Muon Campus AIP

Change Request Form

CR#: Cryo002		
1) DATE: 3/11/14	2)WBS: Cryo1	3) Originator: Ken Domann

4) WBS Description of Primary Affected Tasks: Cryogenics AIP

5) Technical Description & Primary Motivation for Change: This change request documents the reduction of M&S for some activities associated with better estimates and actual awards that are less that what was planned. In addition, some tasks were split to show separate scope for g-2 and Mu2e. Finally, additional technical resources were added to selected tasks. See the attached for detail information. The net effect is to increase contingency and reduce budget by, $50.69K.

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

7) Assessment of Schedule Impact (Use attachments if needed): Some activities were replanned to new dates, however there is no impact to any interface milestones.

8) Secondary Impact & Other Comments: N/A

9) Approvals:

AIP Project Manager:		**Date:** 3/13/2014
AIP Project Coordinator:		**Date:** 3/14/14
AD Div Director:		**Date:**
Directorate:		**Date:**

Cryo CR002 Hours Delta

3/11/2014

UID	WBS	CTC	Name/Resource	Current Hours	Replan Hours	Delta	Comments
1	**Cryo1**		**Muon Campus Cryogenics - AIP**	**32195**	**33259**	**1064**	
833	**Cryo1.04**		**Cryogenic plant sub systems**	**13664**	**14728**	**1064**	
1897	**Cryo1.04.01**		**Cryo LN2 system**	**2616**	**2456**	**-160**	
2902	Cryo1.04.01.07	A1301.04.01	Preparing of LN2 dewar at CHL	0	20	20	New task
			Cryo Tech	0	20	20	
2904	Cryo1.04.01.08	A1301.04.01	Rigging of LN2 dewar from CHL to MC-1	0	30	30	New task
			Cryo Tech	0	30	30	
2499	Cryo1.04.01.09	A1301.04.01	Outdoor Installation - LN2 System	460	250	-210	Decreased hours
			Cryo Tech	460	250	-210	
1925	**Cryo1.04.03**		**Cryo ODH system**	**104**	**58**	**-46**	
2583	Cryo1.04.03.02	A1301.04.03	Install ODH Equipment	88	42	-46	Decreased hours
			Cryo Tech	40	20	-20	
			Cryo Engineer	48	22	-26	
835	**Cryo1.04.04**		**Cryo Refrigerator System**	**6066**	**7136**	**1070**	
2724	**Cryo1.04.04.01**		**Refrigerator System U-tubes**	**500**	**276**	**-224**	
2725	Cryo1.04.04.01.01	A1301.04.04	Design & Fabricate U-tubes	500	276	-224	Decreased hours
			Cryo Tech	360	136	-224	
			Mech Drafter	80	80	0	
			Cryo Engineer	60	60	0	
968	**Cryo1.04.04.02**		**Refrig Syst Heat exchangers**	**646**	**1006**	**360**	
2639	**Cryo1.04.04.02.01**		**Prep Heat Exchangers for Installation**	**646**	**1006**	**360**	
2906	Cryo1.04.04.02.01.04	A1301.04.04	Heat Exchanger Suction Parallel Plate Installation	0	120	120	New task
			Cryo Tech	0	120	120	
2905	Cryo1.04.04.02.01.05	A1301.04.04	Heat Exchangers Recondition Valves	0	80	80	New task
			Cryo Tech	0	80	80	
2907	Cryo1.04.04.02.01.06	A1301.04.04	Heat Exchanger N2 Vent and Common Header Installation	0	160	160	New task
			Cryo Tech	0	160	160	
1418	**Cryo1.04.04.03**		**Refrig Syst Expanders**	**100**	**140**	**40**	
1375	Cryo1.04.04.03.01	A1301.04.04	Refrig Syst Expanders Installation	76	116	40	Increased hours
			Cryo Tech	40	80	40	
			Cryo Engineer	36	36	0	
2663	**Cryo1.04.04.05**		**Refrig Syst Electrical Infrastructure**	**80**	**230**	**150**	
2913	Cryo1.04.04.05.08	A1301.04.04	Refrig Syst Electrical - Installation (T&M Oversight) Phase 2	0	150	150	New task
			Cryo Tech	0	110	110	
			Cryo Engineer	0	40	40	
2488	**Cryo1.04.04.07**		**Refrig Syst Distribution System**	**3992**	**4736**	**744**	
2847	**Cryo1.04.04.07.01**		**Refrigeration Syst Valve Box**	**660**	**760**	**100**	
2849	Cryo1.04.04.07.01.02	A1301.04.04	Refrigeration Syst g-2 Valve Box Fabrication	304	192	-112	Split task between g-2 & Mu2e, revised name
			Cryo Tech	240	160	-80	
			Cryo Engineer	64	32	-32	
2908	Cryo1.04.04.07.01.03	A1301.04.04	Refrigeration Syst Mu2e Valve Box Fabrication	0	192	192	New task, see above
			Cryo Tech	0	160	160	
			Cryo Engineer	0	32	32	
2850	Cryo1.04.04.07.01.04	A1301.04.04	Refrigeration Syst g-2 Valve Box Installation	324	172	-152	Split task between g-2 & Mu2e, revised name

Cryo CR002 Hours Delta

3/11/2014

UID	WBS	CTC	Name/Resource	Current Hours	Replan Hours	Delta	Comments
			Cryo Tech	300	160	-140	
			Cryo Engineer	24	12	-12	
2909	Cryo1.04.04.07.01.05	A1301.04.04	Refrigeration Syst Mu2e Valve Box Installation	0	172	172	New task, see above
			Cryo Tech	0	160	160	
			Cryo Engineer	0	12	12	
2852	**Cryo1.04.04.07.02**		**Refrigeration Syst AP-10 Bayonet Can**	**256**	**416**	**160**	
2855	Cryo1.04.04.07.02.03	A1301.04.04	Refrigeration Syst AP-10 Bayonet Can Installation	0	160	160	Increased hours
			Cryo Tech	0	160	160	
2857	**Cryo1.04.04.07.03**		**Refrigeration Syst Transfer Lines**	**732**	**1152**	**420**	
2860	Cryo1.04.04.07.03.03	A1301.04.04	Refrigeration Syst Transfer Lines Installation	300	400	100	Increased hours
			Cryo Tech	300	400	100	
2861	Cryo1.04.04.07.03.04	A1301.04.04	Refrigeration Syst g-2 Transfer Lines Checkout	24	172	148	Split task between g-2 & Mu2e, revised name
			Cryo Tech	0	160	160	
			Cryo Engineer	24	12	-12	
2910	Cryo1.04.04.07.03.05	A1301.04.04	Refrigeration Syst Mu2e Transfer Lines Checkout	0	172	172	New task, see above
			Cryo Tech	0	160	160	
			Cryo Engineer	0	12	12	
2862	**Cryo1.04.04.07.04**		**Refrigeration Syst g-2/Cradle**	**444**	**404**	**-40**	
2865	Cryo1.04.04.07.04.03	A1301.04.04	Refrigeration Syst g-2/Cradle Installation/Rigging	88	48	-40	Decreased hours
			Cryo Tech	80	40	-40	
			Cryo Engineer	8	8	0	
2867	**Cryo1.04.04.07.05**		**Refrigeration Syst g-2 Test Box**	**464**	**568**	**104**	
2870	Cryo1.04.04.07.05.03	A1301.04.04	Refrigeration Syst g-2 Test Box Procurement	24	96	72	Increased hours
			Cryo Tech	8	80	72	
			Cryo Engineer	16	16	0	
2871	Cryo1.04.04.07.05.04	A1301.04.04	Refrigeration Syst g-2 Test Box Fabrication	160	120	-40	Decreased hours
			Cryo Tech	160	120	-40	
2872	Cryo1.04.04.07.05.05	A1301.04.04	Refrigeration Syst g-2 Test Box Installation	40	112	72	Increased hours
			Cryo Tech	40	112	72	
2686	**Cryo1.04.06**		**Cryo Interconnect Piping**	**2342**	**2542**	**200**	
2916	Cryo1.04.06.14	A1301.04.06	Install Experimental Hall Pipes on Stands	0	40	40	New task
			Cryo Tech	0	40	40	
2914	Cryo1.04.06.20	A1301.04.06	Interconnect Piping Installation Oversight MC-1 Refrig Bldg Headers	0	110	110	New task
			Cryo Tech	0	110	110	
2915	Cryo1.04.06.21	A1301.04.06	Interconnect Piping Installation Oversight MC-1 Exp Hall Headers	0	50	50	New task
			Cryo Tech	0	50	50	

Cryo CR002 Material Cost Deltas

3/11/2014

UID	WBS	CTC	Name	Current M&S	Replan M&S	Delta	Comments
1	**Cryo1**		**Muon Campus Cryogenics - AIP**	**$2,736,845**	**$2,601,265**	**-$135,580**	
833	**Cryo1.04**		**Cryogenic plant sub systems**	**$1,953,605**	**$1,818,025**	**-$135,580**	
1925	**Cryo1.04.03**		**Cryo ODH system**	**$45,000**	**$35,000**	**-$10,000**	
2583	Cryo1.04.03.02	A1301.04.03	Install ODH Equipment	$15,000	$5,000	-$10,000	Decrease M&S
835	**Cryo1.04.04**		**Cryo Refrigerator System**	**$803,297**	**$730,990**	**-$72,307**	
959	**Cryo1.04.04.04**		**Refrig Syst Controls**	**$193,407**	**$142,100**	**-$51,307**	
2662	**Cryo1.04.04.04.01**		**Refrig Syst DCS**	**$193,407**	**$142,100**	**-$51,307**	
2892	Cryo1.04.04.04.01.05	A1301.04.04	Refrig Syst - 2nd DCS Delivery Received	$81,307	$30,000	-$51,307	Decrease M&S
2488	**Cryo1.04.04.07**		**Refrig Syst Distribution System**	**$341,000**	**$320,000**	**-$21,000**	
2850	Cryo1.04.04.07.01.04	A1301.04.04	Refrigeration Syst g-2 Valve Box Installation	$10,000	$5,000	-$5,000	Split task between g-2 & Mu2e, revised name
2909	Cryo1.04.04.07.01.05	A1301.04.04	Refrigeration Syst Mu2e Valve Box Installation	$0	$5,000	$5,000	New task, see above
2867	**Cryo1.04.04.07.05**		**Refrigeration Syst g-2 Test Box**	**$26,000**	**$5,000**	**-$21,000**	
2870	Cryo1.04.04.07.05.03	A1301.04.04	Refrigeration Syst g-2 Test Box Procurement	$26,000	$5,000	-$21,000	Decrease M&S
2686	**Cryo1.04.06**		**Cryo Interconnect Piping**	**$480,810**	**$427,537**	**-$53,273**	
2765	Cryo1.04.06.16	A1301.04.06	Interconnect Piping Contractor Install MC-1 Refrig Bldg Headers	$203,146	$48,300	-$154,846	Split task between Refrig Bldg & Exp Hall, revised name. Decrease M&S
2912	Cryo1.04.06.18	A1301.04.06	Interconnect Piping Contractor Install MC-1 Exp Hall Headers	$0	$101,573	$101,573	New task, see above

Cryo Cap Pre CR002

3/11/2014

Control Account	Baseline		Actual		Forecast		CAM	
	Start	Finish	Start	Finish	Start	Finish	WBS	$K
Work Package	Cost Set	FY12	FY13	FY14	FY15	FY16	FY17	Cumulative
A1301.02.01.01 Cryo AIP Cryo AIP Gen Proj OS - FY13	8/1/13	9/20/13	6/17/13	9/20/13	6/17/13	9/20/13		
	Scheduled	0.00	51.35	0.00	0.00	0.00	0.00	51.35
A1301.02.01.02 Cryo AIP Cryo AIP Gen Proj OS - FY14	9/23/13	9/22/14	9/23/13		9/23/13	9/22/14		
	Scheduled	0.00	3.59	128.89	0.00	0.00	0.00	132.49
A1301.02.01.03 Cryo AIP Cryo AIP Gen Proj OS - FY15	9/23/14	9/22/15			9/23/14	9/22/15		
	Scheduled	0.00	0.00	3.21	133.88	0.00	0.00	137.09
A1301.02.01.04 Cryo AIP Cryo AIP Gen Proj OS - FY16	9/23/15	9/22/16			9/23/15	9/22/16		
	Scheduled	0.00	0.00	0.00	3.29	137.84	0.00	141.13
A1301.02.01.05 Cryo AIP Cryo AIP Gen Proj OS - FY17	9/23/16	6/22/17			9/23/16	6/22/17		
	Scheduled	0.00	0.00	0.00	0.00	3.98	123.36	127.34
A1301.03 Cryo Basic Engineering	8/1/13	5/26/17	6/17/13		6/17/13	5/26/17		
	Scheduled	0.00	33.09	234.74	77.64	80.46	53.60	479.54
A1301.04.01 LN2 system	8/30/13	9/2/14	8/30/13		8/30/13	9/2/14		
	Scheduled	0.00	4.52	458.57	0.00	0.00	0.00	463.09
A1301.04.02 Gas management system	8/1/13	5/21/14	6/17/13		6/17/13	5/21/14		
	Scheduled	0.00	57.84	178.03	0.00	0.00	0.00	235.87
A1301.04.03 ODH system	1/3/14	8/29/14			1/3/14	8/29/14		
	Scheduled	0.00	0.00	67.37	0.00	0.00	0.00	67.37
A1301.04.04 Cryo Refrigerator system	8/1/13	5/15/15	6/17/13		6/17/13	5/15/15		
	Scheduled	0.00	149.08	1,151.97	340.86	0.00	0.00	1,641.91
A1301.04.05 Cryo Compressor System	10/10/13	9/23/14	6/17/13		6/17/13	9/23/14		
	Scheduled	0.00	59.45	366.94	0.00	0.00	0.00	426.39
A1301.04.06 Cryo Interconnect Piping	8/1/13	7/30/14	7/26/13		7/26/13	7/30/14		
	Scheduled	0.00	225.59	628.38	0.00	0.00	0.00	853.98
A1301.04.07 Cryo Interconnect Electrical & Controls	8/1/13	5/23/14	6/17/13		6/17/13	5/23/14		
	Scheduled	0.00	46.63	119.53	0.00	0.00	0.00	166.15
A1301.05.01 Mu2e Interface Connection	5/22/14	2/13/17			5/22/14	2/13/17		
	Scheduled	0.00	0.00	69.54	212.12	1,123.07	254.39	1,659.13
A1301.05.02 g-2 interface connection	8/19/13	9/20/13	8/19/13	9/20/13	8/19/13	9/20/13		
	Scheduled	0.00	27.20	0.00	0.00	0.00	0.00	27.20
A1301.06 Cryo Safety Documents	10/1/13	9/2/14	10/1/13		10/1/13	9/2/14		
	Scheduled	0.00	0.00	154.53	0.00	0.00	0.00	154.53
A1301.07 Testing/Checkout	11/21/14	4/10/17			11/21/14	4/10/17		
	Scheduled	0.00	0.00	0.00	71.72	0.00	75.95	147.67
A1301.08 Cryo g-2 Acceptance Tests	9/25/14	10/22/14			9/25/14	10/22/14		
	Scheduled	0.00	0.00	23.44	96.03	0.00	0.00	119.47
A1301.09 Cryo Mu2e Acceptance Tests	2/14/17	3/13/17			2/14/17	3/13/17		
	Scheduled	0.00	0.00	0.00	0.00	0.00	104.33	104.33
Grand Total								
	Scheduled	0.00	658.34	3,585.15	935.55	1,345.35	611.63	7,136.02

Cryo Cap Post CR002

3/11/2014

Control Account	Baseline		Actual		Forecast		CAM	
	Start	Finish	Start	Finish	Start	Finish	WBS	$K
Work Package	Cost Set	FY12	FY13	FY14	FY15	FY16	FY17	Cumulative
A1301.02.01.01 Cryo AIP Cryo AIP Gen Proj OS - FY13	8/1/13	9/20/13	6/17/13	9/20/13	6/17/13	9/20/13		
	Scheduled	0.00	51.35	0.00	0.00	0.00	0.00	51.35
A1301.02.01.02 Cryo AIP Cryo AIP Gen Proj OS - FY14	9/23/13	9/22/14	9/23/13		9/23/13	9/22/14		
	Scheduled	0.00	3.59	128.89	0.00	0.00	0.00	132.49
A1301.02.01.03 Cryo AIP Cryo AIP Gen Proj OS - FY15	9/23/14	9/22/15			9/23/14	9/22/15		
	Scheduled	0.00	0.00	3.20	133.89	0.00	0.00	137.09
A1301.02.01.04 Cryo AIP Cryo AIP Gen Proj OS - FY16	9/23/15	9/22/16			9/23/15	9/22/16		
	Scheduled	0.00	0.00	0.00	3.28	137.85	0.00	141.13
A1301.02.01.05 Cryo AIP Cryo AIP Gen Proj OS - FY17	9/23/16	6/22/17			9/23/16	6/22/17		
	Scheduled	0.00	0.00	0.00	0.00	3.98	123.36	127.34
A1301.03 Cryo Basic Engineering	8/1/13	5/26/17	6/17/13		6/17/13	5/26/17		
	Scheduled	0.00	33.09	234.74	77.84	80.34	53.52	479.53
A1301.04.01 LN2 system	8/30/13	9/2/14	8/30/13		8/30/13	9/2/14		
	Scheduled	0.00	4.52	442.82	0.00	0.00	0.00	447.34
A1301.04.02 Gas management system	8/1/13	7/14/14	6/17/13		6/17/13	7/14/14		
	Scheduled	0.00	57.84	178.03	0.00	0.00	0.00	235.87
A1301.04.03 ODH system	5/5/14	8/26/14			5/5/14	8/26/14		
	Scheduled	0.00	0.00	49.62	0.00	0.00	0.00	49.62
A1301.04.04 Cryo Refrigerator system	8/1/13	2/1/16	6/17/13		6/17/13	2/1/16		
	Scheduled	0.00	149.08	1,094.39	105.12	319.40	0.00	1,667.98
A1301.04.05 Cryo Compressor System	10/10/13	9/23/14	6/17/13		6/17/13	9/23/14		
	Scheduled	0.00	59.45	366.94	0.00	0.00	0.00	426.39
A1301.04.06 Cryo Interconnect Piping	8/1/13	7/30/14	7/26/13		7/26/13	7/30/14		
	Scheduled	0.00	225.59	582.36	0.00	0.00	0.00	807.96
A1301.04.07 Cryo Interconnect Electrical & Controls	8/1/13	5/23/14	6/17/13		6/17/13	5/23/14		
	Scheduled	0.00	46.63	119.53	0.00	0.00	0.00	166.15
A1301.05.01 Mu2e Interface Connection	5/22/14	3/27/17			5/22/14	3/27/17		
	Scheduled	0.00	0.00	69.54	214.73	1,035.76	341.59	1,661.62
A1301.05.02 g-2 Interface connection	8/19/13	9/20/13	8/19/13	9/20/13	8/19/13	9/20/13		
	Scheduled	0.00	27.20	0.00	0.00	0.00	0.00	27.20
A1301.06 Cryo Safety Documents	10/1/13	9/2/14	10/1/13		10/1/13	9/2/14		
	Scheduled	0.00	0.00	154.53	0.00	0.00	0.00	154.53
A1301.07 Testing/Checkout	10/31/14	5/22/17			10/31/14	5/22/17		
	Scheduled	0.00	0.00	0.00	71.72	0.00	75.95	147.67
A1301.08 Cryo g-2 Acceptance Tests	9/29/14	10/24/14			9/29/14	10/24/14		
	Scheduled	0.00	0.00	11.72	108.03	0.00	0.00	119.75
A1301.09 Cryo Mu2e Acceptance Tests	3/28/17	4/24/17			3/28/17	4/24/17		
	Scheduled	0.00	0.00	0.00	0.00	0.00	104.33	104.33
Grand Total								
	Scheduled	0.00	658.34	3,436.32	714.61	1,577.32	698.75	7,085.33