



Muon Campus AIP

Change Request Form

CR#:Cryo013

1) DATE: 4/14/15

2) WBS: Cryo1

3) Originator: Ken Domann *KAD*

4) WBS Description of Primary Affected Tasks: Muon Campus Cryogenics - AIP

5) Technical Description & Primary Motivation for Change: This change requests approval for the following:

1) Cryogenic Transfer line between the Mu2e Refrigerator system in the MC-1 building and the cryo distribution box located in the Mu2e Building (MC-2). Previous scope called for the fabrication of a transfer line based on existing transfer line. New scope calls for: a small design modification to the existing "right bend transfer line"; design and assembly of connection expansion boxes; disassembly, modification and test of the "right bend transfer line"; transportation, connection and testing of new line for Mu2e cryo use.

2) The design, procurement, installation and test of a cryogenic distribution box for the Mu2e experiment. This box is an intermediate connection between the Muon Campus Cryo System (via the cryogenic transfer lines described above) and the Mu2e solenoids. This box contains cryo valves for controlling the flow of liquid helium and nitrogen to the individual mu2e solenoid magnets and solenoid cool down heat exchangers. Scope includes: detailed specification and interface drawings of the cryogenic distribution box; procurement and fabrication of "build to specification" box in industry; vendor oversight; other support components such as bayonet connections to the solenoid magnet cryostats and a helium storage Dewar attached to the cryogenic distribution box; test of the cryogenic distribution box.

3) Add additional labor to FY15, FY16 and FY17 to cover necessary management oversight for the new scope.

The net increase to the Cryo AIP is \$1,334,799. There is a corresponding decrease in contingency.

6) Assessment of Cost Impact (Use attachments if needed): See Attachments for changes.

7) Assessment of Schedule Impact (Use attachments if needed): See attachments. No existing major/interface milestones are impacted. One new interface milestone, Mu2e Bldg Completed, needs to be added to the interface milestone tracking document.

8) Secondary Impact & Other Comments: N/A

9) Approvals:

AIP Project Manager:

Michael J. Lam

Date: April 15, 2015

AIP Project Coordinator:

Mary E. Co

Date: 4/15/15

AD Div Director:

S. Name

Date: 4/15/15

Directorate:

S. Name

Date: 4/15/15

Cryo CR013 Schedule Information

UID	WBS	Name	Start	Finish	Comment
1	Cryo1	Muon Campus Cryogenics - AIP	6/3/13	6/22/17	
2777	Cryo1.01	Cryo AIP Milestones	6/3/13	6/22/17	
2787	Cryo1.01.02	Interface milestones	1/8/14	1/23/17	
2791	Cryo1.01.02.05	Cryo Mu2e Distribution Box Cold (Mu2e Interface)	1/23/17	1/23/17	
2982	Cryo1.01.02.08	Mu2e Bldg Completed	6/1/16	6/1/16	New milestone
829	Cryo1.02	Cryo Project Management	6/17/13	6/22/17	
2761	Cryo1.02.01	General Project OS	6/17/13	6/22/17	
2757	Cryo1.02.01.04	Cryo AIP General Project OS - FY16	9/23/15	9/22/16	
2758	Cryo1.02.01.05	Cryo AIP General Project OS - FY17	9/23/16	6/22/17	
2936	Cryo1.02.01.07	Cryo AIP General Project OS - FY15 Supplemental	3/2/15	9/22/15	New activity
828	Cryo1.03	Cryo Basic Engineering	6/17/13	3/2/15	
2984	Cryo1.03.05	Cryo Engineering	3/2/15	3/2/15	
989	Cryo1.03.05.01	Cryo Mechanical Engineering ** Deleted **	3/2/15	3/2/15	Activity deleted
988	Cryo1.03.05.02	Cryo Controls Engineering ** Deleted **	3/2/15	3/2/15	Activity deleted
990	Cryo1.03.05.03	Cryo Electrical Engineering ** Deleted **	3/2/15	3/2/15	Activity deleted
833	Cryo1.04	Cryogenic plant sub systems	6/17/13	6/24/15	
835	Cryo1.04.04	Cryo Refrigerator System	6/17/13	3/31/15	
2488	Cryo1.04.04.07	Refrig Syst Distribution System	10/1/13	3/31/15	
2826	Cryo1.04.04.07.08	Dwgs Ready for Mu2e Transfer Line Bayonet Can ** Deleted **	3/31/15	3/31/15	Activity deleted
2827	Cryo1.04.04.07.09	Prep Req & Process PO for Mu2e Transfer Line Bayonet Can ** Deleted **	3/2/15	3/31/15	Activity deleted
2828	Cryo1.04.04.07.10	Award PO for Mu2e Transfer Line Bayonet Can ** Deleted **	3/31/15	3/31/15	Activity deleted
2829	Cryo1.04.04.07.11	Procured items Delivered for Mu2e Transfer Line Bayonet Can ** Deleted **	3/2/15	3/31/15	Activity deleted
2830	Cryo1.04.04.07.12	Bayonet Cans Installed for Mu2e Transfer Line Bayonet Can ** Deleted **	3/31/15	3/31/15	Activity deleted
840	Cryo1.05	Cryo Experiment Interfaces	8/19/13	11/17/16	
1456	Cryo1.05.01	Mu2e Interface Connection	5/22/14	11/17/16	
2701	Cryo1.05.01.04	Mu2e Interface - Design/Drafting ** Deleted **	12/11/14	3/31/15	Activity deleted
2988	Cryo1.05.01.05	Mu2e Interface - Transfer Line System Design	3/31/15	8/19/15	New activity
2702	Cryo1.05.01.06	Mu2e Interface - Transfer Line Drawings Ready	8/19/15	8/19/15	
2606	Cryo1.05.01.07	Mu2e Interface - Prep Req & Process PO for Parts ** Deleted **	3/2/15	3/2/15	Activity deleted
2607	Cryo1.05.01.08	Mu2e Interface - 1st Award PO ** Deleted **	3/31/15	3/31/15	Activity deleted
2608	Cryo1.05.01.09	Mu2e Interface - 1st Procured Items Delivered ** Deleted **	3/31/15	3/31/15	Activity deleted
2834	Cryo1.05.01.10	Mu2e Interface - 2nd Award PO ** Deleted **	3/31/15	3/31/15	Activity deleted
2833	Cryo1.05.01.11	Mu2e Interface - 2nd Procured Items Delivered ** Deleted **	3/31/15	3/31/15	Activity deleted

Cryo CR013 Schedule Information

UID	WBS	Name	Start	Finish	Comment
2739	Cry01.05.01.12	Mu2e Interface - Fabrication ** Deleted **	3/31/15	3/31/15	Activity deleted
2714	Cry01.05.01.13	Mu2e Interface - Installation ** Deleted **	3/31/15	3/31/15	Activity deleted
2738	Cry01.05.01.14	Mu2e Interface - Task Management ** Deleted **	3/31/15	3/31/15	Activity deleted
2978	Cry01.05.01.15	Mu2e Interface - Transport of Existing Lines	8/20/15	11/13/15	New activity
2979	Cry01.05.01.16	Mu2e Interface - Assemble Other Components	11/16/15	5/10/16	New activity
2980	Cry01.05.01.17	Mu2e Interface - Assemble/Install Transfer Line	6/1/16	8/24/16	New activity
2981	Cry01.05.01.18	Mu2e Interface - Transfer Line Testing	8/25/16	11/17/16	New activity
2531	Cry01.05.01.19	Mu2e Is connected	11/17/16	11/17/16	
2937	Cry01.10	Cryo Distribution Box (CDB)	4/15/15	4/6/17	
2938	Cry01.10.01	CDB Preliminary Design Phase	4/15/15	7/23/15	
2939	Cry01.10.01.01	Cryo Distribution Box Requirements	4/15/15	4/21/15	New activity
2940	Cry01.10.01.02	Preliminary Specification	4/22/15	5/12/15	New activity
2941	Cry01.10.01.03	Preliminary Drawings	4/22/15	5/12/15	New activity
2942	Cry01.10.01.04	Review of Packet	5/13/15	5/27/15	New activity
2943	Cry01.10.01.05	Conduct & Evaluate RFI	5/28/15	6/24/15	New activity
2944	Cry01.10.01.06	Final decision on procurement plan	6/25/15	6/25/15	New activity
2945	Cry01.10.01.07	Complete CDB Prelim. Eng. Design	4/15/15	7/23/15	New activity
2950	Cry01.10.02	CDB Procurement Readiness	7/24/15	10/5/15	
2949	Cry01.10.02.01	Complete Final Specification	7/24/15	9/3/15	New activity
2948	Cry01.10.02.02	Complete Drawings for Procurement	7/24/15	9/3/15	New activity
2947	Cry01.10.02.03	Complete Documentation for Procurement Package	9/4/15	9/21/15	New activity
2946	Cry01.10.02.04	Final review of package	9/22/15	10/5/15	New activity
2962	Cry01.10.03	Procurement and Fabrication of CDB	10/6/15	2/23/17	
2961	Cry01.10.03.01	CDB Bid Cycle	10/6/15	11/16/15	New activity
2960	Cry01.10.03.02	Evaluate Bid/choose vendor	11/17/15	11/23/15	New activity
2959	Cry01.10.03.03	Project and DOE approval	11/24/15	1/12/16	New activity
2958	Cry01.10.03.04	Contract signed for CDB	1/12/16	1/12/16	New activity
2957	Cry01.10.03.05	Vendor completed final design and drawings	1/13/16	5/18/16	New activity
2956	Cry01.10.03.06	Vendor fabricates CDB	5/19/16	1/25/17	New activity
2955	Cry01.10.03.07	Fermilab Oversight of CDB	1/13/16	2/22/17	New activity
2954	Cry01.10.03.08	Ship CDB to Fermilab	1/26/17	2/8/17	New activity
2953	Cry01.10.03.09	Perform safety review of CDB	2/9/17	2/15/17	New activity
2952	Cry01.10.03.10	Acceptance tests at Fermilab	2/9/17	2/22/17	New activity

Cryo CR013 Schedule Information

UID	WBS	Name	Start	Finish	Comment
2951	Cryo1.10.03.11	CDB received and accepted	2/23/17	2/23/17	New activity
2970	Cryo1.10.04	Cryo02.03.04 Ancillary Components	4/15/15	4/6/17	
2969	Cryo1.10.04.01	Specify Helium Dewar	4/15/15	5/12/15	New activity
2968	Cryo1.10.04.02	Procure Helium dewar	10/12/16	1/11/17	New activity
2967	Cryo1.10.04.03	Procure Heat exchanger	10/12/16	1/11/17	New activity
2966	Cryo1.10.04.04	TL from Helium dewar to CDB	10/12/16	1/11/17	New activity
2965	Cryo1.10.04.05	TIs from CDB to feedbox	1/13/16	2/24/16	New activity
2964	Cryo1.10.04.06	Procure Transfer line A	2/25/16	5/18/16	New activity
2963	Cryo1.10.04.07	Feedbox valves related to CDB	1/12/17	4/6/17	New activity
2823	Cryo1.13	MU2e Checkout complete	1/23/17	1/23/17	

Cryo CR013 Material Delta

UID	WBS	Name	New M&S	Old M&S	Delta	Comment
1	Cryo1	Muon Campus Cryogenics - AIP	\$3,614,424	\$2,777,785	\$836,639	
829	Cryo1.02	Cryo Project Management	\$148,298	\$120,000	\$28,298	
2761	Cryo1.02.01	General Project OS	\$148,298	\$120,000	\$28,298	
2757	Cryo1.02.01.04	Cryo AIP General Project OS - FY16	\$42,000	\$34,000	\$8,000	
2758	Cryo1.02.01.05	Cryo AIP General Project OS - FY17	\$26,000	\$25,000	\$1,000	
2936	Cryo1.02.01.07	Cryo AIP General Project OS - FY15 Supplemental	\$19,298	\$0	\$19,298	New activity
833	Cryo1.04	Cryogenic plant sub systems	\$1,826,545	\$2,006,545	(\$180,000)	
835	Cryo1.04.04	Cryo Refrigerator System	\$622,588	\$802,588	(\$180,000)	
2488	Cryo1.04.04.07	Refrig Syst Distribution System	\$165,500	\$345,500	(\$180,000)	
2829	Cryo1.04.04.07.11	Procured Items Delivered for Muze Transfer Line Bayonet Can	\$0	\$180,000	(\$180,000)	Activity deleted
840	Cryo1.05	Cryo Experiment Interfaces	\$297,581	\$600,841	(\$303,260)	
1456	Cryo1.05.01	MuZe Interface Connection	\$297,581	\$600,841	(\$303,260)	
2701	Cryo1.05.01.04	MuZe Interface - Transfer Line System Design	\$0	\$21,712	(\$21,712)	Activity deleted
2988	Cryo1.05.01.05	MuZe Interface - Transfer Line System Design	\$21,712	\$0	\$21,712	New activity
2608	Cryo1.05.01.08	MuZe Interface - 1st Procured Items Delivered	\$0	\$300,841	(\$300,841)	Activity deleted
2833	Cryo1.05.01.10	MuZe Interface - 2nd Procured Items Delivered	\$0	\$300,000	(\$300,000)	Activity deleted
2978	Cryo1.05.01.14	MuZe Interface - Transport of Existing Lines	\$28,713	\$0	\$28,713	New activity
2979	Cryo1.05.01.15	MuZe Interface - Assemble Other Components	\$215,906	\$0	\$215,906	New activity
2980	Cryo1.05.01.16	MuZe Interface - Assemble/Install Transfer Line	\$31,250	\$0	\$31,250	New activity
2937	Cryo1.10	Cryo Distribution Box (CDB)	\$1,291,601	\$0	\$1,291,601	
2962	Cryo1.10.03	Procurement and Fabrication of CDB	\$1,025,803	\$0	\$1,025,803	
2951	Cryo1.10.03.11	CDB received and accepted	\$1,025,803	\$0	\$1,025,803	New activity
2970	Cryo1.10.04	Cryo02.03.04 Ancillary Components	\$265,798	\$0	\$265,798	
2968	Cryo1.10.04.02	Procure Helium dewar	\$46,463	\$0	\$46,463	New activity
2967	Cryo1.10.04.03	Procure Heat exchanger	\$55,756	\$0	\$55,756	New activity
2966	Cryo1.10.04.04	TL from Helium dewar to CDB	\$23,232	\$0	\$23,232	New activity
2965	Cryo1.10.04.05	TLS from CDB to feedbox	\$27,083	\$0	\$27,083	New activity
2964	Cryo1.10.04.06	Procure Transfer line A	\$94,696	\$0	\$94,696	New activity
2963	Cryo1.10.04.07	Feedbox valves related to CDB	\$18,568	\$0	\$18,568	New activity

Cryo CR013 Labor Delta

UID	WBS	Name	New Hours	Old Hours	Delta Hours	Comment
1	Cryo1	Muon Campus Cryogenics - AIP	34240	32717	1523	
829	Cryo1.02	Cryo Project Management	2654	2051	603	
2761	Cryo1.02.01	General Project OS	2654	2051	603	
2757	Cryo1.02.01.04	Cryo AIP General Project OS - FY16	715	601	114	
		FNAD_CRYO_SR	88	251	-163	
		FNTD_PRJ_MNGR	177	0	177	
		FNAD_AC_EXP_PHYST	100	0	100	
2758	Cryo1.02.01.05	Cryo AIP General Project OS - FY17	778	572	206	
		FNAD_CRYO_SR	88	222	-134	
		FNTD_PRJ_MNGR	265	0	265	
		FNAD_AC_EXP_PHYST	75	0	75	
2936	Cryo1.02.01.07	Cryo AIP General Project OS - FY15 Supplemental	283	0	283	New Activity
		FNAD_CRYO_SR	88	0	88	
		FNTD_PRJ_MNGR	135	0	135	
		FNAD_AC_EXP_PHYST	60	0	60	
828	Cryo1.03	Cryo Basic Engineering	2196	3716	-1520	
2984	Cryo1.03.05	Cryo Engineering	0	1520	-1520	
989	Cryo1.03.05.01	Cryo Mechanical Engineering	320	0	320	Activity deleted
		FNAD_CRYO_EN	320	0	320	
988	Cryo1.03.05.02	Cryo Controls Engineering	800	0	800	Activity deleted
		FNAD_CRYO_EN	800	0	800	
990	Cryo1.03.05.03	Cryo Electrical Engineering	400	0	400	Activity deleted
		FNAD_CRYO_EN	400	0	400	
833	Cryo1.04	Cryogenic plant sub systems	13920	14760	-840	
835	Cryo1.04.04	Cryo Refrigerator System	6296	7136	-840	
2488	Cryo1.04.04.07	Refrig Syst Distribution System	3896	4736	-840	
2827	Cryo1.04.04.07.09	Prep Req & Process PO for Mu2e Transfer Line Bayonet Can	40	0	40	Activity deleted
		FNAD_CRYO_EN	0	40	-40	
2830	Cryo1.04.04.07.12	Bayonet Cans Installed for Mu2e Transfer Line Bayonet Can	800	0	800	Activity deleted
		FNAD_CRYO_EN	0	160	-160	
		FNAD_CRYO_TECH	0	640	-640	
840	Cryo1.05	Cryo Experiment Interfaces	6591	8410	-1819	
1456	Cryo1.05.01	MuZe Interface Connection	6421	8240	-1819	
2701	Cryo1.05.01.04	MuZe Interface - Transfer Line System Design ** Deleted **	0	1160	-1160	Activity deleted
		FNAD_MECH_DRAFTER	0	1160	-1160	
2988	Cryo1.05.01.05	MuZe Interface - Transfer Line System Design	1,712	0	1712	New Activity

Cryo CR013 Labor Delta

UID	WBS	Name		New Hours	Old Hours	Delta Hours	Comment
			FNTD_CRYO_DESIGNER	978	0	978	
			FNPD_CRYO_EN	623	0	623	
			FNAD_MECH_ASMBY_TECH	111	0	111	
2606	Cryo1.05.01.06	Mu2e Interface - Prep Req & Process PO for Parts	FNAD_CRYO_EN	0	16	-16	Activity deleted
			FNAD_CRYO_EN	0	16	-16	
2739	Cryo1.05.01.11	Mu2e Interface - Fabrication	FNAD_CRYO_EN	3112	0	-3112	Activity deleted
			FNAD_CRYO_EN	0	192	-192	
			FNAD_CRYO_TECH	0	2920	-2920	
2714	Cryo1.05.01.12	Mu2e Interface - Installation	FNAD_CRYO_EN	3112	0	-3112	Activity deleted
			FNAD_CRYO_EN	0	192	-192	
			FNAD_CRYO_TECH	0	2920	-2920	
2738	Cryo1.05.01.13	Mu2e Interface - Task Management	FNAD_CRYO_TECH	40	0	-40	Activity deleted
			FNAD_CRYO_TECH	0	40	-40	
2978	Cryo1.05.01.14	Mu2e Interface - Transport of Existing Lines	FNPD_CRYO_EN	828	0	828	New Activity
			FNPD_CRYO_EN	48		48	
			FNAD_MECH_ASMBY_TECH	690		690	
			FNTD_WELDER	90		90	
2979	Cryo1.05.01.15	Mu2e Interface - Assemble Other Components	FNPD_CRYO_EN	450	0	450	New Activity
			FNPD_CRYO_EN	90		90	
			FNAD_MECH_ASMBY_TECH	360		360	
2980	Cryo1.05.01.16	Mu2e Interface - Assemble/Install Transfer Line	FNPD_CRYO_EN	1530	0	1530	New Activity
			FNPD_CRYO_EN	60	0	60	
			FNAD_MECH_ASMBY_TECH	900	0	900	
			FNTD_CRYO_DESIGNER	120	0	120	
			FNTD_WELDER	450	0	450	
2981	Cryo1.05.01.17	Mu2e Interface - Transfer Line Testing	FNPD_CRYO_EN	1101	0	1101	New Activity
			FNPD_CRYO_EN	201	0	201	
			FNAD_MECH_ASMBY_TECH	690	0	690	
			FNTD_WELDER	210	0	210	
2937	Cryo1.10	Cryo Distribution Box (CDB)		5099	0	5099	
2938	Cryo1.10.01	CDB Preliminary Design Phase		1396	0	1396	
2939	Cryo1.10.01.01	Cryo Distribution Box Requirements		160	0	160	New Activity
			FNTD_CRYO_DESIGNER	27	0	27	
			FNTD_CRYO_EN	133	0	133	
2940	Cryo1.10.01.02	Preliminary Specification		40	0	40	New Activity
			FNPD_CRYO_SR	20	0	20	

Cryo CR013 Labor Delta

UID	WBS	Name		New Hours	Old Hours	Delta Hours	Comment
2941	Cry01.10.01.03	Preliminary Drawings	FNTD_PRJ_MNGR	20	0	20	
			FNTD_CRYO_DESIGNER	48	0	48	New Activity
			FNTD_CRYO_EN	24	0	24	
2942	Cry01.10.01.04	Review of Packet	FNTD_CRYO_EN	24	0	24	
			FNTD_CRYO_DESIGNER	40	0	40	New Activity
			FNTD_CRYO_EN	8	0	8	
			FNTD_CRYO_DESIGNER	24	0	24	
			FNTD_PRJ_MNGR	8	0	8	
2943	Cry01.10.01.05	Conduct & Evaluate RFI	FNTD_PRJ_MNGR	48	0	48	New Activity
			FNPD_CRYO_SR	16	0	16	
			FNTD_CRYO_EN	16	0	16	
			FNTD_FABRCATN_SPLST	8	0	8	
			FNTD_PRJ_MNGR	8	0	8	
2945	Cry01.10.01.07	Complete CDB Prelim. Eng. Design	FNTD_CRYO_EN	1060	0	1060	New Activity
			FNTD_MECH_DESIGN_EN	530	0	530	
			FNTD_MECH_DESIGNER	80	0	80	
			FNTD_MECH_DESIGNER	400	0	400	
			FNAD_MECH_ASMBY_TECH	50	0	50	
2950	Cry01.10.02	CDB Procurement Readiness	FNTD_CRYO_EN	1231	0	1231	
2949	Cry01.10.02.01	Complete Final Specification	FNTD_CRYO_EN	991	0	991	New Activity
			FNTD_MECH_DESIGN_EN	526	0	526	
			FNTD_MECH_DESIGNER	90	0	90	
			FNTD_MECH_DESIGNER	325	0	325	
			FNAD_MECH_ASMBY_TECH	50	0	50	
2948	Cry01.10.02.02	Complete Drawings for Procurement	FNTD_MECH_DESIGN_EN	160	0	160	New Activity
			FNTD_MECH_DESIGNER	40	0	40	
			FNTD_MECH_DESIGNER	120	0	120	
2946	Cry01.10.02.04	Final review of package	FNPD_CRYO_SR	80	0	80	New Activity
			FNTD_CRYO_EN	20	0	20	
			FNTD_CRYO_DESIGNER	20	0	20	
			FNTD_MECH_DESIGN_EN	20	0	20	
			FNTD_PRJ_MNGR	20	0	20	
2962	Cry01.10.03	Procurement and Fabrication of CDB	FNTD_CRYO_EN	1375	0	1375	
2961	Cry01.10.03.01	CDB Bid Cycle	FNPD_CRYO_SR	60	0	60	New Activity
			FNTD_CRYO_EN	20	0	20	
			FNTD_CRYO_EN	20	0	20	

Cryo CR013 Labor Delta

UID	WBS	Name	New Hours	Old Hours	Delta Hours	Comment
			20	0	20	
		FNTD_PRJ_MNGR				
2960	Cryo1.10.03.02	Evaluate Bid/choose vendor	32	0	32	New Activity
		FNPD_CRYO_SR	8	0	8	
		FNTD_CRYO_EN	8	0	8	
		FNTD_MECH_DESIGN_EN	8	0	8	
		FNTD_PRJ_MNGR	8	0	8	
2955	Cryo1.10.03.07	Fermilab Oversight of CDB	1163	0	1163	New Activity
		FNTD_MECH_DESIGNER	160	0	160	
		FNTD_CRYO_EN	440	0	440	
		FNAD_MECH_ASMBY_TECH	563	0	563	
2952	Cryo1.10.03.10	Acceptance tests at Fermilab	120	0	120	New Activity
		FNTD_MECH_DESIGN_EN	40	0	40	
		FNAD_MECH_ASMBY_TECH	80	0	80	
2970	Cryo1.10.04	Cryo02.03.04 Ancillary Components	1097	0	1097	
2969	Cryo1.10.04.01	Specify Helium Dewar	24	0	24	New Activity
		FNTD_CRYO_DESIGNER	8	0	8	
		FNTD_CRYO_EN	16	0	16	
2965	Cryo1.10.04.05	TIs from CDB to feedbox	1073	0	1073	New Activity
		FNTD_CRYO_DESIGNER	480	0	480	
		FNTD_CRYO_EN	257	0	257	
		FNAD_CRYO_TECH	320	0	320	
		FNTD_FABRCATN_SPC1ST	16	0	16	

Cryo Pre CR013 Cap

Control Account		FY13	FY14	FY15	FY16	FY17	Cumulative
A1301.02.01.01 Cryo AIP General Project Oversight - FY13	Scheduled	51,346.42	0.00	0.00	0.00	0.00	51,346.42
A1301.02.01.02 Cryo AIP General Project Oversight - FY14	Scheduled	3,594.05	129,557.05	0.00	0.00	0.00	133,151.10
A1301.02.01.03 Cryo AIP General Project Oversight - FY15	Scheduled	0.00	2,134.07	30,214.73	0.00	0.00	32,348.80
A1301.02.01.04 Cryo AIP General Project Oversight - FY16	Scheduled	0.00	0.00	3,106.86	130,736.21	0.00	133,843.07
A1301.02.01.05 Cryo AIP General Project Oversight - FY17	Scheduled	0.00	0.00	0.00	3,754.32	116,470.08	120,224.40
A1301.03 Cryo Basic Engineering	Scheduled	33,093.96	236,082.70	70,985.99	73,406.86	49,000.83	462,570.34
A1301.04.01 LN2 system	Scheduled	4,514.95	409,013.92	0.00	0.00	0.00	413,528.87
A1301.04.02 Gas management system	Scheduled	57,841.53	178,224.26	0.00	0.00	0.00	236,065.78
A1301.04.03 ODH system	Scheduled	0.00	49,757.63	0.00	0.00	0.00	49,757.63
A1301.04.04 Cryo Refrigerator system	Scheduled	149,077.19	1,134,055.74	157,480.87	315,558.09	0.00	1,756,171.89
A1301.04.05 Cryo Compressor System	Scheduled	59,453.27	367,138.94	0.00	0.00	0.00	426,592.21
A1301.04.06 Cryo Interconnect Piping	Scheduled	225,594.62	512,339.28	0.00	0.00	0.00	737,933.91
A1301.04.07 Cryo Interconnect Electrical & Controls	Scheduled	46,627.36	119,526.30	0.00	0.00	0.00	166,153.66
A1301.04.08 Cryogenic Fluids	Scheduled	0.00	0.00	261,857.93	0.00	0.00	261,857.93
A1301.05.01 Mu2e Interface Connection	Scheduled	0.00	70,813.93	206,847.51	1,018,711.31	312,773.87	1,609,146.62
A1301.05.02 g-2 interface connection	Scheduled	27,198.92	0.00	0.00	0.00	0.00	27,198.92
A1301.06 Cryo Safety Documents	Scheduled	0.00	155,311.42	0.00	0.00	0.00	155,311.42
A1301.07 Testing/Checkout	Scheduled	0.00	0.00	65,416.12	0.00	69,534.72	134,950.84
A1301.08 Cryo g-2 Acceptance Tests	Scheduled	0.00	11,968.50	102,502.33	0.00	0.00	114,470.83
A1301.09 Cryo Mu2e Acceptance Tests	Scheduled	0.00	0.00	0.00	0.00	97,719.37	97,719.37
Grand Total	Scheduled	658,342.28	3,375,923.74	898,412.34	1,542,166.80	645,498.87	7,120,344.02

Cryo Post CR013 Cap

Control Account	W/P	FY13	FY14	FY15	FY16	FY17	Cumulative
A1301.02.01.01 Cryo AIP General Project Oversight - FY13	Scheduled	51,346.42	0.00	0.00	0.00	0.00	51,346.42
A1301.02.01.02 Cryo AIP General Project Oversight - FY14	Scheduled	3,594.05	129,557.05	0.00	0.00	0.00	133,151.10
A1301.02.01.03 Cryo AIP General Project Oversight - FY15	Scheduled	0.00	2,134.07	30,214.73	0.00	0.00	32,348.80
A1301.02.01.04 Cryo AIP General Project Oversight - FY16	Scheduled	0.00	0.00	3,820.92	160,781.37	0.00	164,602.29
A1301.02.01.05 Cryo AIP General Project Oversight - FY17	Scheduled	0.00	0.00	0.00	5,007.64	155,471.77	160,479.41
A1301.02.01.07 Cryo AIP Gen Proj OS - FY15 Supp	Scheduled	0.00	0.00	74,049.03	0.00	0.00	74,049.03
A1301.03 Cryo Basic Engineering	Scheduled	33,093.96	236,082.70	0.00	0.00	0.00	269,176.66
A1301.04.01 LN2 system	Scheduled	4,514.95	409,013.92	0.00	0.00	0.00	413,528.87
A1301.04.02 Gas management system	Scheduled	57,841.53	178,224.26	0.00	0.00	0.00	236,065.78
A1301.04.03 ODH system	Scheduled	0.00	49,757.63	0.00	0.00	0.00	49,757.63
A1301.04.04 Cryo Refrigerator system	Scheduled	149,077.19	1,134,055.74	152,524.20	0.00	0.00	1,435,657.13
A1301.04.05 Cryo Compressor System	Scheduled	59,453.27	367,138.94	0.00	0.00	0.00	426,592.21
A1301.04.06 Cryo Interconnect Piping	Scheduled	225,594.62	512,339.28	0.00	0.00	0.00	737,933.91
A1301.04.07 Cryo Interconnect Electrical & Controls	Scheduled	46,627.36	119,526.30	0.00	0.00	0.00	166,153.66
A1301.04.08 Cryogenic Fluids	Scheduled	0.00	0.00	261,857.93	0.00	0.00	261,857.93
A1301.05.01 MU2e Interface Connection	Scheduled	0.00	70,813.93	320,085.24	663,932.94	72,583.00	1,127,415.11
A1301.05.02 g-2 interface connection	Scheduled	27,198.92	0.00	0.00	0.00	0.00	27,198.92
A1301.06 Cryo Safety Documents	Scheduled	0.00	155,311.42	0.00	0.00	0.00	155,311.42
A1301.07 Testing/Checkout	Scheduled	0.00	0.00	65,416.12	0.00	69,534.72	134,950.84
A1301.08 Cryo g-2 Acceptance Tests	Scheduled	0.00	11,968.50	102,502.33	0.00	0.00	114,470.83
A1301.09 Cryo MU2e Acceptance Tests	Scheduled	0.00	0.00	0.00	0.00	97,719.37	97,719.37
A1301.10 Cryo Distribution Box (CDB)	Scheduled	0.00	0.00	322,703.66	384,731.71	1,477,939.96	2,185,375.33
Grand Total	Scheduled	658,342.28	3,375,923.74	1,333,174.17	1,214,453.65	1,873,248.82	8,455,142.67