	8,567	9,046	9,435	9,690	9,990	10,299	10,537	7,215	117,779
130.04.08.02.01 Mechanical Systems Integration Total			19,254	26,722	25,376	21,838	22,428	23,034	24,320	25,366	26,052	26,858	27,690	28,330	19,397	316,665
130.04.08.02.02 Electrical Systems Integration	IIS0100 Conventional Power	Electrical Engineer P2	7,162	9,939	9,439	8,123	8,342	8,568	9,046	9,435	9,690	9,990	10,299	10,538	7,215	117,785
	IIS0100 Conventional Power	Total	7,162	9,939	9,439	8,123	8,342	8,568	9,046	9,435	9,690	9,990	10,299	10,538	7,215	117,785
	IIS0110 Clean Power & Grounding	Electrical Engineer P2	7,162	9,939	9,439	8,123	8,342	8,568	9,046	9,435	9,690	9,990	10,299	10,538	7,215	117,785
	IIS0110 Clean Power & Grounding	Total	7,162	9,939	9,439	8,123	8,342	8,568	9,046	9,435	9,690	9,990	10,299	10,538	7,215	117,785
	IIS0120 UPS and Emergency Power	Electrical Engineer P2	7,162	9,939	9,439	8,123	8,342	8,568	9,046	9,435	9,690	9,990	10,299	10,538	7,215	117,785
	IIS0120 UPS and Emergency Power	Total	7,162	9,939	9,439	8,123	8,342	8,568	9,046	9,435	9,690	9,990	10,299	10,538	7,215	117,785
	IIS0130 Tray Routing	Electrical Engineer P2	7,162	9,939	9,439	8,123	8,342	8,568	9,046	9,435	9,690	9,990	10,299	10,538	7,215	117,785
	IIS0130 Tray Routing	Total	7,162	9,939	9,439	8,123	8,342	8,568	9,046	9,435	9,690	9,990	10,299	10,538	7,215	117,785
130.04.08.02.02 Electrical Systems Integration Total			28,647	39,757	37,755	32,491	33,368	34,270	36,184	37,740	38,761	39,960	41,198	42,150	28,860	471,141
130.04.08.02.03.01 Interface Definition	IIS0140 Requirements	Mechanical Engineer P5	6,489	9,005	8,552	6,089										30,135
	IIS0140 Requirements	Total	6,489	9,005	8,552	6,089										30,135
	IIS0150 Interface Control Documents	Mechanical Engineer P5	13,273	18,420	17,493	12,454										61,639
	IIS0150 Interface Control Documents	Total	13,273	18,420	17,493	12,454										61,639
130.04.08.02.03.01 Interface Definition Total			19,761	27,426	26,044	18,543										91,774
130.04.08.02.03.02 Installation Planning	IIS0170 Scheduling	Mechanical Engineer P2	11,353	15,756	14,963	12,877	13,225	3,055								71,229
	IIS0170 Scheduling	Total	11,353	15,756	14,963	12,877	13,225	3,055								71,229
	IIS0180 Subgroup Coordination	Mechanical Engineer P2	7,161	9,939	9,438	8,122	8,342	8,567	9,046	9,435	9,690	9,990	10,299	10,537	7,215	117,779
	IIS0180 Subgroup Coordination	Total	7,161	9,939	9,438	8,122	8,342	8,567	9,046	9,435	9,690	9,990	10,299	10,537	7,215	117,779
130.04.08.02.03.02 Installation Planning Total			18,515	25,695	24,401	20,999	21,566	11,622	9,046	9,435	9,690	9,990	10,299	10,537	7,215	189,008
130.04.08.02.04 Establish Engineering Standards, Reviews and Document	IIS0190 Engineering Design Standards	Mechanical Engineer P5	26,545	36,840	34,985	24,908										123,279
	IIS0190 Engineering Design Standards	Total	26,545	36,840	34,985	24,908										123,279
	IIS0200 Engineering Design Reviews	Mechanical Engineer P5	24,775	34,384	32,653	28,101	28,859	1,666								150,439
	IIS0200 Engineering Design Reviews	Total	24,775	34,384	32,653	28,101	28,859	1,666								150,439
	IIS0210 Engineering Document Control System	Mechanical Engineer P5	7,079	9,824	9,329	8,029	8,245	8,468	8,941	9,326	9,578	9,874	10,180	10,416	7,131	116,421
	IIS0210 Engineering Document Control System	Total	7,079	9,824	9,329	8,029	8,245	8,468	8,941	9,326	9,578	9,874	10,180	10,416	7,131	116,421
	IIS0220 Engineering Change Control Process	Mechanical Engineer P5	7,079	9,824	9,329	8,029	8,245	8,468	8,941	9,326	9,578	9,874	10,180	10,416	7,131	116,421
	IIS0220 Engineering Change Control Process	Total	7,079	9,824	9,329	8,029	8,245	8,468	8,941	9,326	9,578	9,874	10,180	10,416	7,131	116,421
	IIS0230 Develop Work Controls System Review Process	Mechanical Engineer P5	18,287	25,379	24,101	20,741	21,301	21,877	1,083							132,767
	IIS0230 Develop Work Controls System Review Process	Total	18,287	25,379	24,101	20,741	21,301	21,877	1,083							132,767
	IIS0240 Develop Rigging and Hoisting Practices	Mechanical Engineer P5	18,287	25,379	24,101	20,741	21,301	21,877	1,083							132,767
	IIS0240 Develop Rigging and Hoisting Practices	Total	18,287	25,379	24,101	20,741	21,301	21,877	1,083							132,767
130.04.08.02.04 Establish Engineering Standards, Reviews and Document Total			102,051	141,631	134,498	110,548	87,952	62,357	20,048	18,652	19,156	19,749	20,360	20,831	14,263	772,095
Grand Total			188,228	261,230	248,074	204,420	165,314	131,283	89,597	91,193	93,658	96,557	99,547	101,849	69,734	1,840,684

130.04.08.02 Integration - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.02.01 Mechanical Systems Interface	IIS0080 3-D Interface Control	Mechanical Engineer P5	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0080 3-D Interface Control	Total	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0090 Mechanical Services	Mechanical Engineer P2	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0090 Mechanical Services	Total	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
130.04.08.02.01 Mechanical Systems Integration Total			151.70	205.00	203.36	204.18	204.18	204.18	209.92	213.20	213.20	214.02	214.84	214.02	142.68	2,594.48
130.04.08.02.02 Electrical Systems Integration	IIS0100 Conventional Power	Electrical Engineer P2	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0100 Conventional Power	Total	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0110 Clean Power & Grounding	Electrical Engineer P2	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0110 Clean Power & Grounding	Total	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0120 UPS and Emergency Power	Electrical Engineer P2	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0120 UPS and Emergency Power	Total	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0130 Tray Routing	Electrical Engineer P2	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0130 Tray Routing	Total	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
130.04.08.02.02 Electrical Systems Integration Total			303.40	410.00	406.72	408.36	408.36	408.36	419.84	426.40	426.40	428.04	429.68	428.04	285.36	5,188.96
130.04.08.02.03.01 Interface Definition	IIS0140 Requirements	Mechanical Engineer P5	40.70	55.00	54.56	45.32										195.58
	IIS0140 Requirements	Total	40.70	55.00	54.56	45.32										195.58
	IIS0150 Interface Control Documents	Mechanical Engineer P5	83.25	112.50	111.60	92.70										

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.02.03.02 Installation Plannin	IIS0170 Scheduling		120.25	162.50	161.20	161.85	161.85	36.40								804.05
	IIS0180 Subgroup Coordination	Mechanical Engineer P2	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
	IIS0180 Subgroup Coordination	Total	75.85	102.50	101.68	102.09	102.09	102.09	104.96	106.60	106.60	107.01	107.42	107.01	71.34	1,297.24
130.04.08.02.03.02 Installation Planning	Total		196.10	265.00	262.88	263.94	263.94	138.49	104.96	106.60	106.60	107.01	107.42	107.01	71.34	2,101.29
130.04.08.02.04 Establish Engineering	IIS0190 Engineering Design Standards	Mechanical Engineer P5	166.50	225.00	223.20	185.40										800.10
	IIS0190 Engineering Design Standards	Total	166.50	225.00	223.20	185.40										800.10
	IIS0200 Engineering Design Reviews	Mechanical Engineer P5	155.40	210.00	208.32	209.16	209.16	11.76								1,003.80
	IIS0200 Engineering Design Reviews	Total	155.40	210.00	208.32	209.16	209.16	11.76								1,003.80
	IIS0210 Engineering Document Control System	Mechanical Engineer P5	44.40	60.00	59.52	59.76	59.76	59.76	61.44	62.40	62.40	62.64	62.88	62.64	41.76	759.36
	IIS0210 Engineering Document Control System	Total	44.40	60.00	59.52	59.76	59.76	59.76	61.44	62.40	62.40	62.64	62.88	62.64	41.76	759.36
	IIS0220 Engineering Change Control Process	Mechanical Engineer P5	44.40	60.00	59.52	59.76	59.76	59.76	61.44	62.40	62.40	62.64	62.88	62.64	41.76	759.36
	IIS0220 Engineering Change Control Process	Total	44.40	60.00	59.52	59.76	59.76	59.76	61.44	62.40	62.40	62.64	62.88	62.64	41.76	759.36
	IIS0230 Develop Work Controls System Review Process	Mechanical Engineer P5	114.70	155.00	153.76	154.38	154.38	154.38	7.44							894.04
	IIS0230 Develop Work Controls System Review Process	Total	114.70	155.00	153.76	154.38	154.38	154.38	7.44							894.04
	IIS0240 Develop Rigging and Hoisting Practices	Mechanical Engineer P5	114.70	155.00	153.76	154.38	154.38	154.38	7.44							894.04
	IIS0240 Develop Rigging and Hoisting Practices	Total	114.70	155.00	153.76	154.38	154.38	154.38	7.44							894.04
130.04.08.02.04 Establish Engineering Standards, Reviews and Document	Total		640.10	865.00	858.08	822.84	637.44	440.04	137.76	124.80	124.80	125.28	125.76	125.28	83.52	5,110.70
Grand Total			1,415.25	1,912.50	1,897.20	1,837.34	1,513.92	1,191.07	872.48	871.00	871.00	874.35	877.70	874.35	582.90	15,591.06

130.04.08.03 Installation Planning & Support (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.03.01 Site Prep	IIS0250 Secure and Outfit PA Warehouse	BNL M&S CS Special Procurement			137,147							137,147
		Mechanical Engineer P2			44,847							44,847
	IIS0250 Secure and Outfit PA Warehouse	Total			181,994							181,994
	IIS0260 Setup Homestake Storage	BNL M&S CS Special Procurement					72,326					72,326
		Mechanical Engineer P2					14,542					14,542
	IIS0260 Setup Homestake Storage	Total					86,868					86,868
	IIS0270 Setup Lease for Transportation (with trucking com	Administrative Support A1					2,052					2,052
		Mechanical Engineer P2					1,793					1,793
	IIS0270 Setup Lease for Transportation (with trucking com	Total					3,844					3,844
	IIS0280 PA Transportation	BNL M&S CS Special Procurement							231,574	384,340	165,601	781,515
		Mechanical Engineer P2							16,259	26,985	11,628	54,872
	IIS0280 PA Transportation	Total							247,832	411,325	177,229	836,386
	IIS0290 Identify and Procure General Tools and Equipment	Mechanical Engineer P2			641	22,388						23,029
	IIS0290 Identify and Procure General Tools and Equipment	Total			641	22,388						23,029
	IIS0300 Replacement of missing tools/Procurement of addit	Mechanical Engineer P2				2,305	4,963	5,117	5,275	5,397	1,529	24,585
	IIS0300 Replacement of missing tools/Procurement of addit	Total				2,305	4,963	5,117	5,275	5,397	1,529	24,585
	IIS0310 Setup the Inventory Management System for Warehou	Mechanical Engineer P2			11,195							11,195
	IIS0310 Setup the Inventory Management System for Warehou	Total			11,195							11,195
	IIS0320 Maintainance of Inventory Management SW	Mechanical Engineer P2			634	1,841	1,891	1,949	2,010	2,056	1,294	11,675
	IIS0320 Maintainance of Inventory Management SW	Total			634	1,841	1,891	1,949	2,010	2,056	1,294	11,675
	IIS0330 PA Warehouse Lease	BNL M&S CS Special Procurement			653,473	874,655	898,247	926,041	954,679	746,547		5,053,643
	IIS0330 PA Warehouse Lease	Total			653,473	874,655	898,247	926,041	954,679	746,547		5,053,643
	IIS0340 Setup Office Space on Surface	BNL M&S CS Special Procurement					72,326					72,326
	IIS0340 Setup Office Space on Surface	Total					72,326					72,326
	IIS0350 Implement Work Controls System Review Process	Mechanical Engineer P2			7,570	16,568	17,016	17,543	18,086	18,504	1,165	96,452
	IIS0350 Implement Work Controls System Review Process	Total			7,570	16,568	17,016	17,543	18,086	18,504	1,165	96,452
	IIS0360 Decommission Warehouse	Administrative Support A1								4,432		4,432
		Mechanical Engineer P2								3,957		3,957
	IIS0360 Decommission Warehouse	Total								8,390		8,390
130.04.08.03.01 Site Prep Total					855,507	917,757	1,085,155	950,649	1,227,882	1,192,219	181,218	6,410,388
130.04.08.03.02.01 PMT Installation Un	IIS0370 Deck PIU's, Light Collectors and Light Barriers ,	BNL M&S CS Special Procurement							880,002			880,002
		Mechanical Engineer P2							92,044			92,044
	IIS0370 Deck PIU's, Light Collectors and Light Barriers ,	Total							972,046			972,046
	IIS0380 Install boxing rings	Mechanical Engineer P2							12,464			12,464
	IIS0380 Install boxing rings	Total							12,464			12,464
	IIS0390 Install Wall PMT's (Sector 1)	BNL M&S CS Special Procurement							333,466	190,256		523,722
		Mechanical Engineer P2							34,213	19,521		53,734
	IIS0390 Install Wall PMT's (Sector 1)	Total							367,679	209,777		577,456
	IIS0400 Install Wall PMT's (Sector 2)	BNL M&S CS Special Procurement							333,466	190,256		523,722
		Mechanical Engineer P2							34,213	19,521		53,734
	IIS0400 Install Wall PMT's (Sector 2)	Total							367,679	209,777		577,456
	IIS0410 Install Wall PMT's (Sector 3)	BNL M&S CS Special Procurement							333,466	190,256		523,722
		Mechanical Engineer P2							34,213	19,521		53,734
	IIS0410 Install Wall PMT's (Sector 3)	Total							367,679	209,777		577,456
	IIS0420 Install Wall PMT's (Sector 4)	BNL M&S CS Special Procurement							532,716			532,716
		Mechanical Engineer P2							54,660			54,660
	IIS0420 Install Wall PMT's (Sector 4)	Total							587,375			587,375
	IIS0430 Install Wall PMT's (Sector 5)	BNL M&S CS Special Procurement							532,716			532,716
		Mechanical Engineer P2							54,660			54,660
	IIS0430 Install Wall PMT's (Sector 5)	Total							587,375			587,375
	IIS0440 Install Wall PMT's (Sector 6)	BNL M&S CS Special Procurement							532,716			532,716
		Mechanical Engineer P2							54,660			54,660
	IIS0440 Install Wall PMT's (Sector 6)	Total							587,375			587,375
	IIS0450 Install Floor Structure	BNL M&S CS Special Procurement							321,196			321,196
		Mechanical Engineer P2							33,085			33,085
	IIS0450 Install Floor Structure	Total							354,281			354,281
	IIS0460 Install Floor PMTs (Sector 1)	BNL M&S CS Special Procurement							125,345			125,345
		Mechanical Engineer P2							12,604			12,604

	IIS0460 Install Floor PMTs (Sector 1)	Total			137,949	137,949
	IIS0470 Install Floor PMTs (Sector 2)		BNL M&S CS Special Procurement Mechanical Engineer P2		125,345	125,345
					12,604	12,604
	IIS0470 Install Floor PMTs (Sector 2)	Total			137,949	137,949
	IIS0480 Install Floor PMTs (Sector 3)		BNL M&S CS Special Procurement Mechanical Engineer P2		125,345	125,345
					12,604	12,604
	IIS0480 Install Floor PMTs (Sector 3)	Total			137,949	137,949
	IIS0490 Install Floor PMTs (Sector 4)		BNL M&S CS Special Procurement Mechanical Engineer P2		125,345	125,345
					12,604	12,604
	IIS0490 Install Floor PMTs (Sector 4)	Total			137,949	137,949
	IIS0500 Install Floor PMTs (Sector 5)		BNL M&S CS Special Procurement Mechanical Engineer P2		125,345	125,345
					12,604	12,604
	IIS0500 Install Floor PMTs (Sector 5)	Total			137,949	137,949
	IIS0510 Install Floor PMTs (Sector 6)		BNL M&S CS Special Procurement Mechanical Engineer P2		125,345	125,345
					12,604	12,604
	IIS0510 Install Floor PMTs (Sector 6)	Total			137,949	137,949
	IIS0520 Install Floor Light Collector and Light Barriers		BNL M&S CS Special Procurement Mechanical Engineer P2		78,341	78,341
					7,877	7,877
	IIS0520 Install Floor Light Collector and Light Barriers Total				86,218	86,218
	IIS0530 Install Floor Light Collector and Light Barriers		BNL M&S CS Special Procurement Mechanical Engineer P2		78,341	78,341
					7,877	7,877
	IIS0530 Install Floor Light Collector and Light Barriers Total				86,218	86,218
	IIS0540 Install Floor Light Collector and Light Barriers		BNL M&S CS Special Procurement Mechanical Engineer P2		78,341	78,341
					7,877	7,877
	IIS0540 Install Floor Light Collector and Light Barriers Total				86,218	86,218
	IIS0550 Install Floor Light Collector and Light Barriers		BNL M&S CS Special Procurement Mechanical Engineer P2		78,341	78,341
					7,877	7,877
	IIS0550 Install Floor Light Collector and Light Barriers Total				86,218	86,218
	IIS0560 Install Floor Light Collector and Light Barriers		BNL M&S CS Special Procurement Mechanical Engineer P2		78,341	78,341
					7,877	7,877
	IIS0560 Install Floor Light Collector and Light Barriers Total				86,218	86,218
	IIS0570 Install Floor Light Collector and Light Barriers		BNL M&S CS Special Procurement Mechanical Engineer P2		78,341	78,341
					7,877	7,877
	IIS0570 Install Floor Light Collector and Light Barriers Total				86,218	86,218
	IIS0580 Install Light Collectors and Light Barriers on th		BNL M&S CS Special Procurement		23,502	23,502
	IIS0580 Install Light Collectors and Light Barriers on th Total				23,502	23,502
	IIS0590 Install Light Collectors and Light Barriers on th		BNL M&S CS Special Procurement		23,502	23,502
	IIS0590 Install Light Collectors and Light Barriers on th Total				23,502	23,502
	IIS0600 Install Light Collectors and Light Barriers on th		BNL M&S CS Special Procurement		23,502	23,502
	IIS0600 Install Light Collectors and Light Barriers on th Total				23,502	23,502
	IIS0610 Install Light Collectors and Light Barriers on th		BNL M&S CS Special Procurement		23,502	23,502
	IIS0610 Install Light Collectors and Light Barriers on th Total				23,502	23,502
	IIS0620 Install Light Collectors and Light Barriers on th		BNL M&S CS Special Procurement		23,502	23,502
	IIS0620 Install Light Collectors and Light Barriers on th Total				23,502	23,502
	IIS0630 Install Light Collectors and Light Barriers on th		BNL M&S CS Special Procurement		23,502	23,502
	IIS0630 Install Light Collectors and Light Barriers on th Total				23,502	23,502
	IIS0640 Installation of Deck Annular PIUs		BNL M&S CS Special Procurement		78,340	78,340
	IIS0640 Installation of Deck Annular PIUs Total				78,340	78,340
	IIS0650 Survey PMT's before filling in the Vessel		BNL M&S CS Special Procurement			80,456
	IIS0650 Survey PMT's before filling in the Vessel Total					80,456
	IIS0660 Install all remaining PMTs		BNL M&S CS Special Procurement			16,091
	IIS0660 Install all remaining PMTs Total					16,091
	IIS0670 PMT Cable Hookup to Racks		BNL M&S CS Special Procurement	5,322	570,611	373,842
	IIS0670 PMT Cable Hookup to Racks Total			5,322	570,611	373,842
	IIS0680 Survey PMTs after filling in the Vessel		BNL M&S CS Special Procurement			80,456
	IIS0680 Survey PMTs after filling in the Vessel Total					80,456
	130.04.08.03.02.01 PMT Installation Unit (PIU) Total				2,092,870	4,880,703
	130.04.08.03.02.02 Water System Insta					
	IIS0690 Install Vessel Water Piping (Deck)		BNL M&S CS Special Procurement		95,354	95,354
	IIS0690 Install Vessel Water Piping (Deck) Total				95,354	95,354
	IIS0700 Install Vessel Water Piping (Wall Sector 1)		BNL M&S CS Special Procurement		11,442	11,442
	IIS0700 Install Vessel Water Piping (Wall Sector 1) Total				11,442	11,442
	IIS0710 Install Vessel Water Piping (Wall Sector 2)		BNL M&S CS Special Procurement		11,442	11,442

130.04.08.03.02.02 Water System Insta	IIS0710 Install Vessel Water Piping (Wall Sector 2)	Total							11,442	11,442
	IIS0720 Install Vessel Water Piping (Wall Sector 3)		BNL M&S CS Special Procurement						11,442	11,442
	IIS0720 Install Vessel Water Piping (Wall Sector 3)	Total							11,442	11,442
	IIS0730 Install Vessel Water Piping (Wall Sector 4)		BNL M&S CS Special Procurement						11,442	11,442
	IIS0730 Install Vessel Water Piping (Wall Sector 4)	Total							11,442	11,442
	IIS0740 Install Vessel Water Piping (Wall Sector 5)		BNL M&S CS Special Procurement						11,442	11,442
	IIS0740 Install Vessel Water Piping (Wall Sector 5)	Total							11,442	11,442
	IIS0750 Install Vessel Water Piping (Wall Sector 6)		BNL M&S CS Special Procurement						11,442	11,442
	IIS0750 Install Vessel Water Piping (Wall Sector 6)	Total							11,442	11,442
	IIS0760 Install Vessel Water Piping (Floor)		BNL M&S CS Special Procurement						95,354	95,354
	IIS0760 Install Vessel Water Piping (Floor)	Total							95,354	95,354
	IIS0770 Install Surface Fill System		BNL M&S CS Special Procurement	17,339	48,967					66,305
	IIS0770 Install Surface Fill System	Total		17,339	48,967					66,305
	IIS0780 Install Water Recirculation System		BNL M&S CS Special Procurement					125,345		125,345
	IIS0780 Install Water Recirculation System	Total						125,345		125,345
	IIS0790 Install Pumps		BNL M&S CS Special Procurement					64,239		64,239
	IIS0790 Install Pumps	Total						64,239		64,239
	IIS0800 Install Sump and Drain		BNL M&S CS Special Procurement					31,336		31,336
	IIS0800 Install Sump and Drain	Total						31,336		31,336
	IIS0810 Install Waste System (alternative)		BNL M&S CS Special Procurement					31,336		31,336
	IIS0810 Install Waste System (alternative)	Total						31,336		31,336
130.04.08.03.02.02 Water System Installation Total				17,339	48,967			259,363	252,256	577,924
130.04.08.03.02.03 Other Systems	IIS0840 Install Fire Protection System		BNL M&S CS Special Procurement Mechanical Engineer P2					3,917,027		3,917,027
	IIS0840 Install Fire Protection System	Total						24,430		24,430
	IIS0840 Install Fire Protection System	Total						3,941,456		3,941,456
	IIS0850 Install Electronics Above Ground		BNL M&S CS Special Procurement Mechanical Engineer P2			578,608				578,608
	IIS0850 Install Electronics Above Ground	Total				14,545				14,545
	IIS0850 Install Electronics Above Ground	Total				593,154				593,154
	IIS0870 Install Detector Electrical Distribution		BNL M&S CS Special Procurement Mechanical Engineer P2					762,831		762,831
	IIS0870 Install Detector Electrical Distribution	Total						53,721		53,721
	IIS0870 Install Detector Electrical Distribution	Total						816,552		816,552
	IIS0880 Install Clean Ground System		BNL M&S CS Special Procurement					457,698		457,698
	IIS0880 Install Clean Ground System	Total						457,698		457,698
	IIS0890 Install Man Lifts (Use CF Power Distribution Syst		BNL M&S CS Special Procurement					61,026		61,026
	IIS0890 Install Man Lifts (Use CF Power Distribution Syst	Total						61,026		61,026
	IIS0900 Install Electronics Racks Underground		BNL M&S CS Special Procurement Mechanical Engineer P2					114,425		114,425
	IIS0900 Install Electronics Racks Underground	Total						23,786		23,786
	IIS0900 Install Electronics Racks Underground	Total						138,210		138,210
	IIS0910 Install Electronic Crates in Racks		BNL M&S CS Special Procurement Mechanical Engineer P2					9,535	107,718	117,254
	IIS0910 Install Electronic Crates in Racks	Total						1,982	22,394	24,375
	IIS0910 Install Electronic Crates in Racks	Total						11,517	130,112	141,629
	IIS0920 Install Cable Trays		BNL M&S CS Special Procurement					114,425		114,425
	IIS0920 Install Cable Trays	Total						114,425		114,425
	IIS0930 Install Ethernet Cables		BNL M&S CS Special Procurement					11,442	35,253	46,696
	IIS0930 Install Ethernet Cables	Total						11,442	35,253	46,696
	IIS0940 System Check out (PMTs and Electronics)		BNL M&S CS Special Procurement Mechanical Engineer P2					28,288	19,223	47,511
	IIS0940 System Check out (PMTs and Electronics)	Total						33,109	22,499	55,608
	IIS0940 System Check out (PMTs and Electronics)	Total						61,396	41,722	103,118
	IIS0950 Install Calibration Systems		BNL M&S CS Special Procurement					165,280	143,624	308,904
	IIS0950 Install Calibration Systems	Total						165,280	143,624	308,904
	IIS0960 Clean Vessel No. 1		BNL M&S CS Special Procurement Mechanical Engineer P2					47,004		47,004
	IIS0960 Clean Vessel No. 1	Total						16,543		16,543
	IIS0960 Clean Vessel No. 1	Total						63,547		63,547
	IIS0970 Clean Vessel No. 2		BNL M&S CS Special Procurement Mechanical Engineer P2					47,004		47,004
	IIS0970 Clean Vessel No. 2	Total						16,543		16,543
	IIS0970 Clean Vessel No. 2	Total						63,547		63,547
	IIS0990 Install Computing systems below ground		BNL M&S CS Special Procurement Mechanical Engineer P2					247,920	58,755	306,675
	IIS0990 Install Computing systems below ground	Total						25,395	6,019	31,415
	IIS0990 Install Computing systems below ground	Total						273,316	64,775	338,090
	IIS1000 Install Control room above ground		BNL M&S CS Special Procurement Mechanical Engineer P2			289,304				289,304
	IIS1000 Install Control room above ground	Total				14,545				14,545
	IIS1000 Install Control room above ground	Total				303,850				303,850

IIS1010 Install Gas Blanket System	BNL M&S CS Special Procurement Mechanical Engineer P2	256,957								256,957		
		15,755								15,755		
IIS1010 Install Gas Blanket System Total		272,712								272,712		
IIS1020 Gas and Light Barrier (Final seal)	BNL M&S CS Special Procurement							40,228		40,228		
IIS1020 Gas and Light Barrier (Final seal) Total								40,228		40,228		
IIS1030 Seal Ports and Hatches	BNL M&S CS Special Procurement Mechanical Engineer P2							40,228		40,228		
								8,090		8,090		
IIS1030 Seal Ports and Hatches Total								48,319		48,319		
IIS1040 Fill Vessel	BNL M&S CS Special Procurement Mechanical Engineer P2	17,520						14,190		31,710		
		12,233						9,908		22,140		
IIS1040 Fill Vessel Total		29,753						24,097		53,850		
130.04.08.03.02.03 Other Systems Total						897,003		2,049,466	4,806,175	154,366	7,907,010	
Grand Total			17,339	48,967	855,507	917,757	1,982,158	950,649	5,629,581	11,131,354	886,430	22,419,742

130.04.08.03 Installation Planning & Support - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.03.01 Site Prep	IIS0250 Secure and Outfit PA Warehouse	Mechanical Engineer P2	520.38							520.38
	IIS0250 Secure and Outfit PA Warehouse Total		520.38							520.38
	IIS0260 Setup Homestake Storage	Mechanical Engineer P2			159.98					159.98
	IIS0260 Setup Homestake Storage Total				159.98					159.98
	IIS0270 Setup Lease for Transportation (with trucking com	Administrative Support A1			40.02					40.02
		Mechanical Engineer P2			19.72					19.72
	IIS0270 Setup Lease for Transportation (with trucking com Total				59.74					59.74
	IIS0280 PA Transportation	Mechanical Engineer P2					169.58	274.05	114.98	558.61
	IIS0280 PA Transportation Total						169.58	274.05	114.98	558.61
	IIS0290 Identify and Procure General Tools and Equipment	Mechanical Engineer P2	7.44	252.96						260.40
	IIS0290 Identify and Procure General Tools and Equipment Total		7.44	252.96						260.40
	IIS0300 Replacement of missing tools/Procurement of addit	Mechanical Engineer P2		26.04	54.60	54.81	55.02	54.81	15.12	260.40
	IIS0300 Replacement of missing tools/Procurement of addit Total			26.04	54.60	54.81	55.02	54.81	15.12	260.40
	IIS0310 Setup the Inventory Management System for Warehou	Mechanical Engineer P2	129.90							129.90
	IIS0310 Setup the Inventory Management System for Warehou Total		129.90							129.90
	IIS0320 Maintainance of Inventory Management SW	Mechanical Engineer P2	7.36	20.80	20.80	20.88	20.96	20.88	12.80	124.48
	IIS0320 Maintainance of Inventory Management SW Total		7.36	20.80	20.80	20.88	20.96	20.88	12.80	124.48
	IIS0350 Implement Work Controls System Review Process	Mechanical Engineer P2	87.84	187.20	187.20	187.92	188.64	187.92	11.52	1,038.24
	IIS0350 Implement Work Controls System Review Process Total		87.84	187.20	187.20	187.92	188.64	187.92	11.52	1,038.24
	IIS0360 Decommission Warehouse	Administrative Support A1						79.81		79.81
		Mechanical Engineer P2						40.19		40.19
	IIS0360 Decommission Warehouse Total							120.00		120.00
130.04.08.03.01 Site Prep Total			752.92	487.00	482.32	263.61	434.20	657.66	154.42	3,232.13
130.04.08.03.02.01 PMT Installation Un	IIS0370 Deck PIU's, Light Collectors and Light Barriers ,	Mechanical Engineer P2					960.04			960.04
	IIS0370 Deck PIU's, Light Collectors and Light Barriers , Total						960.04			960.04
	IIS0380 Install boxing rings	Mechanical Engineer P2					130.00			130.00
	IIS0380 Install boxing rings Total						130.00			130.00
	IIS0390 Install Wall PMT's (Sector 1)	Mechanical Engineer P2					356.85	198.25		555.10
	IIS0390 Install Wall PMT's (Sector 1) Total						356.85	198.25		555.10
	IIS0400 Install Wall PMT's (Sector 2)	Mechanical Engineer P2					356.85	198.25		555.10
	IIS0400 Install Wall PMT's (Sector 2) Total						356.85	198.25		555.10
	IIS0410 Install Wall PMT's (Sector 3)	Mechanical Engineer P2					356.85	198.25		555.10
	IIS0410 Install Wall PMT's (Sector 3) Total						356.85	198.25		555.10
	IIS0420 Install Wall PMT's (Sector 4)	Mechanical Engineer P2						555.10		555.10
	IIS0420 Install Wall PMT's (Sector 4) Total							555.10		555.10
	IIS0430 Install Wall PMT's (Sector 5)	Mechanical Engineer P2						555.10		555.10
	IIS0430 Install Wall PMT's (Sector 5) Total							555.10		555.10
	IIS0440 Install Wall PMT's (Sector 6)	Mechanical Engineer P2						555.10		555.10
	IIS0440 Install Wall PMT's (Sector 6) Total							555.10		555.10
	IIS0450 Install Floor Structure	Mechanical Engineer P2						336.00		336.00
	IIS0450 Install Floor Structure Total							336.00		336.00
	IIS0460 Install Floor PMTs (Sector 1)	Mechanical Engineer P2						128.00		128.00

	IIS0460 Install Floor PMTs (Sector 1)	Total						128.00	128.00			
	IIS0470 Install Floor PMTs (Sector 2)		Mechanical Engineer P2					128.00	128.00			
	IIS0470 Install Floor PMTs (Sector 2)	Total						128.00	128.00			
	IIS0480 Install Floor PMTs (Sector 3)		Mechanical Engineer P2					128.00	128.00			
	IIS0480 Install Floor PMTs (Sector 3)	Total						128.00	128.00			
	IIS0490 Install Floor PMTs (Sector 4)		Mechanical Engineer P2					128.00	128.00			
	IIS0490 Install Floor PMTs (Sector 4)	Total						128.00	128.00			
	IIS0500 Install Floor PMTs (Sector 5)		Mechanical Engineer P2					128.00	128.00			
	IIS0500 Install Floor PMTs (Sector 5)	Total						128.00	128.00			
	IIS0510 Install Floor PMTs (Sector 6)		Mechanical Engineer P2					128.00	128.00			
	IIS0510 Install Floor PMTs (Sector 6)	Total						128.00	128.00			
	IIS0520 Install Floor Light Collector and Light Barriers		Mechanical Engineer P2					80.00	80.00			
	IIS0520 Install Floor Light Collector and Light Barriers	Total						80.00	80.00			
	IIS0530 Install Floor Light Collector and Light Barriers		Mechanical Engineer P2					80.00	80.00			
	IIS0530 Install Floor Light Collector and Light Barriers	Total						80.00	80.00			
	IIS0540 Install Floor Light Collector and Light Barriers		Mechanical Engineer P2					80.00	80.00			
	IIS0540 Install Floor Light Collector and Light Barriers	Total						80.00	80.00			
	IIS0550 Install Floor Light Collector and Light Barriers		Mechanical Engineer P2					80.00	80.00			
	IIS0550 Install Floor Light Collector and Light Barriers	Total						80.00	80.00			
	IIS0560 Install Floor Light Collector and Light Barriers		Mechanical Engineer P2					80.00	80.00			
	IIS0560 Install Floor Light Collector and Light Barriers	Total						80.00	80.00			
	IIS0570 Install Floor Light Collector and Light Barriers		Mechanical Engineer P2					80.00	80.00			
	IIS0570 Install Floor Light Collector and Light Barriers	Total						80.00	80.00			
130.04.08.03.02.01 PMT Installation Unit (PIU) Total							2,160.59	3,844.05	6,004.64			
130.04.08.03.02.03 Other Systems	IIS0840 Install Fire Protection System		Mechanical Engineer P2					248.10	248.10			
	IIS0840 Install Fire Protection System	Total						248.10	248.10			
	IIS0850 Install Electronics Above Ground		Mechanical Engineer P2		160.02				160.02			
	IIS0850 Install Electronics Above Ground	Total			160.02				160.02			
	IIS0870 Install Detector Electrical Distribution		Mechanical Engineer P2			560.32			560.32			
	IIS0870 Install Detector Electrical Distribution	Total				560.32			560.32			
	IIS0900 Install Electronics Racks Underground		Mechanical Engineer P2			248.09			248.09			
	IIS0900 Install Electronics Racks Underground	Total				248.09			248.09			
	IIS0910 Install Electronic Crates in Racks		Mechanical Engineer P2			20.67	227.42		248.09			
	IIS0910 Install Electronic Crates in Racks	Total				20.67	227.42		248.09			
	IIS0940 System Check out (PMTs and Electronics)		Mechanical Engineer P2				336.24	222.48	558.72			
	IIS0940 System Check out (PMTs and Electronics)	Total					336.24	222.48	558.72			
	IIS0960 Clean Vessel No. 1		Mechanical Engineer P2				168.00		168.00			
	IIS0960 Clean Vessel No. 1	Total					168.00		168.00			
	IIS0970 Clean Vessel No. 2		Mechanical Engineer P2				168.00		168.00			
	IIS0970 Clean Vessel No. 2	Total					168.00		168.00			
	IIS0990 Install Computing systems below ground		Mechanical Engineer P2			264.88	61.13		326.01			
	IIS0990 Install Computing systems below ground	Total				264.88	61.13		326.01			
	IIS1000 Install Control room above ground		Mechanical Engineer P2		160.02				160.02			
	IIS1000 Install Control room above ground	Total			160.02				160.02			
	IIS1010 Install Gas Blanket System		Mechanical Engineer P2				160.00		160.00			
	IIS1010 Install Gas Blanket System	Total					160.00		160.00			
	IIS1030 Seal Ports and Hatches		Mechanical Engineer P2					80.00	80.00			
	IIS1030 Seal Ports and Hatches	Total						80.00	80.00			
	IIS1040 Fill Vessel		Mechanical Engineer P2				124.23	97.97	222.20			
	IIS1040 Fill Vessel	Total					124.23	97.97	222.20			
130.04.08.03.02.03 Other Systems Total							320.04	1,093.96	1,493.12	400.45	3,307.57	
Grand Total					752.92	487.00	802.36	263.61	3,688.75	5,994.83	554.87	12,544.34

130.04.08.04 Safety Systems (\$ Including Direct, Indirect & Escalation)

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total	
130.04.08.04 Safety Systems	IIS1060 Safety Policies	General ES&H A6	15,822	21,958	12,975											50,755	
		Mechanical Engineer P2	16,768	23,271	13,751												53,790
	IIS1060 Safety Policies	Total	32,589	45,229	26,727											104,545	
	IIS1070 Experimental Safely Review	General ES&H A6	15,822	21,958	12,975											50,755	
		Mechanical Engineer P2	16,768	23,271	13,751												53,790
	IIS1070 Experimental Safely Review	Total	32,589	45,229	26,727											104,545	
	IIS1080 Life Safety Requirements	General ES&H A6	19,777	13,284												33,061	
		Mechanical Engineer P2	16,768	11,263													28,031
	IIS1080 Life Safety Requirements	Total	36,545	24,548												61,093	
	IIS1090 Personnel Access Training	BNL M&S CS Special Procure	9,023	12,522	12,757	13,154	13,509	13,873	458							75,295	
		General ES&H A6	12,779	17,735	16,842	14,494	14,885	15,288	567								92,591
		Mechanical Engineer P2	6,812	9,454	8,978	7,726	7,935	8,149	302								49,356
	IIS1090 Personnel Access Training	Total	28,614	39,711	38,577	35,375	36,329	37,310	1,328							217,242	
	IIS1100 Local Oversight and Inspection	BNL M&S CS Special Procurement							19,614	21,204	21,776	22,450	23,144	23,677	16,398	148,263	
		General ES&H A6							30,035	32,469	33,347	34,379	35,443	36,263	25,114	227,049	
		Mechanical Engineer P2							25,544	27,613	28,360	29,238	30,143	30,840	21,359	193,097	
	IIS1100 Local Oversight and Inspection	Total						75,193	81,286	83,483	86,066	88,730	90,780	62,870	568,409		
130.04.08.04 Safety Systems Total			130,337	154,716	92,030	35,375	36,329	37,310	76,521	81,286	83,483	86,066	88,730	90,780	62,870	1,055,834	
Grand Total			130,337	154,716	92,030	35,375	36,329	37,310	76,521	81,286	83,483	86,066	88,730	90,780	62,870	1,055,834	

130.04.08.04 Safety Systems - Labor Hours

COST ACCOUNT	ACTIVITY ID	RESOURCE	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Grand Total
130.04.08.04 Safety Systems	IIS1060 Safety Policies	General ES&H A6	96.20	130.00	76.44											302.64
		Mechanical Engineer P2	177.60	240.00	141.12											
	IIS1060 Safety Policies	Total	273.80	370.00	217.56											861.36
	IIS1070 Experimental Safely Review	General ES&H A6	96.20	130.00	76.44											302.64
		Mechanical Engineer P2	177.60	240.00	141.12											
	IIS1070 Experimental Safely Review	Total	273.80	370.00	217.56											861.36
	IIS1080 Life Safety Requirements	General ES&H A6	120.25	78.65												198.90
		Mechanical Engineer P2	177.60	116.16												
	IIS1080 Life Safety Requirements	Total	297.85	194.81												492.66
	IIS1090 Personnel Access Training	General ES&H A6	77.70	105.00	104.16	104.58	104.58	104.58	3.78							604.38
		Mechanical Engineer P2	72.15	97.50	96.72	97.11	97.11	97.11	3.51							
	IIS1090 Personnel Access Training	Total	149.85	202.50	200.88	201.69	201.69	201.69	7.29							1,165.59
	IIS1100 Local Oversight and Inspection	General ES&H A6							200.07	210.60	210.60	211.41	212.22	211.41	142.56	1,398.87
		Mechanical Engineer P2							296.40	312.00	312.00	313.20	314.40	313.20	211.20	2,072.40
	IIS1100 Local Oversight and Inspection	Total							496.47	522.60	522.60	524.61	526.62	524.61	353.76	3,471.27
130.04.08.04 Safety Systems Total			995.30	1,137.31	636.00	201.69	201.69	201.69	503.76	522.60	522.60	524.61	526.62	524.61	353.76	6,852.24
Grand Total			995.30	1,137.31	636.00	201.69	201.69	201.69	503.76	522.60	522.60	524.61	526.62	524.61	353.76	6,852.24