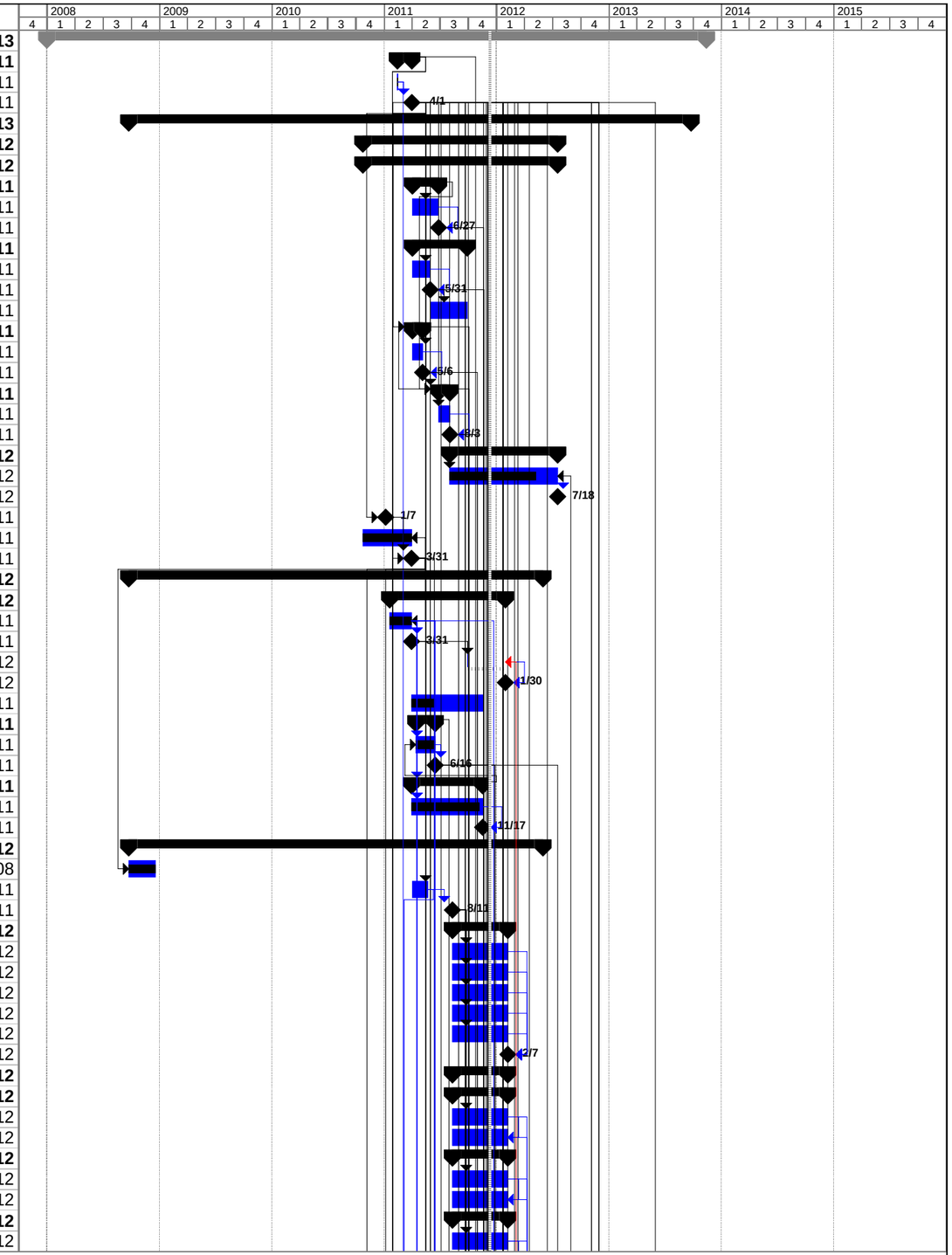
ID	WBS	Task Name	Work	Start	Finish
0	**1.**	**56Mhz Cavity**	**41,317 hrs**	**1/2/08**	**11/13/13**
1	**1.1**	**56 Mhz SRF Cavity Program ETC Start & Funding**	**0 hrs**	**2/14/11**	**4/1/11**
2	1.1.1	All Funding Received	0 hrs	2/14/11	2/14/11
3	1.1.2	Estimate to Complete Start	0 hrs	4/1/11	4/1/11
4	**1.2**	**Structural Components**	**18,382.15 hrs**	**9/23/08**	**9/25/13**
5	**1.2.1**	**Cavity Design**	**2,560 hrs**	**10/25/10**	**7/18/12**
6	**1.2.1.1**	**Cavity/Helium Vessel Transitions**	**2,560 hrs**	**10/25/10**	**7/18/12**
7	**1.2.1.1.1**	**Fundamental Damper**	**760 hrs**	**4/4/11**	**6/27/11**
8	1.2.1.1.1.1	Design	760 hrs	4/4/11	6/27/11
9	1.2.1.1.1.2	Fundamental Damper Design Complete	0 hrs	6/27/11	6/27/11
10	**1.2.1.1.2**	**HOM Dampers**	**680 hrs**	**4/4/11**	**9/28/11**
11	1.2.1.1.2.1	HOM Design	420 hrs	4/4/11	5/31/11
12	1.2.1.1.2.2	HOM Dampers Design Complete	0 hrs	5/31/11	5/31/11
13	1.2.1.1.2.3	Active - cooling of HOM damper (Review suggested)	260 hrs	6/1/11	9/28/11
14	**1.2.1.1.3**	**Fundamental Power Coupler**	**360 hrs**	**4/4/11**	**5/6/11**
15	1.2.1.1.3.1	Design	360 hrs	4/4/11	5/6/11
16	1.2.1.1.3.2	Fundamental Power Coupler design Complete	0 hrs	5/6/11	5/6/11
17	**1.2.1.1.4**	**Pick-up Probes**	**400 hrs**	**6/28/11**	**8/3/11**
18	1.2.1.1.4.1	Design	400 hrs	6/28/11	8/3/11
19	1.2.1.1.4.2	Pick-up Probes Design Complete	0 hrs	8/3/11	8/3/11
20	**1.2.1.1.5**	**IR Detector**	**360 hrs**	**8/2/11**	**7/18/12**
21	1.2.1.1.5.1	Design	360 hrs	8/2/11	7/18/12
22	1.2.1.1.5.2	IR Detector Design Complete	0 hrs	7/18/12	7/18/12
23	1.2.1.1.6	External Design Review	0 hrs	1/7/11	1/7/11
24	1.2.1.1.7	LESHC & ASSRC Reviews Complete See note	0 hrs	10/25/10	3/31/11
25	1.2.1.2	Cavity Design & Drawing Package Complete	0 hrs	3/31/11	3/31/11
26	**1.2.2**	**Cryomodule**	**2,122 hrs**	**9/23/08**	**5/31/12**
27	**1.2.2.1**	**Heluim Vessel**	**0 hrs**	**1/20/11**	**1/30/12**
28	1.2.2.1.1	Design	0 hrs	1/20/11	3/31/11
29	1.2.2.1.2	Bid cycle	0 hrs	3/31/11	3/31/11
30	1.2.2.1.3	Procure & inspect	0 hrs	9/30/11	1/30/12
31	1.2.2.1.4	All Helium Vessel Procurements and Inspections Complete	0 hrs	1/30/12	1/30/12
32	1.2.2.2	Cavity/Helium Vessel Support System/String Assembly	0 hrs	4/1/11	11/17/11
33	**1.2.2.3**	**Space Frame & Nitronic Rods**	**432 hrs**	**4/15/11**	**6/16/11**
34	1.2.2.3.1	Space Frame & Nitronic Rods Design	432 hrs	4/15/11	6/16/11
35	1.2.2.3.2	Space Frame & Nitronic Rods Design Complete	0 hrs	6/16/11	6/16/11
36	**1.2.2.4**	**String Assembly**	**120 hrs**	**4/1/11**	**11/17/11**
37	1.2.2.4.1	Design	120 hrs	4/1/11	11/17/11
38	1.2.2.4.2	String Assembly Design Complete	0 hrs	11/17/11	11/17/11
39	**1.2.2.5**	**Tuner**	**850 hrs**	**9/23/08**	**5/31/12**
40	1.2.2.5.1	Design (Develop concept)	0 hrs	9/23/08	12/19/08
41	1.2.2.5.2	Complete Final Tuner Layout	320 hrs	4/4/11	5/23/11
42	1.2.2.5.3	Tuner Procurement Package Complete (Specs & Reqs)	0 hrs	8/11/11	8/11/11
43	**1.2.2.5.4**	**Procurement**	**0 hrs**	**8/12/11**	**2/7/12**
44	1.2.2.5.4.1	**Motion Controller (2axis)**	0 hrs	8/12/11	2/7/12
45	1.2.2.5.4.2	**Servo Motor Drive**	0 hrs	8/12/11	2/7/12
46	1.2.2.5.4.3	**Drive Components**	0 hrs	8/12/11	2/7/12
47	1.2.2.5.4.4	**Piezo Drive**	0 hrs	8/12/11	2/7/12
48	1.2.2.5.4.5	**Hardware & Misc.**	0 hrs	8/12/11	2/7/12
49	1.2.2.5.5	All Tuner Procurements Delivered	0 hrs	2/7/12	2/7/12
50	**1.2.2.5.6**	**Fabricate Tuner Machined Components**	**410 hrs**	**8/12/11**	**2/7/12**
51	**1.2.2.5.6.1**	**First Stage (Inner Frame)**	**140 hrs**	**8/12/11**	**2/7/12**
52	1.2.2.5.6.1.1	Procurement	0 hrs	8/12/11	2/7/12
53	1.2.2.5.6.1.2	**Fabricate**	140 hrs	8/12/11	2/7/12
54	**1.2.2.5.6.2**	**Second stage (Outer Frame)**	**150 hrs**	**8/12/11**	**2/7/12**
55	1.2.2.5.6.2.1	**Procurement**	0 hrs	8/12/11	2/7/12
56	1.2.2.5.6.2.2	**Fabricate**	150 hrs	8/12/11	2/7/12
57	**1.2.2.5.6.3**	**Motor drive assembly (Coarse Tuner)**	**60 hrs**	**8/12/11**	**2/7/12**
58	1.2.2.5.6.3.1	**Procurement**	0 hrs	8/12/11	2/7/12



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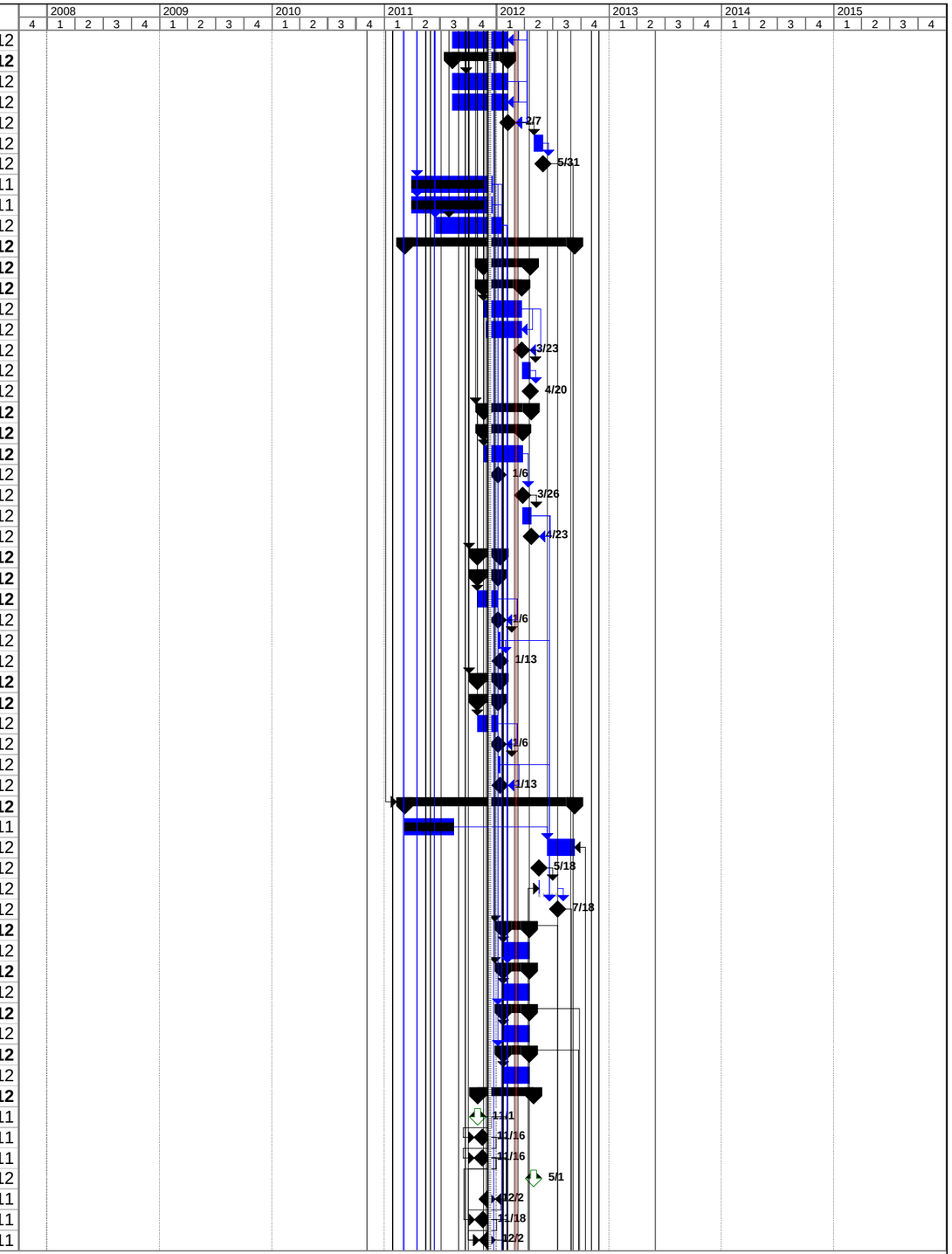
ID	WBS	Task Name	Work	Start	Finish
59	1.2.2.5.6.3.2	**Fabricate**	60 hrs	8/12/11	2/7/12
60	**1.2.2.5.6.4**	**Piezo drive assembly (Fine Tuner)**	**60 hrs**	**8/12/11**	**2/7/12**
61	1.2.2.5.6.4.1	**Procurement**	0 hrs	8/12/11	2/7/12
62	1.2.2.5.6.4.2	**Fabricate**	60 hrs	8/12/11	2/7/12
63	1.2.2.5.7	All Tuner Machined Component Procurements and Fabrications Complete	0 hrs	2/7/12	2/7/12
64	1.2.2.5.8	Assembly Components in Mock-up & Test for Tuner	120 hrs	5/3/12	5/31/12
65	1.2.2.5.9	Deliver Tuner Components for Installation	0 hrs	5/31/12	5/31/12
66	1.2.2.6	Magnetic Shields Design	200 hrs	4/1/11	12/19/11
67	1.2.2.7	Heat Shield Design	200 hrs	4/1/11	12/19/11
68	1.2.2.8	Vacuum Vessel / Cryomodule Component Design)	320 hrs	6/17/11	1/19/12
69	**1.2.3**	**Cavity Transitional Components**	**2,788.23 hrs**	**3/10/11**	**9/11/12**
70	**1.2.3.1**	**Fundamental Damper**	**560 hrs**	**11/21/11**	**4/20/12**
71	**1.2.3.1.1**	**Procurement**	**0 hrs**	**11/21/11**	**3/23/12**
72	1.2.3.1.1.1	**Purchase**	0 hrs	11/21/11	3/23/12
73	1.2.3.1.2	**Fundamental Damper Fabricated**	400 hrs	11/28/11	3/23/12
74	1.2.3.1.3	All Fundamental Dampner Procurements Delivered	0 hrs	3/23/12	3/23/12
75	1.2.3.1.4	Fundamental Damper Testing	160 hrs	3/26/12	4/20/12
76	1.2.3.1.5	Fundamental Damper Complete & Ready for Installation	0 hrs	4/20/12	4/20/12
77	**1.2.3.2**	**HOM Dampers Needed for VTF Testing**	**200 hrs**	**11/22/11**	**4/23/12**
78	**1.2.3.2.1**	**Procurement**	**0 hrs**	**11/22/11**	**3/26/12**
79	**1.2.3.2.1.1**	**Purchase (See note) Niowave**	**0 hrs**	**11/22/11**	**3/26/12**
80	1.2.3.2.1.2	Purchase one (1) for early Delivery See Note	0 hrs	1/6/12	1/6/12
81	1.2.3.2.2	All HOM Dampner Procurements Delivered	0 hrs	3/26/12	3/26/12
82	1.2.3.2.3	Fundamental Damper Testing	200 hrs	3/27/12	4/23/12
83	1.2.3.2.4	Higher Order Mode (HOM) Complete & Ready for Installation	0 hrs	4/23/12	4/23/12
84	**1.2.3.3**	**Fundamental Power Coupler Needed for VTF Testing**	**160 hrs**	**11/1/11**	**1/13/12**
85	**1.2.3.3.1**	**Procurement**	**0 hrs**	**11/1/11**	**1/6/12**
86	**1.2.3.3.1.1**	**Purchase**	**0 hrs**	**11/1/11**	**1/6/12**
87	1.2.3.3.2	All Fundamental Power Coupler Procurements Delivered	0 hrs	1/6/12	1/6/12
88	1.2.3.3.3	Fundamental Damper Testing	160 hrs	1/9/12	1/13/12
89	1.2.3.3.4	Fundamental Power Couple Complete & Ready for Installation	0 hrs	1/13/12	1/13/12
90	**1.2.3.4**	**RF Pick-up Probes Needed for VTF Testing**	**40 hrs**	**11/1/11**	**1/13/12**
91	**1.2.3.4.1**	**Procurement**	**0 hrs**	**11/1/11**	**1/6/12**
92	1.2.3.4.1.1	**Purchase**	0 hrs	11/1/11	1/6/12
93	1.2.3.4.2	All RF Pick-up Probe Procurements Delivered	0 hrs	1/6/12	1/6/12
94	1.2.3.4.3	Fundamental Damper Testing	40 hrs	1/9/12	1/13/12
95	1.2.3.4.4	RF Pick-up Probes Complete & Ready for Installation	0 hrs	1/13/12	1/13/12
96	**1.2.3.5**	**IR Detector**	**388.23 hrs**	**3/10/11**	**9/11/12**
97	1.2.3.5.1	IR Detector Window Testing	388.23 hrs	3/10/11	8/15/11
98	1.2.3.5.2	Procure Detectors (See note)	0 hrs	6/15/12	9/11/12
99	1.2.3.5.3	All IR Detector Procurements Delivered for Test	0 hrs	5/18/12	5/18/12
100	1.2.3.6	Prepare for Cold Testing in VTF2	0 hrs	5/18/12	7/18/12
101	1.2.3.7	All Transitional Components Received, Tested and Cleaned	0 hrs	7/18/12	7/18/12
102	**1.2.3.8**	**Space Frame Fabrication**	**480 hrs**	**1/24/12**	**4/17/12**
103	1.2.3.8.1	Fabricate In-house Please review hours	480 hrs	1/24/12	4/17/12
104	**1.2.3.9**	**Cryomodule Components Fabrication**	**480 hrs**	**1/24/12**	**4/17/12**
105	1.2.3.9.1	Fabricate In-house Please review hours	480 hrs	1/24/12	4/17/12
106	**1.2.3.10**	**Heat Shield Fabrication**	**480 hrs**	**1/24/12**	**4/17/12**
107	1.2.3.10.1	Fabricate In-house Please review hours	480 hrs	1/24/12	4/17/12
108	**1.2.3.11**	**Magnetic Shield Procurement**	**0 hrs**	**1/24/12**	**4/17/12**
109	1.2.3.11.1	Procurement of Two (2) Magnetic Shield (MU-Metal)	0 hrs	1/24/12	4/17/12
110	**1.2.4**	**Vertical Test Facility (Milestones) See Note**	**0 hrs**	**11/1/11**	**5/1/12**
111	1.2.4.1	Vacuum for Cryo	0 hrs	11/1/11	11/1/11
112	1.2.4.2	Vacuum for Cavity	0 hrs	11/16/11	11/16/11
113	1.2.4.3	Cryo system complete	0 hrs	11/16/11	11/16/11
114	1.2.4.4	Controls / Machine Protection Sys Complete	0 hrs	5/1/12	5/1/12
115	1.2.4.5	RF System Complete	0 hrs	12/2/11	12/2/11
116	1.2.4.6	VTF Test Area Block Roof	0 hrs	11/18/11	11/18/11
117	1.2.4.7	Pass System	0 hrs	12/2/11	12/2/11



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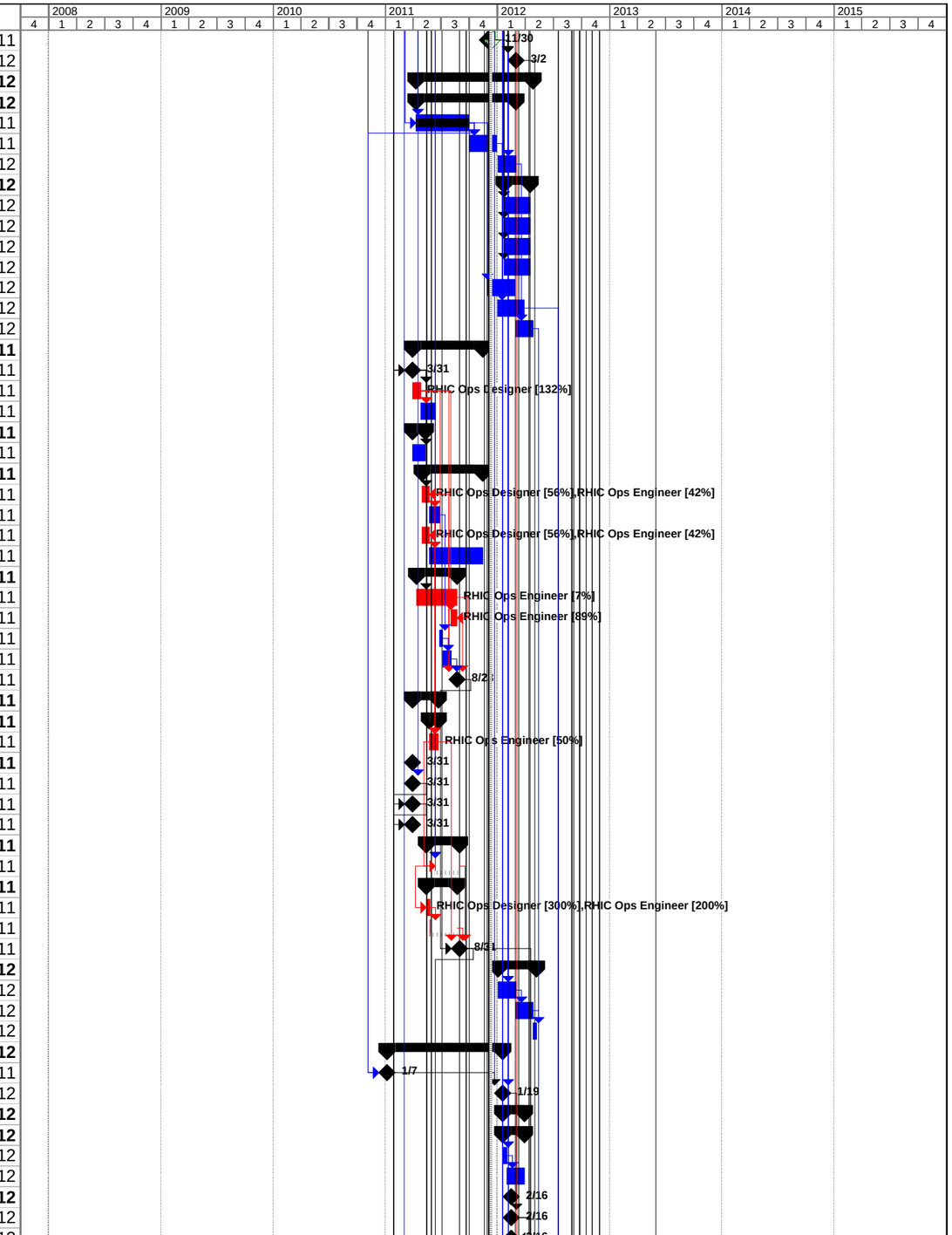
ID	WBS	Task Name	Work	Start	Finish
118	1.2.4.8	912 Mezzanine and Clean Room Complete	0 hrs	11/30/11	11/30/11
119	1.2.4.9	VTF Commissioned	0 hrs	3/2/12	3/2/12
120	**1.2.5**	**String Assembly Tooling**	**1,685.85 hrs**	**4/12/11**	**4/27/12**
121	**1.2.5.1**	**Layout Vacuum-Sealed String G valve-to-G Valve**	**771.57 hrs**	**4/12/11**	**3/2/12**
122	1.2.5.1.1	String Assembly layout complete	320 hrs	4/12/11	9/30/11
123	1.2.5.1.2	Design of String Assembly Tooling	240 hrs	10/3/11	12/30/11
124	1.2.5.1.3	Design of Cryomodule Assembly Tooling	211.57 hrs	1/4/12	3/2/12
125	**1.2.5.2**	**Vacuum gauge ports- hardware & valves**	**0 hrs**	**1/24/12**	**4/17/12**
126	1.2.5.2.1	Pump ports & hardware	0 hrs	1/24/12	4/17/12
127	1.2.5.2.2	Gate Valves	0 hrs	1/24/12	4/17/12
128	1.2.5.2.3	Burst Disc ports	0 hrs	1/24/12	4/17/12
129	1.2.5.2.4	String Assy Components	0 hrs	1/24/12	4/17/12
130	1.2.5.3	Fabrication String Assembly Supports & Inter-Cleanroom Transport	160 hrs	12/1/11	2/29/12
131	1.2.5.4	Fabrication of String Assembly Tooling	480 hrs	1/3/12	3/28/12
132	1.2.5.5	Fabrication of Cryomodule Assembly Tooling	274.28 hrs	3/2/12	4/27/12
133	**1.2.6**	**Process Tooling**	**2,353 hrs**	**3/31/11**	**11/15/11**
134	1.2.6.1	Processing location selected	0 hrs	3/31/11	3/31/11
135	1.2.6.2	Cage design	200 hrs	4/1/11	4/27/11
136	1.2.6.3	Cage fabrication	100 hrs	4/28/11	6/14/11
137	**1.2.6.4**	**Pressure Balancing Adapter**	**480 hrs**	**4/1/11**	**5/12/11**
138	1.2.6.4.1	Design	480 hrs	4/1/11	5/12/11
139	**1.2.6.5**	**Cage -to-BCP Cabinet Adapter**	**665 hrs**	**5/2/11**	**11/15/11**
140	1.2.6.5.1	without He Vessel design	140 hrs	5/2/11	5/25/11
141	1.2.6.5.2	Adapter fabrication	60 hrs	5/26/11	6/27/11
142	1.2.6.5.3	with He vessel design	140 hrs	5/2/11	5/25/11
143	1.2.6.5.4	Adapter fabrication	325 hrs	5/26/11	11/15/11
144	**1.2.6.6**	**Lifting and Assembly Fixtures**	**428 hrs**	**4/14/11**	**8/23/11**
145	1.2.6.6.1	Liftcart specifiy & procure	48 hrs	4/14/11	8/23/11
146	1.2.6.6.2	Cage-grasping mount - with /without He Vessel	100 hrs	8/4/11	8/23/11
147	1.2.6.6.3	Rollcart design	160 hrs	6/28/11	7/7/11
148	1.2.6.6.4	Rollcart fabrication	120 hrs	7/8/11	8/4/11
149	1.2.6.6.5	Lifting and Assembly Fixtures Complete	0 hrs	8/23/11	8/23/11
150	**1.2.6.7**	**High Pressure Rinse Adapter**	**80 hrs**	**3/31/11**	**6/23/11**
151	**1.2.6.7.1**	**HPR Cage Adapter**	**80 hrs**	**5/26/11**	**6/23/11**
152	1.2.6.7.1.1	w & w/o He vessel	80 hrs	5/26/11	6/23/11
153	**1.2.6.7.2**	**HPR device (provided by BCP facility)**	**0 hrs**	**3/31/11**	**3/31/11**
154	1.2.6.7.2.1	Determine design criteria	0 hrs	3/31/11	3/31/11
155	1.2.6.7.2.2	Design HPR device	0 hrs	3/31/11	3/31/11
156	1.2.6.7.2.3	Fabricate, build & test HPR	0 hrs	3/31/11	3/31/11
157	**1.2.6.8**	**Vertical Test Facility Mounting Fixture**	**400 hrs**	**5/16/11**	**8/31/11**
158	1.2.6.8.1	w & w/o He vessel	0 hrs	6/14/11	8/31/11
159	**1.2.6.8.2**	**Vacuum Pumpout Components**	**400 hrs**	**5/16/11**	**8/24/11**
160	1.2.6.8.2.1	Design VTF vacuum pumpout system	400 hrs	5/16/11	5/27/11
161	1.2.6.8.2.2	Procure components	0 hrs	5/27/11	8/24/11
162	1.2.6.9	BCP/ VTF Tooling complete	0 hrs	8/31/11	8/31/11
163	**1.2.7**	**Cryomodule Stand (Includes Isolator Stand)**	**343.05 hrs**	**1/4/12**	**5/8/12**
164	1.2.7.1	Design / engineering	160 hrs	1/4/12	3/2/12
165	1.2.7.2	Fabricate Components	133.05 hrs	3/2/12	4/27/12
166	1.2.7.3	Inspect Components & Assemble	50 hrs	4/27/12	5/8/12
167	**1.2.8**	**Design Reviews of Integrated Systems**	**0 hrs**	**1/7/11**	**1/19/12**
168	1.2.8.1	Conceptual design review	0 hrs	1/7/11	1/7/11
169	1.2.8.2	Critical Design Review	0 hrs	1/19/12	1/19/12
170	**1.2.9**	**Cryogenic Supply & Return**	**80 hrs**	**1/19/12**	**3/30/12**
171	**1.2.9.1**	**Heat Shield Plumbing**	**80 hrs**	**1/19/12**	**3/30/12**
172	1.2.9.1.1	Design	80 hrs	1/19/12	2/2/12
173	1.2.9.1.2	Procurement Tubes and Metal	0 hrs	2/2/12	3/30/12
174	**1.2.10**	**Safety Reviews of Complete 56MHz System**	**0 hrs**	**2/16/12**	**2/16/12**
175	1.2.10.1	ASSRC	0 hrs	2/16/12	2/16/12
176	1.2.10.2	LESHC	0 hrs	2/16/12	2/16/12



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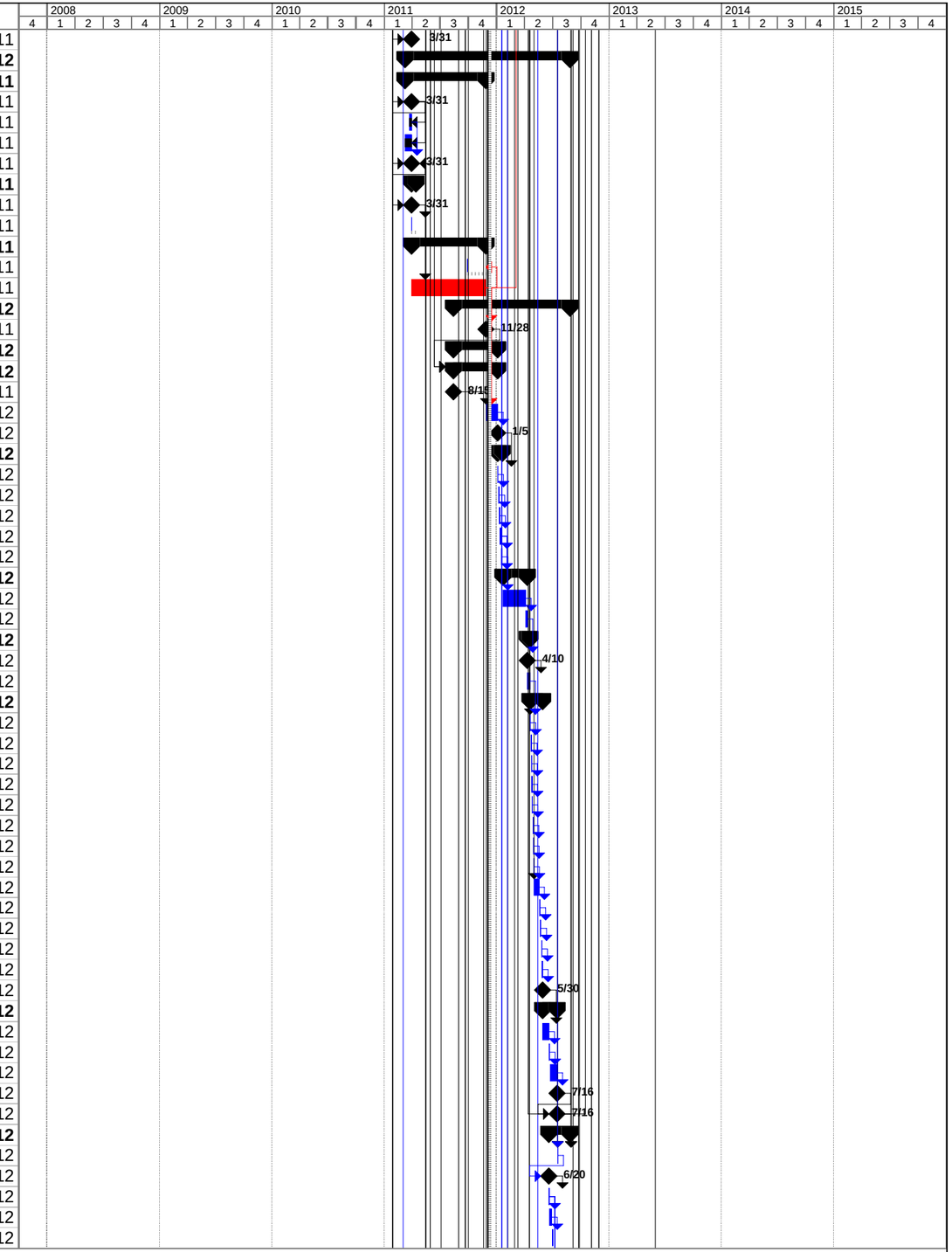
ID	WBS	Task Name	Work	Start	Finish
177	1.2.11	First Copper Prototype delivered to BLG 905	0 hrs	3/31/11	3/31/11
178	**1.2.12**	**Cavity Manufacturing**	**1,730 hrs**	**3/11/11**	**8/27/12**
179	**1.2.12.1**	**Cavity Procurement**	**10 hrs**	**3/11/11**	**11/28/11**
180	1.2.12.1.1	Complete drawing package	0 hrs	3/31/11	3/31/11
181	1.2.12.1.2	Complete SOW	0 hrs	3/25/11	3/31/11
182	1.2.12.1.3	Complete Specification	0 hrs	3/11/11	3/31/11
183	1.2.12.1.4	Bidding cycle	0 hrs	3/31/11	3/31/11
184	**1.2.12.1.5**	**Vendor selected**	**10 hrs**	**3/31/11**	**4/15/11**
185	1.2.12.1.5.1	Contract awarded	0 hrs	3/31/11	3/31/11
186	1.2.12.1.5.2	Vendor Incoming Cavity Inspections	10 hrs	3/31/11	4/15/11
187	**1.2.12.1.6**	**Cavity fabrication**	**0 hrs**	**4/1/11**	**11/28/11**
188	1.2.12.1.6.1	ASME-code required weld testing	0 hrs	9/29/11	11/28/11
189	1.2.12.1.6.2	Cavity prototyping, forming & fabrication	0 hrs	4/1/11	11/28/11
190	**1.2.12.2**	**Single Cavity Processing**	**1,720 hrs**	**8/15/11**	**8/27/12**
191	1.2.12.2.1	Cavity shipped to AES processing center	0 hrs	11/28/11	11/28/11
192	**1.2.12.2.2**	**Intial Bulk Chemistry on Cavity Note**	**0 hrs**	**8/15/11**	**1/5/12**
193	**1.2.12.2.2.1**	**Procurement**	**0 hrs**	**8/15/11**	**1/5/12**
194	1.2.12.2.2.1.1	P.O. Dispatched to AES for BCP/HPR Assembly	0 hrs	8/15/11	8/15/11
195	1.2.12.2.2.1.2	Vendor AES Prepares BCP/HPR Assembly	0 hrs	11/29/11	1/5/12
196	1.2.12.2.2.1.3	AES Ships Cavity to BNL	0 hrs	1/5/12	1/5/12
197	**1.2.12.2.3**	**Heat treat Cavity (600 C) @BNL**	**32 hrs**	**1/6/12**	**1/20/12**
198	1.2.12.2.3.1	Insert into furnace	0 hrs	1/6/12	1/6/12
199	1.2.12.2.3.2	Heat-treat @ 600 C for 16 hours	32 hrs	1/9/12	1/10/12
200	1.2.12.2.3.3	Check RF tuning	0 hrs	1/11/12	1/12/12
201	1.2.12.2.3.4	Recheck dimensions on CMM	0 hrs	1/13/12	1/17/12
202	1.2.12.2.3.5	Ship Fired Cavity to Niowave	0 hrs	1/18/12	1/20/12
203	**1.2.12.2.4**	**Welding of the Helium Vessel at Niowave Inc.**	**0 hrs**	**1/23/12**	**4/10/12**
204	1.2.12.2.4.1	Weld, Leak Check, Pressure Test	0 hrs	1/23/12	4/5/12
205	1.2.12.2.4.2	Ship to BNL	0 hrs	4/6/12	4/10/12
206	**1.2.12.2.5**	**Light BCP Processing**	**0 hrs**	**4/10/12**	**4/19/12**
207	1.2.12.2.5.1	Fired Cavity Received at AES	0 hrs	4/10/12	4/10/12
208	1.2.12.2.5.2	2nd BCP, remove 100 microns	0 hrs	4/11/12	4/19/12
209	**1.2.12.2.6**	**Qualify Cavity (VTF 1)**	**184 hrs**	**4/20/12**	**5/30/12**
210	1.2.12.2.6.1	Degrease cavity (ultra sonic tank)	0 hrs	4/20/12	4/20/12
211	1.2.12.2.6.2	Perform light BCP (50 microns) on cavity	0 hrs	4/23/12	4/24/12
212	1.2.12.2.6.3	HPR of cavity	0 hrs	4/25/12	4/25/12
213	1.2.12.2.6.4	Transfer to roll-cart, dry in Class 10	0 hrs	4/26/12	4/26/12
214	1.2.12.2.6.5	Assemble input probe, field probe & vacuum end flanges	0 hrs	4/27/12	4/27/12
215	1.2.12.2.6.6	HPR of cavity & dry	0 hrs	4/30/12	4/30/12
216	1.2.12.2.6.7	Assemble vacuum pumpout port	0 hrs	5/1/12	5/1/12
217	1.2.12.2.6.8	Evacuate cavity and pump over night	0 hrs	5/2/12	5/2/12
218	1.2.12.2.6.9	Perform leak test on cavity, transport to VTA	144 hrs	5/3/12	5/18/12
219	1.2.12.2.6.10	Insert cavity into teststand & bake @ 100C	0 hrs	5/21/12	5/22/12
220	1.2.12.2.6.11	Insert cavity into dewar & cooldown	16 hrs	5/23/12	5/25/12
221	1.2.12.2.6.12	Fill with LHe & pump to 2K	0 hrs	5/28/12	5/28/12
222	1.2.12.2.6.13	Perform RF test & warm up	24 hrs	5/29/12	5/30/12
223	1.2.12.2.6.14	Vertical Test 1 complete	0 hrs	5/30/12	5/30/12
224	**1.2.12.2.7**	**Qualify Cavity (VTF 2 & 3)**	**0 hrs**	**5/31/12**	**7/16/12**
225	1.2.12.2.7.1	Repeat Qualify Cavity - (see VTF 1 above)	0 hrs	5/31/12	6/20/12
226	1.2.12.2.7.2	Disassemble & measure frequency & field flatness	0 hrs	6/21/12	6/22/12
227	1.2.12.2.7.3	Qualify Cavity (VTF 3)	0 hrs	6/25/12	7/16/12
228	1.2.12.2.7.4	Repeat Qualify Cavity (VTF) (if needed?)	0 hrs	7/16/12	7/16/12
229	1.2.12.2.7.5	Vertical Test 2 complete	0 hrs	7/16/12	7/16/12
230	**1.2.12.2.8**	**String Assembly (includes Mock-up & Shipping)**	**1,504 hrs**	**6/20/12**	**8/27/12**
231	1.2.12.2.8.1	Re-inspect stands & other assembly equipment	24 hrs	7/19/12	7/19/12
232	1.2.12.2.8.2	Class 100 Cleanroom installation complete	0 hrs	6/20/12	6/20/12
233	1.2.12.2.8.3	Clean Rail tooling & bring into cleanroom	160 hrs	6/20/12	6/21/12
234	1.2.12.2.8.4	Process valves, BT transitions, HOM dampers, seals, etc.	100 hrs	6/22/12	6/29/12
235	1.2.12.2.8.5	Receive & inspect valves, BT transitions, HOM dampers, seals, etc.	0 hrs	7/2/12	7/2/12



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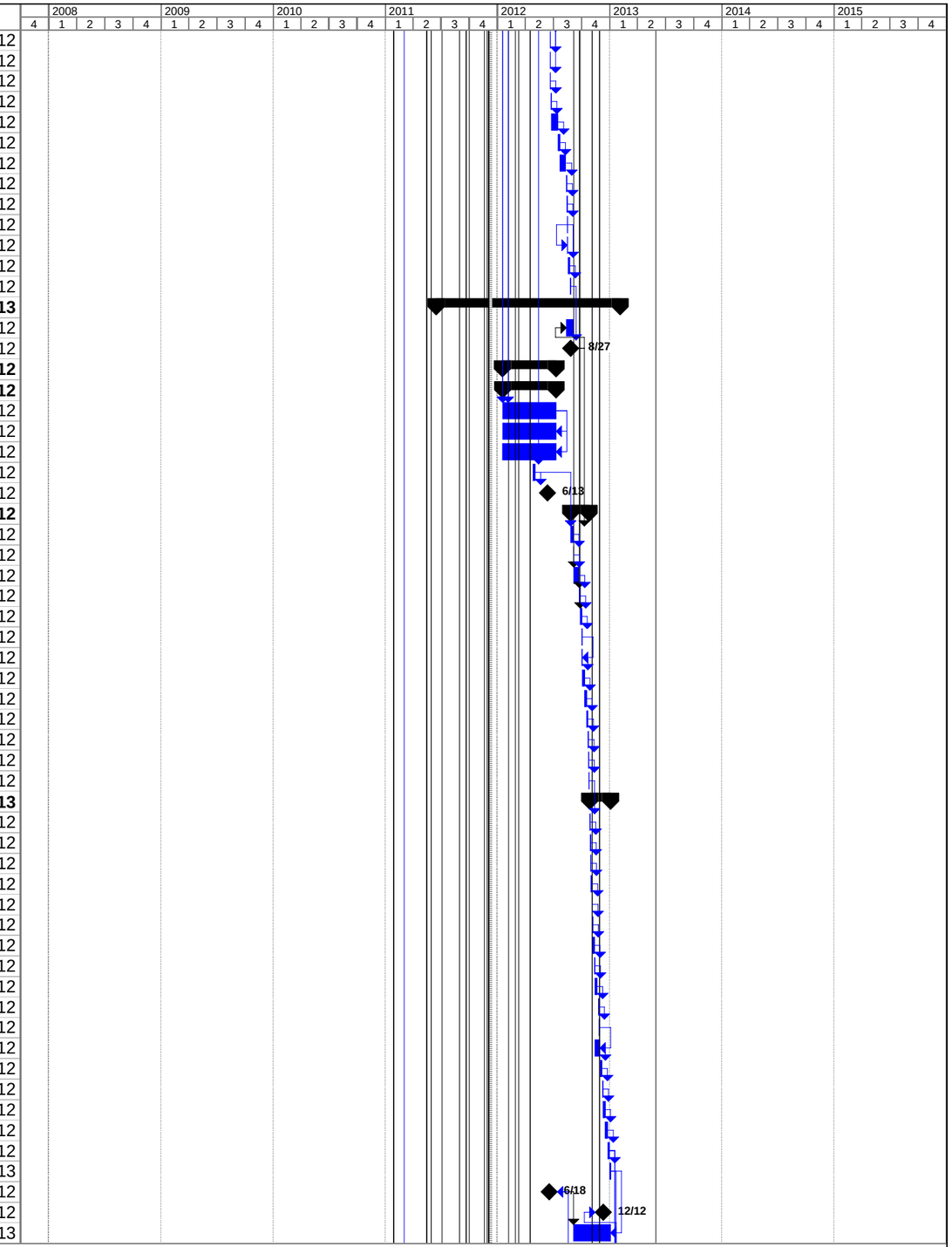
ID	WBS	Task Name	Work	Start	Finish
236	1.2.12.2.8.6	Clean gate valves	20 hrs	6/22/12	6/22/12
237	1.2.12.2.8.7	Clean beam line components	20 hrs	6/22/12	6/22/12
238	1.2.12.2.8.8	Receive & inspect couplers (SNS), clean exterior, transfer to cleanroom	20 hrs	6/22/12	6/22/12
239	1.2.12.2.8.9	Assemble field probe	8 hrs	6/25/12	6/25/12
240	1.2.12.2.8.10	Mock-up of line components	408 hrs	6/26/12	7/17/12
241	1.2.12.2.8.11	Assemble coupler to cavity, then to rail	144 hrs	7/18/12	7/23/12
242	1.2.12.2.8.12	Assemble beamline components to rail	400 hrs	7/24/12	8/13/12
243	1.2.12.2.8.13	Evacuate string and pump over night	16 hrs	8/14/12	8/15/12
244	1.2.12.2.8.14	Perform leak check & establish vacuum	8 hrs	8/16/12	8/16/12
245	1.2.12.2.8.15	Transfer to "cryomodule" group for shipping	16 hrs	8/17/12	8/17/12
246	1.2.12.2.8.16	Clean Cleanroom	16 hrs	8/17/12	8/17/12
247	1.2.12.2.8.17	Prepare string for shipping	120 hrs	8/20/12	8/24/12
248	1.2.12.2.8.18	Shipping of cavity string	24 hrs	8/27/12	8/27/12
249	**1.2.13**	**Cavity Mechanical Installation**	**3,646 hrs**	**6/16/11**	**2/4/13**
250	1.2.13.1	Survey cavity positions in RHIC Sector 3, Blue and Yellow	0 hrs	8/14/12	9/4/12
251	1.2.13.2	56 MHz SCRF Cavity String Arrives at BNL	0 hrs	8/27/12	8/27/12
252	**1.2.13.3**	**Cryomodule Purchased and Fabricated Components**	**1,578 hrs**	**1/19/12**	**7/11/12**
253	**1.2.13.3.1**	**Procurement**	**0 hrs**	**1/19/12**	**7/11/12**
254	1.2.13.3.1.1	**Cryomodule and String Components**	0 hrs	1/19/12	7/11/12
255	1.2.13.3.2	**Fabricate**	1,484.3 hrs	1/19/12	7/11/12
256	1.2.13.3.3	**Fabricate**	93.7 hrs	1/19/12	7/11/12
257	1.2.13.4	Cryomodule components and assembly tooling received and inspected	0 hrs	4/27/12	5/4/12
258	1.2.13.5	Cryomodule assembly complete	0 hrs	6/13/12	6/13/12
259	**1.2.13.6**	**Construction of SCRF Cavity thru to Nitronic rod installation**	**740 hrs**	**8/28/12**	**10/26/12**
260	1.2.13.6.1	Place Cavity on interim stands	120 hrs	8/28/12	9/5/12
261	1.2.13.6.2	Remove space frame	16 hrs	9/6/12	9/6/12
262	1.2.13.6.3	Install tuner & test	144 hrs	9/7/12	9/24/12
263	1.2.13.6.4	Install inner magnetic shield	35 hrs	9/25/12	9/27/12
264	1.2.13.6.5	Install heatshield in space frame	37 hrs	9/28/12	10/2/12
265	1.2.13.6.6	Install LN2 line in SF/HS assembly	48 hrs	10/3/12	10/4/12
266	1.2.13.6.7	Weld SST extension to helium vessel	48 hrs	10/3/12	10/4/12
267	1.2.13.6.8	Leak check all cryo-lines and SST extension	48 hrs	10/5/12	10/11/12
268	1.2.13.6.9	Insulate H/S with MLI	100 hrs	10/12/12	10/18/12
269	1.2.13.6.10	Place SF/HS with external supports around cavity	48 hrs	10/19/12	10/22/12
270	1.2.13.6.11	Mount support rods between cavity & SF	48 hrs	10/23/12	10/24/12
271	1.2.13.6.12	Secure cavity to rods	24 hrs	10/25/12	10/25/12
272	1.2.13.6.13	Remove cavity interim supports	24 hrs	10/26/12	10/26/12
273	**1.2.13.7**	**Construction of SCRF Cavity thru closing vacuum vessel**	**1,328 hrs**	**10/29/12**	**1/4/13**
274	1.2.13.7.1	Mount H/S end caps & bottom of H/S	48 hrs	10/29/12	10/30/12
275	1.2.13.7.2	Install bottom arc to SF	16 hrs	10/31/12	10/31/12
276	1.2.13.7.3	Mount bottom of outer magnetic shield	24 hrs	11/1/12	11/1/12
277	1.2.13.7.4	Install vacuum vessel lower shell & align penetrations	48 hrs	11/2/12	11/5/12
278	1.2.13.7.5	Secure lower shell to SF assembly	24 hrs	11/6/12	11/6/12
279	1.2.13.7.6	Roll in base stand assembly	24 hrs	11/7/12	11/7/12
280	1.2.13.7.7	Survey stand into position & adjust stand	48 hrs	11/8/12	11/13/12
281	1.2.13.7.8	Remove external supports	16 hrs	11/14/12	11/14/12
282	1.2.13.7.9	Leak check all cryo-lines and feedthroughs	80 hrs	11/15/12	11/21/12
283	1.2.13.7.10	Install inner and outer magnetic shield	120 hrs	11/26/12	11/27/12
284	1.2.13.7.11	Assemble remaining magnetic shield components	96 hrs	11/28/12	11/29/12
285	1.2.13.7.12	Mount FPC, HOM (4), IR and probe cables & ports	240 hrs	11/15/12	11/30/12
286	1.2.13.7.13	Install interim supports w/o F damper supports	96 hrs	12/3/12	12/7/12
287	1.2.13.7.14	Install valve supports & remove SF-based supports	24 hrs	12/10/12	12/10/12
288	1.2.13.7.15	Verify survey position of cavity prior to closing shell/connect X-fer lines	120 hrs	12/11/12	12/17/12
289	1.2.13.7.16	Assemble remaining vacuum vessel components	120 hrs	12/18/12	12/26/12
290	1.2.13.7.17	Leak check & repair vacuum vessel	72 hrs	12/27/12	12/31/12
291	1.2.13.7.18	Move Cryomodule to 912 cold test area	112 hrs	1/2/13	1/4/13
292	1.2.13.8	Layout of Horizontal Cold Test Area	0 hrs	6/18/12	6/18/12
293	1.2.13.9	ASSRC & RSC Approval to run received	0 hrs	12/12/12	12/12/12
294	1.2.13.10	Construct 56 MHz cold test blockhouse & run utilities	0 hrs	9/6/12	1/4/13



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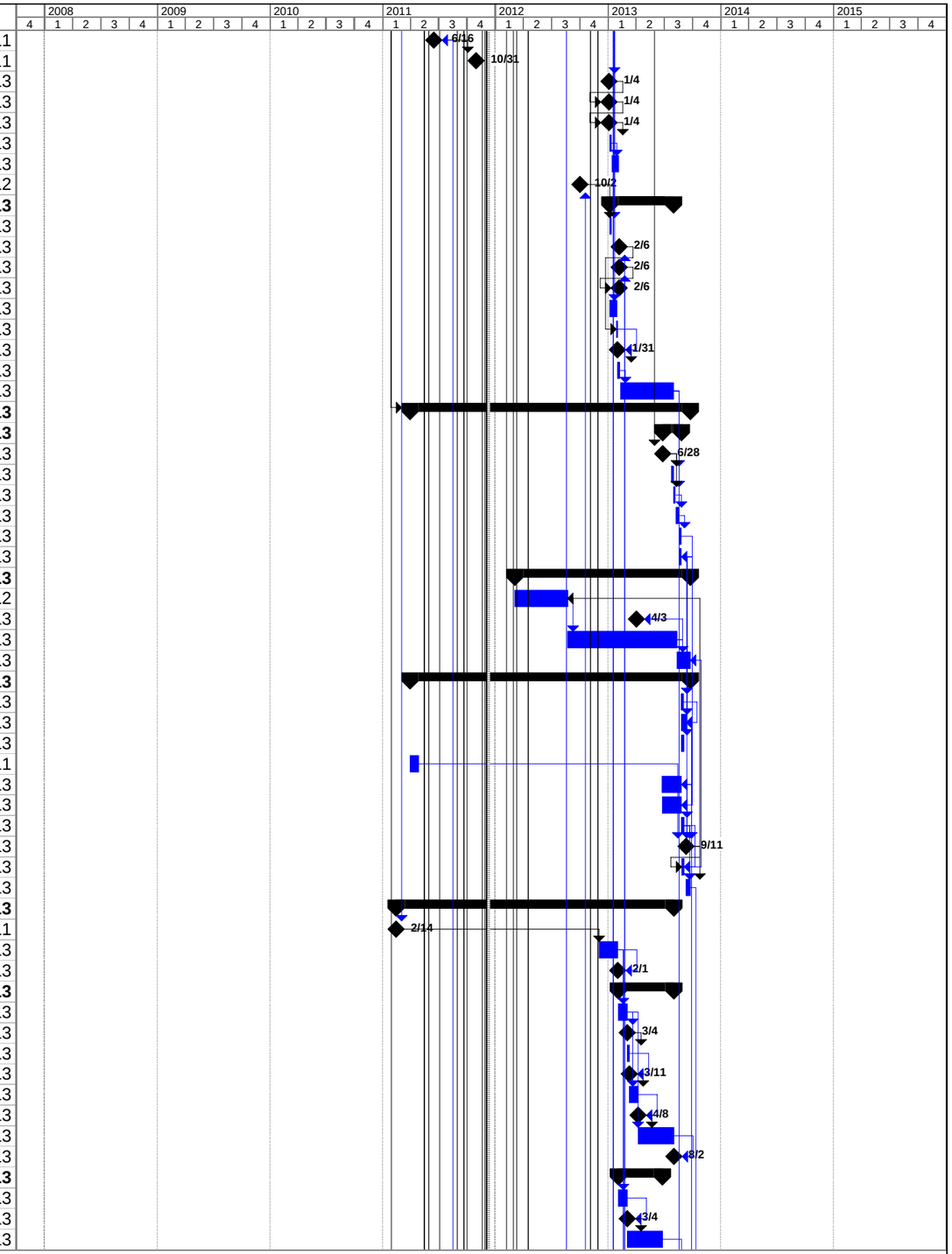
ID	WBS	Task Name	Work	Start	Finish
295	1.2.13.11	Procure & receive required RF components	0 hrs	6/16/11	6/16/11
296	1.2.13.12	Acceptance test amplifier	0 hrs	10/31/11	10/31/11
297	1.2.13.13	Install transmitter with integrated circulator & load & test at BLG 912	0 hrs	1/4/13	1/4/13
298	1.2.13.14	Procure & receive final cables BLG 912 & RHIC	0 hrs	1/4/13	1/4/13
299	1.2.13.15	Install cable transmitter/cryomodule & test	0 hrs	1/4/13	1/4/13
300	1.2.13.16	Connect transmitter to water system	0 hrs	1/7/13	1/11/13
301	1.2.13.17	Test connection	0 hrs	1/15/13	2/4/13
302	1.2.13.18	Build Low Level RF system	0 hrs	10/2/12	10/2/12
303	**1.2.14**	**Cryomodule Cold Testing (Horizontal Test)**	**290 hrs**	**1/7/13**	**8/1/13**
304	1.2.14.1	Survey cryomodule into test area	40 hrs	1/7/13	1/15/13
305	1.2.14.2	Connect Cryomodule to test area cryo system	0 hrs	2/6/13	2/6/13
306	1.2.14.3	Test Cryogenics systyem	0 hrs	2/6/13	2/6/13
307	1.2.14.4	Cryomodule installed	0 hrs	2/6/13	2/6/13
308	1.2.14.5	Attached & Test RF System	120 hrs	1/7/13	1/30/13
309	1.2.14.6	Schedule ASSRC Walkthru	0 hrs	1/29/13	1/31/13
310	1.2.14.7	Receive ASSRC approval to cooldown cryomodule	0 hrs	1/31/13	1/31/13
311	1.2.14.8	Cryomodule Cool Down	40 hrs	2/1/13	2/8/13
312	1.2.14.9	Run Cryomodule Cold Tests with Low Power & Warm Up	90 hrs	2/11/13	8/1/13
313	**1.2.15**	**Determine Complete RHIC system requirements**	**784 hrs**	**4/1/11**	**9/25/13**
314	**1.2.15.1**	**Cryomodule Installation at RHIC IP4**	**784 hrs**	**6/28/13**	**8/27/13**
315	1.2.15.1.1	Start of 2013 Shutdown	0 hrs	6/28/13	6/28/13
316	1.2.15.1.2	Have shielding block removed at Sector 3	176 hrs	7/26/13	8/6/13
317	1.2.15.1.3	Move cryomodule to Sector 3	208 hrs	8/2/13	8/9/13
318	1.2.15.1.4	Survey cryomodule into place	80 hrs	8/9/13	8/19/13
319	1.2.15.1.5	Attach ballast tank/RHIC cryo-system to He vessel and secure	160 hrs	8/19/13	8/27/13
320	1.2.15.1.6	Attach all cryo-lines to feedthroughs	160 hrs	8/19/13	8/27/13
321	**1.2.15.2**	**e-CX Safety System (PASS)**	**0 hrs**	**3/5/12**	**9/25/13**
322	1.2.15.2.1	Determine safety criteria required	0 hrs	3/5/12	8/23/12
323	1.2.15.2.2	System reviewed & approved by RSC, ASSRC, etc.	0 hrs	4/3/13	4/3/13
324	1.2.15.2.3	RHIC PASS system upgrade installed	0 hrs	8/23/12	8/13/13
325	1.2.15.2.4	PASS system tested and running	0 hrs	8/13/13	9/25/13
326	**1.2.15.3**	**Assemble SRF Cavity & Associated Components**	**0 hrs**	**4/1/11**	**9/25/13**
327	1.2.15.3.1	Assemble transmitter waveguide to cavities' FPCs	0 hrs	8/27/13	9/3/13
328	1.2.15.3.2	Connect Cryomodule to RF Transmitter, et. al. & test	0 hrs	8/27/13	9/11/13
329	1.2.15.3.3	Finalize connections to cryomodule, test Fund. Damper	0 hrs	8/27/13	9/4/13
330	1.2.15.3.4	Assembly of Cryo system to cryomodule complete	0 hrs	4/1/11	4/28/11
331	1.2.15.3.5	Finalize Vacuum connections; dress cables, connect valves and gauges	0 hrs	6/25/13	8/27/13
332	1.2.15.3.6	Instrument HOM probes	0 hrs	6/26/13	8/27/13
333	1.2.15.3.7	Replace shielding blocks at IP4	0 hrs	8/27/13	9/5/13
334	1.2.15.3.8	All systems tied-in and tested	0 hrs	9/11/13	9/11/13
335	1.2.15.3.9	ASSRC in-tunnel walkthru, checklist item sign-off & approval to run	0 hrs	8/28/13	9/5/13
336	1.2.15.3.10	Cavity SystemsTesting	0 hrs	9/11/13	9/25/13
337	**1.3**	**Controls**	**576 hrs**	**2/14/11**	**8/2/13**
338	1.3.1	Controls Funding Milestone	0 hrs	2/14/11	2/14/11
339	1.3.2	Controls Design System Collaboration	0 hrs	12/4/12	2/1/13
340	1.3.3	Controls Design System Collaboration Complete	0 hrs	2/1/13	2/1/13
341	**1.3.4**	**Machine protection**	**496 hrs**	**2/4/13**	**8/2/13**
342	1.3.4.1	Design & Configuration	240 hrs	2/4/13	3/4/13
343	1.3.4.2	Machine Protection Design & Configuration Complete	0 hrs	3/4/13	3/4/13
344	1.3.4.3	Specifications and Web Requisitioning	16 hrs	3/5/13	3/11/13
345	1.3.4.4	Machine Protection Specifications and Web Requisitioning Complete	0 hrs	3/11/13	3/11/13
346	1.3.4.5	Machine Protection Procurement	0 hrs	3/12/13	4/8/13
347	1.3.4.6	All Machine Protection Procurements Delivered	0 hrs	4/8/13	4/8/13
348	1.3.4.7	Interface Integration	240 hrs	4/9/13	8/2/13
349	1.3.4.8	Machine Protection Interface Integration Complete	0 hrs	8/2/13	8/2/13
350	**1.3.5**	**RF Interface**	**26 hrs**	**2/4/13**	**6/26/13**
351	1.3.5.1	Configure database	12 hrs	2/4/13	3/4/13
352	1.3.5.2	RF Interface Configured Database Complete	0 hrs	3/4/13	3/4/13
353	1.3.5.3	Interface Integration	14 hrs	3/5/13	6/26/13



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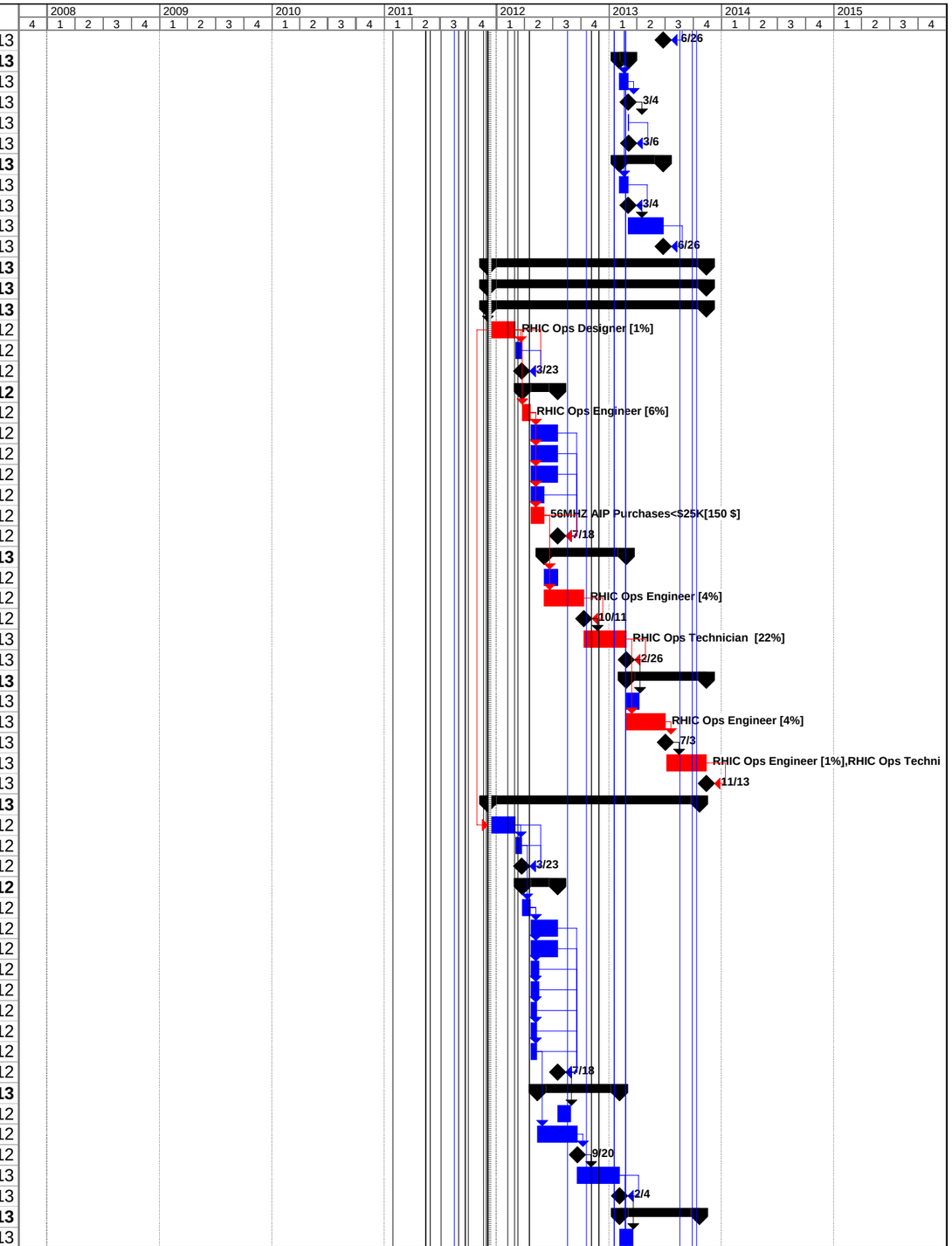
ID	WBS	Task Name	Work	Start	Finish
354	1.3.5.4	RF Interface Integration Complete	0 hrs	6/26/13	6/26/13
355	**1.3.6**	**Vacuum Interface**	**26 hrs**	**2/4/13**	**3/6/13**
356	1.3.6.1	Configure database	12 hrs	2/4/13	3/4/13
357	1.3.6.2	Vacuum Interface Configured Database Complete	0 hrs	3/4/13	3/4/13
358	1.3.6.3	Interface Integration	14 hrs	3/5/13	3/6/13
359	1.3.6.4	Vacuum Interface Integration Complete	0 hrs	3/6/13	3/6/13
360	**1.3.7**	**Cryo Interface**	**28 hrs**	**2/4/13**	**6/26/13**
361	1.3.7.1	Configure Database	14 hrs	2/4/13	3/4/13
362	1.3.7.2	Cryo Interface Configured Database Complete	0 hrs	3/4/13	3/4/13
363	1.3.7.3	Interface Integration	14 hrs	3/5/13	6/26/13
364	1.3.7.4	Cryo Interface Integration Complete	0 hrs	6/26/13	6/26/13
365	**1.4**	**Beam Instrumentation**	**1,128 hrs**	**12/5/11**	**11/13/13**
366	**1.4.1**	**Tuner Motion Control, Fine & Coarse**	**1,128 hrs**	**12/5/11**	**11/13/13**
367	**1.4.1.1**	**Fine Control**	**376 hrs**	**12/5/11**	**11/13/13**
368	1.4.1.1.1	Design System	4 hrs	12/5/11	3/2/12
369	1.4.1.1.2	System Design Collaboration	40 hrs	3/5/12	3/23/12
370	1.4.1.1.3	Fine Control Design and Collaboration Complete	0 hrs	3/23/12	3/23/12
371	**1.4.1.1.4**	**Procurement**	**10 hrs**	**3/26/12**	**7/18/12**
372	1.4.1.1.4.1	Prepare Specs, Requisitions and Procurement Interface	10 hrs	3/26/12	4/20/12
373	1.4.1.1.4.2	Piezo motor controller	0 hrs	4/23/12	7/18/12
374	1.4.1.1.4.3	Piezo motor fine	0 hrs	4/23/12	7/18/12
375	1.4.1.1.4.4	Cable	0 hrs	4/23/12	7/18/12
376	1.4.1.1.4.5	Connectors, misc	0 hrs	4/23/12	6/4/12
377	1.4.1.1.4.6	Position transducer	0 hrs	4/23/12	6/4/12
378	1.4.1.1.5	All Fine Control Procurements Delivered	0 hrs	7/18/12	7/18/12
379	**1.4.1.1.6**	**Installation in 912**	**194 hrs**	**6/5/12**	**2/26/13**
380	1.4.1.1.6.1	Documentation	4 hrs	6/5/12	7/18/12
381	1.4.1.1.6.2	Design, Programming, testing	30 hrs	6/5/12	10/11/12
382	1.4.1.1.6.3	Installation in 912 Fine Ctrl - Design, Programming, Testing Complete	0 hrs	10/11/12	10/11/12
383	1.4.1.1.6.4	Assembly, fabrication, installation, testing 912	160 hrs	10/12/12	2/26/13
384	1.4.1.1.7	Installation in 912 Fine Ctrl - Assembly, Fabrication, Installation & Testing Compl	0 hrs	2/26/13	2/26/13
385	**1.4.1.1.8**	**Relocation to RHIC**	**128 hrs**	**2/27/13**	**11/13/13**
386	1.4.1.1.8.1	Documentation	8 hrs	2/27/13	4/9/13
387	1.4.1.1.8.2	Design, Programming, Testing	30 hrs	2/27/13	7/3/13
388	1.4.1.1.8.3	Relocation to RHIC - Design, Programming & Testing Complete	0 hrs	7/3/13	7/3/13
389	1.4.1.1.8.4	Installation, testing RHIC	90 hrs	7/8/13	11/13/13
390	1.4.1.1.9	Relocation to RHIC Fine Ctrl - Installation & Testing Complete	0 hrs	11/13/13	11/13/13
391	**1.4.1.2**	**Coarse Control**	**376 hrs**	**12/5/11**	**10/22/13**
392	1.4.1.2.1	Design System	4 hrs	12/5/11	3/2/12
393	1.4.1.2.2	System Design Collaboration	30 hrs	3/5/12	3/23/12
394	1.4.1.2.3	Coarse Control Design and Collaboration Complete	0 hrs	3/23/12	3/23/12
395	**1.4.1.2.4**	**Procurement**	**10 hrs**	**3/26/12**	**7/18/12**
396	1.4.1.2.4.1	Prepare Specs, Requisitions and Procurement Interface	10 hrs	3/26/12	4/20/12
397	1.4.1.2.4.2	Servo motor (no encoder) & spare	0 hrs	4/23/12	7/18/12
398	1.4.1.2.4.3	Servo motor controller/driver & spare	0 hrs	4/23/12	7/18/12
399	1.4.1.2.4.4	24V dc ps for controller	0 hrs	4/23/12	5/18/12
400	1.4.1.2.4.5	Digi for RS-232 Interface to Linux	0 hrs	4/23/12	5/18/12
401	1.4.1.2.4.6	Cable	0 hrs	4/23/12	5/11/12
402	1.4.1.2.4.7	Connectors, misc	0 hrs	4/23/12	5/11/12
403	1.4.1.2.4.8	Position transducer, Reference Chassis	0 hrs	4/23/12	5/11/12
404	1.4.1.2.5	All Coarse Control Procurements Delivered	0 hrs	7/18/12	7/18/12
405	**1.4.1.2.6**	**Installation in 912**	**204 hrs**	**5/14/12**	**2/4/13**
406	1.4.1.2.6.1	Documentation	4 hrs	7/19/12	8/29/12
407	1.4.1.2.6.2	Design, Programming, Testing	30 hrs	5/14/12	9/20/12
408	1.4.1.2.6.3	Installation in 912 Coarse Ctrl - Design, Programming, Testing Complete	0 hrs	9/20/12	9/20/12
409	1.4.1.2.6.4	Assembly, fabrication, installation, Testing 912	170 hrs	9/21/12	2/4/13
410	1.4.1.2.7	Installation in 912 Coarse Ctrl - Assembly, Fabrication, Installation & Testing Cor	0 hrs	2/4/13	2/4/13
411	**1.4.1.2.8**	**Relocation to RHIC**	**128 hrs**	**2/5/13**	**10/22/13**
412	1.4.1.2.8.1	Documentation	8 hrs	2/5/13	3/19/13



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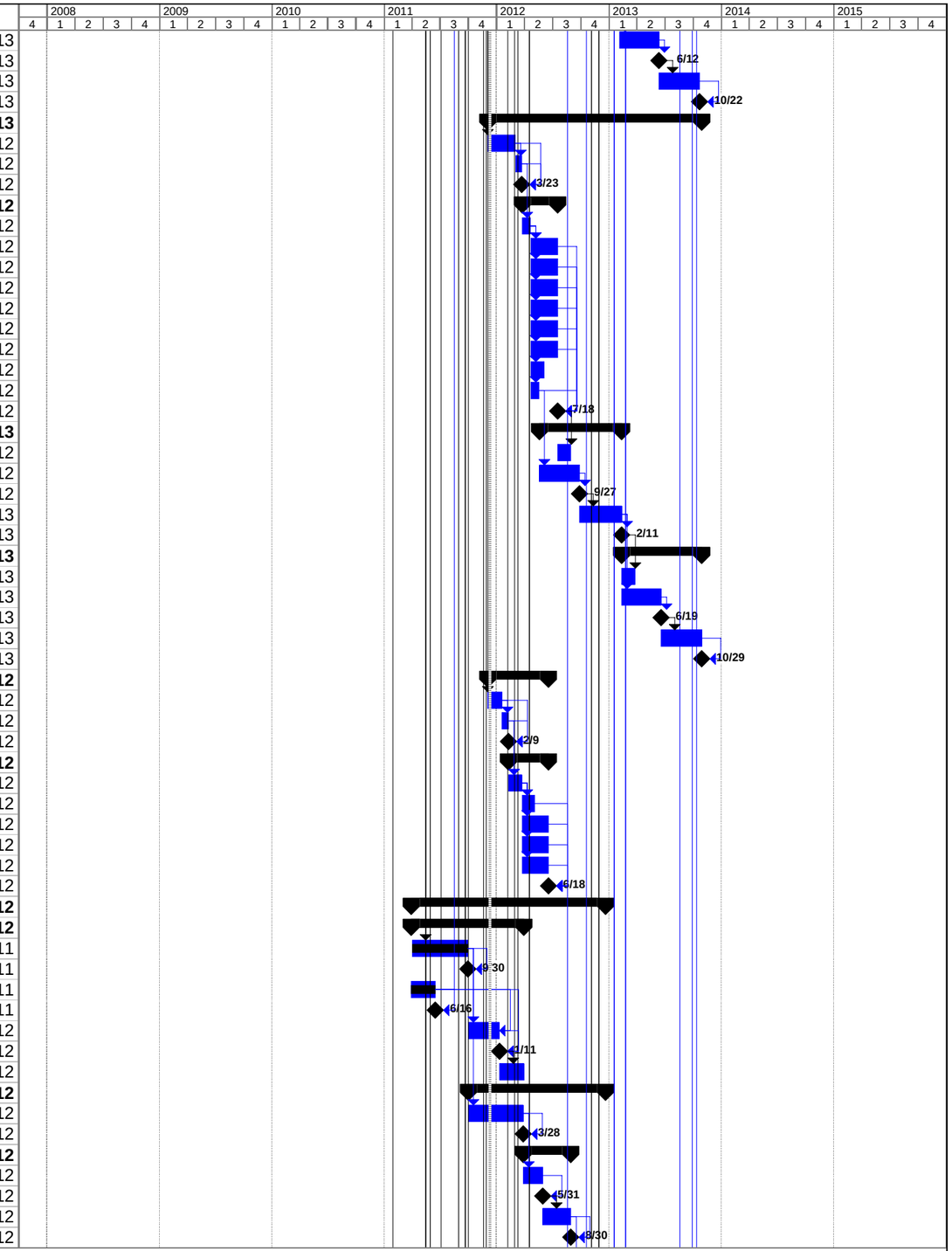
ID	WBS	Task Name	Work	Start	Finish
413	1.4.1.2.8.2	Design, Programming, Testing	30 hrs	2/5/13	6/12/13
414	1.4.1.2.8.3	Relocation to RHIC Coarse Ctrl - Design, Programming, Testing Complete	0 hrs	6/12/13	6/12/13
415	1.4.1.2.8.4	Installation, testing RHIC	90 hrs	6/13/13	10/22/13
416	1.4.1.2.9	Relocation to RHIC Coarse Ctrl - Installation & Testing Complete	0 hrs	10/22/13	10/22/13
417	**1.4.1.3**	**Fundamental Damper Motion Control**	**362 hrs**	**12/5/11**	**10/29/13**
418	1.4.1.3.1	Design System	4 hrs	12/5/11	3/2/12
419	1.4.1.3.2	System Design Collaboration	30 hrs	3/5/12	3/23/12
420	1.4.1.3.3	Fundamental Damper Motion Control Design and Collaboration Complete	0 hrs	3/23/12	3/23/12
421	**1.4.1.3.4**	**Procurement**	**10 hrs**	**3/26/12**	**7/18/12**
422	1.4.1.3.4.1	Prepare Specs, Requisitions and Procurement Interface	10 hrs	3/26/12	4/20/12
423	1.4.1.3.4.2	Fundamental damping actuator (Kollmorgen)	0 hrs	4/23/12	7/18/12
424	1.4.1.3.4.3	Servo controller/drive	0 hrs	4/23/12	7/18/12
425	1.4.1.3.4.4	Motor power cable	0 hrs	4/23/12	7/18/12
426	1.4.1.3.4.5	Motor feedback cable	0 hrs	4/23/12	7/18/12
427	1.4.1.3.4.6	Base unit 1 axis	0 hrs	4/23/12	7/18/12
428	1.4.1.3.4.7	Ethernet daughter board	0 hrs	4/23/12	7/18/12
429	1.4.1.3.4.8	Connectors, misc	0 hrs	4/23/12	6/4/12
430	1.4.1.3.4.9	Position transducer	0 hrs	4/23/12	5/18/12
431	1.4.1.3.5	All Fundamental Damper Motion Control Procurements Delivered	0 hrs	7/18/12	7/18/12
432	**1.4.1.3.6**	**Installation in 912**	**204 hrs**	**5/21/12**	**2/11/13**
433	1.4.1.3.6.1	Documentation	4 hrs	7/19/12	8/29/12
434	1.4.1.3.6.2	Design, Programming, testing	30 hrs	5/21/12	9/27/12
435	1.4.1.3.6.3	Installation in 912 Fundamental Damper Motion Control - Design, Programmi	0 hrs	9/27/12	9/27/12
436	1.4.1.3.6.4	Assembly, fabrication, installation, testing 912	170 hrs	9/28/12	2/11/13
437	1.4.1.3.7	Installation in 912 Fundamental Damper Motion Control - Assembly, Fabrication,	0 hrs	2/11/13	2/11/13
438	**1.4.1.3.8**	**Relocation to RHIC**	**114 hrs**	**2/12/13**	**10/29/13**
439	1.4.1.3.8.1	Documentation	4 hrs	2/12/13	3/26/13
440	1.4.1.3.8.2	Design, Programming, testing	20 hrs	2/12/13	6/19/13
441	1.4.1.3.8.3	Relocation to RHIC Fundamental Damper Motion Control - Design, Programn	0 hrs	6/19/13	6/19/13
442	1.4.1.3.8.4	Installation, testing RHIC	90 hrs	6/20/13	10/29/13
443	1.4.1.3.9	Relocation to RHIC Fundamental Damper Motion Control - Installation & Testing	0 hrs	10/29/13	10/29/13
444	**1.4.1.4**	**Common Hardware (To all 3 Systems)**	**14 hrs**	**12/5/11**	**6/18/12**
445	1.4.1.4.1	Design System	4 hrs	12/5/11	1/19/12
446	1.4.1.4.2	System Design Collaboration	10 hrs	1/20/12	2/9/12
447	1.4.1.4.3	Common Hardware (To all 3 Systems) Design and Collaboration Complete	0 hrs	2/9/12	2/9/12
448	**1.4.1.4.4**	**Procurement**	**0 hrs**	**2/10/12**	**6/18/12**
449	1.4.1.4.4.1	Prepare Specs, Requisitions and Procurement Interface	0 hrs	2/10/12	3/23/12
450	1.4.1.4.4.2	Junction Box - Hoffmann & half rack w/wheels	0 hrs	3/26/12	5/4/12
451	1.4.1.4.4.3	Driver/Controller Rack mounted drawer(s)	0 hrs	3/26/12	6/18/12
452	1.4.1.4.4.4	Rack for bldg 912	0 hrs	3/26/12	6/18/12
453	1.4.1.4.4.5	Rack interconnect hardware, DIN rail, etc…	0 hrs	3/26/12	6/18/12
454	1.4.1.4.5	All Common Hardware (To all 3 Systems) Procurements Delivered	0 hrs	6/18/12	6/18/12
455	**1.5**	**RF Systems**	**2,885.85 hrs**	**3/31/11**	**12/21/12**
456	**1.5.1**	**HLRF**	**1,125.85 hrs**	**3/31/11**	**3/30/12**
457	1.5.1.1	Design High Level RF	245.85 hrs	4/4/11	9/30/11
458	1.5.1.2	HLRF Design Complete	0 hrs	9/30/11	9/30/11
459	1.5.1.3	Procure (All Material Rec'd)	0 hrs	3/31/11	6/16/11
460	1.5.1.4	All HLRF Procurements Delivered	0 hrs	6/16/11	6/16/11
461	1.5.1.5	Prepare, Assemble and Stage all HLRF Material for Integration	440 hrs	10/3/11	1/11/12
462	1.5.1.6	HLRF Ready for Integration	0 hrs	1/11/12	1/11/12
463	1.5.1.7	System Integration (see note)	440 hrs	1/12/12	3/30/12
464	**1.5.2**	**LLRF**	**1,760 hrs**	**10/3/11**	**12/21/12**
465	1.5.2.1	Design Low Level RF	440 hrs	10/3/11	3/28/12
466	1.5.2.2	LLRF Design Complete	0 hrs	3/28/12	3/28/12
467	**1.5.2.3**	**Procurement**	**160 hrs**	**3/29/12**	**8/30/12**
468	1.5.2.3.1	Prepare Specs, Requisitions and Procurement Interface	160 hrs	3/29/12	5/31/12
469	1.5.2.3.2	All Specs, Requisitions and Procurement Interface Documents Complete	0 hrs	5/31/12	5/31/12
470	1.5.2.3.3	Procure Material	0 hrs	5/31/12	8/30/12
471	1.5.2.3.4	All LLRF Procurements Delivered	0 hrs	8/30/12	8/30/12



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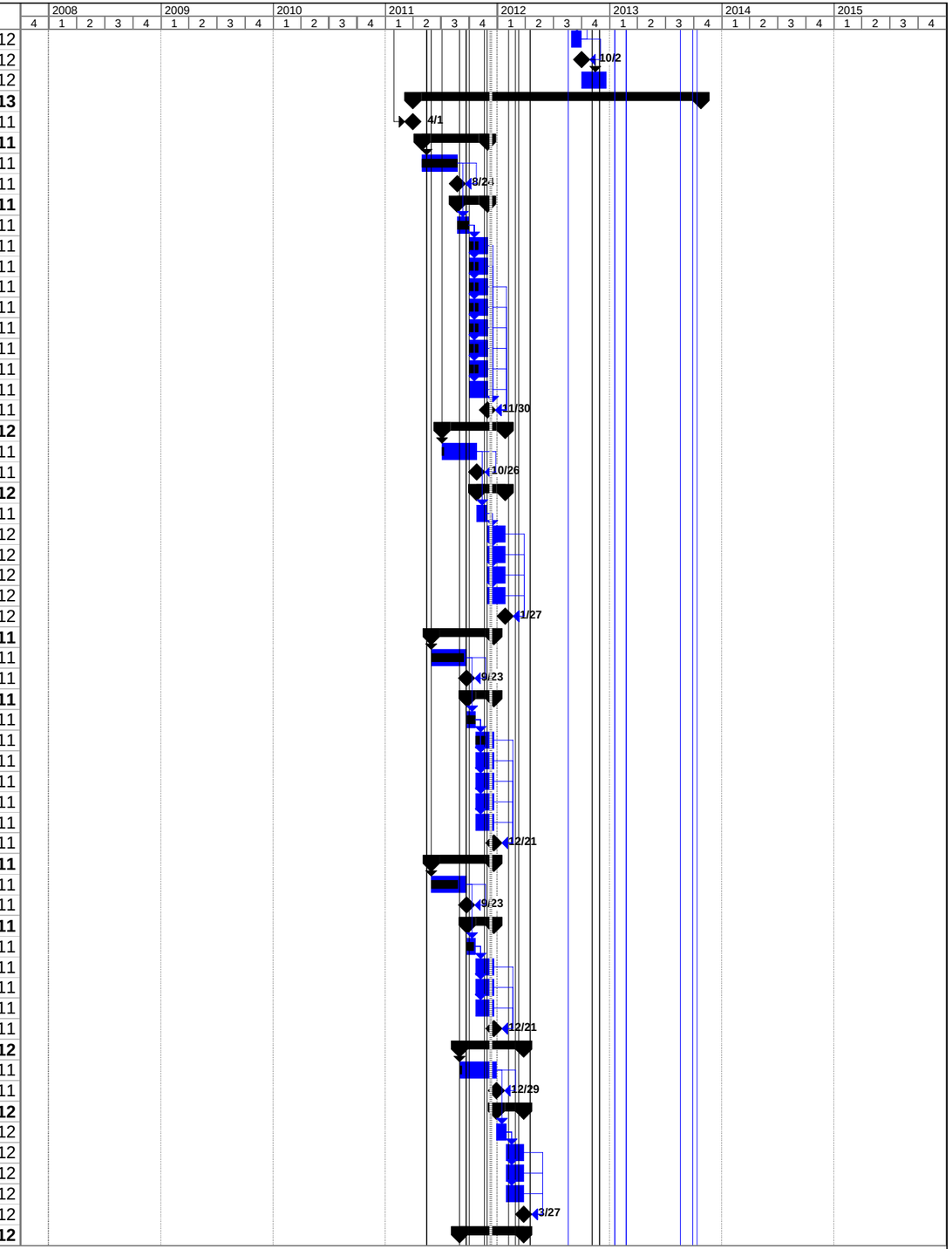
ID	WBS	Task Name	Work	Start	Finish
472	1.5.2.4	Prepare, Assemble and Stage all LLRF Material for Integration	720 hrs	8/30/12	10/2/12
473	1.5.2.5	LLRF Ready for Integration	0 hrs	10/2/12	10/2/12
474	1.5.2.6	System Integration (see note)	440 hrs	10/2/12	12/21/12
475	**1.6**	**Vacuum System**	**7,155 hrs**	**4/1/11**	**10/25/13**
476	1.6.1	Estimate to Complete Start	0 hrs	4/1/11	4/1/11
477	**1.6.2**	**Turbopump for insulating vacuum**	**145 hrs**	**5/2/11**	**11/30/11**
478	1.6.2.1	Design	120 hrs	5/2/11	8/24/11
479	1.6.2.2	Turbopump for Insulating Vacuum Design Complete	0 hrs	8/24/11	8/24/11
480	**1.6.2.3**	**Procurement**	**25 hrs**	**8/25/11**	**11/30/11**
481	1.6.2.3.1	Prepare Specs, Requisitions and Procurement Interface	25 hrs	8/25/11	9/30/11
482	1.6.2.3.2	Turbo V301, with cooling fan	0 hrs	10/3/11	11/30/11
483	1.6.2.3.3	Turbo-V 301 1 Rack Controller, 110V	0 hrs	10/3/11	11/30/11
484	1.6.2.3.4	V301 Air Cooling Kit:	0 hrs	10/3/11	11/30/11
485	1.6.2.3.5	Extended turbopump cable for V301	0 hrs	10/3/11	11/30/11
486	1.6.2.3.6	Rotary Vane Mechanical Pump, DS302	0 hrs	10/3/11	11/30/11
487	1.6.2.3.7	Inlet Screen, DN100	0 hrs	10/3/11	11/30/11
488	1.6.2.3.8	ElectroPneumatic Angle Valve, 24VDC, limit switches	0 hrs	10/3/11	11/30/11
489	1.6.2.3.9	cross, with two 2-3/4" ports	0 hrs	10/3/11	11/30/11
490	1.6.2.4	All Turbo Pump for Insulating Vacuum Procurement Delivered	0 hrs	11/30/11	11/30/11
491	**1.6.3**	**Beam vacuum**	**165 hrs**	**7/6/11**	**1/27/12**
492	1.6.3.1	Design	120 hrs	7/6/11	10/26/11
493	1.6.3.2	Beam Vacuum Design Complete	0 hrs	10/26/11	10/26/11
494	**1.6.3.3**	**Procurement**	**45 hrs**	**10/27/11**	**1/27/12**
495	1.6.3.3.1	Prepare Specs, Requisitions and Procurement Interface	25 hrs	10/27/11	11/28/11
496	1.6.3.3.2	DN120 RF shielded gate valves w/ 6.75 " CF flanges 2 ea	0 hrs	11/29/11	1/27/12
497	1.6.3.3.3	DN40 All metal right angle valves w/ 2 -3/4" CF flanges 4ea	0 hrs	11/29/11	1/27/12
498	1.6.3.3.4	flange adapters and hardware	0 hrs	11/29/11	1/27/12
499	1.6.3.3.5	NEG pipe	20 hrs	11/29/11	1/27/12
500	1.6.3.4	All Beam Vacuum Procurements Delivered	0 hrs	1/27/12	1/27/12
501	**1.6.4**	**Ion pumps and controllers**	**145 hrs**	**6/1/11**	**12/21/11**
502	1.6.4.1	Design	120 hrs	6/1/11	9/23/11
503	1.6.4.2	Ion Pumps and Controllers Design Complete	0 hrs	9/23/11	9/23/11
504	**1.6.4.3**	**Procurement**	**25 hrs**	**9/26/11**	**12/21/11**
505	1.6.4.3.1	Prepare Specs, Requisitions and Procurement Interface	25 hrs	9/26/11	10/21/11
506	1.6.4.3.2	Ion pump, 20 l/s 2ea	0 hrs	10/24/11	12/21/11
507	1.6.4.3.3	Varian dual ion pump controllers with Fischer HV connector 2ea	0 hrs	10/24/11	12/21/11
508	1.6.4.3.4	Fischer connector for Varian dual controller 2ea	0 hrs	10/24/11	12/21/11
509	1.6.4.3.5	Rack mount adaptor	0 hrs	10/24/11	12/21/11
510	1.6.4.3.6	Ion pump 270l/sec	0 hrs	10/24/11	12/21/11
511	1.6.4.4	All Ion Pumps and Controllers Procurement Delivered	0 hrs	12/21/11	12/21/11
512	**1.6.5**	**Vacuum gauges, controllers and racks**	**145 hrs**	**6/1/11**	**12/21/11**
513	1.6.5.1	Design	120 hrs	6/1/11	9/23/11
514	1.6.5.2	Vacuum Gauges, Controllers and Racks Design Complete	0 hrs	9/23/11	9/23/11
515	**1.6.5.3**	**Procurement**	**25 hrs**	**9/26/11**	**12/21/11**
516	1.6.5.3.1	Prepare Specs, Requisitions and Procurement Interface	25 hrs	9/26/11	10/21/11
517	1.6.5.3.2	MKS/HPS Gauge Controller, 937A, analog I/O, add-on boards 3ea	0 hrs	10/24/11	12/21/11
518	1.6.5.3.3	#421 Cold Cathode Sensor, 2.75" CF 6ea	0 hrs	10/24/11	12/21/11
519	1.6.5.3.4	Convection-Pirani Sensor Tube, 2.75" CF 3ea	0 hrs	10/24/11	12/21/11
520	1.6.5.4	All Vacuum Gauges, Controllers and Racks Procurement Delivered	0 hrs	12/21/11	12/21/11
521	**1.6.6**	**Vacuum chambers**	**145 hrs**	**9/1/11**	**3/27/12**
522	1.6.6.1	Design	120 hrs	9/1/11	12/29/11
523	1.6.6.2	Vacuum chambers Design Complete	0 hrs	12/29/11	12/29/11
524	**1.6.6.3**	**Procurement**	**25 hrs**	**12/30/11**	**3/27/12**
525	1.6.6.3.1	Prepare Specs, Requisitions and Procurement Interface	25 hrs	12/30/11	1/30/12
526	1.6.6.3.2	Transitions 2ea	0 hrs	1/31/12	3/27/12
527	1.6.6.3.3	Warm Bore Beamtubes 2ea	0 hrs	1/31/12	3/27/12
528	1.6.6.3.4	Bellows, rf-shielded beamtube-arc expansion 2ea	0 hrs	1/31/12	3/27/12
529	1.6.6.4	All Vacuum Chambers Procurement Delivered	0 hrs	3/27/12	3/27/12
530	**1.6.7**	**PLC for valve interlock and control (GSA Pricing)**	**145 hrs**	**9/1/11**	**3/27/12**



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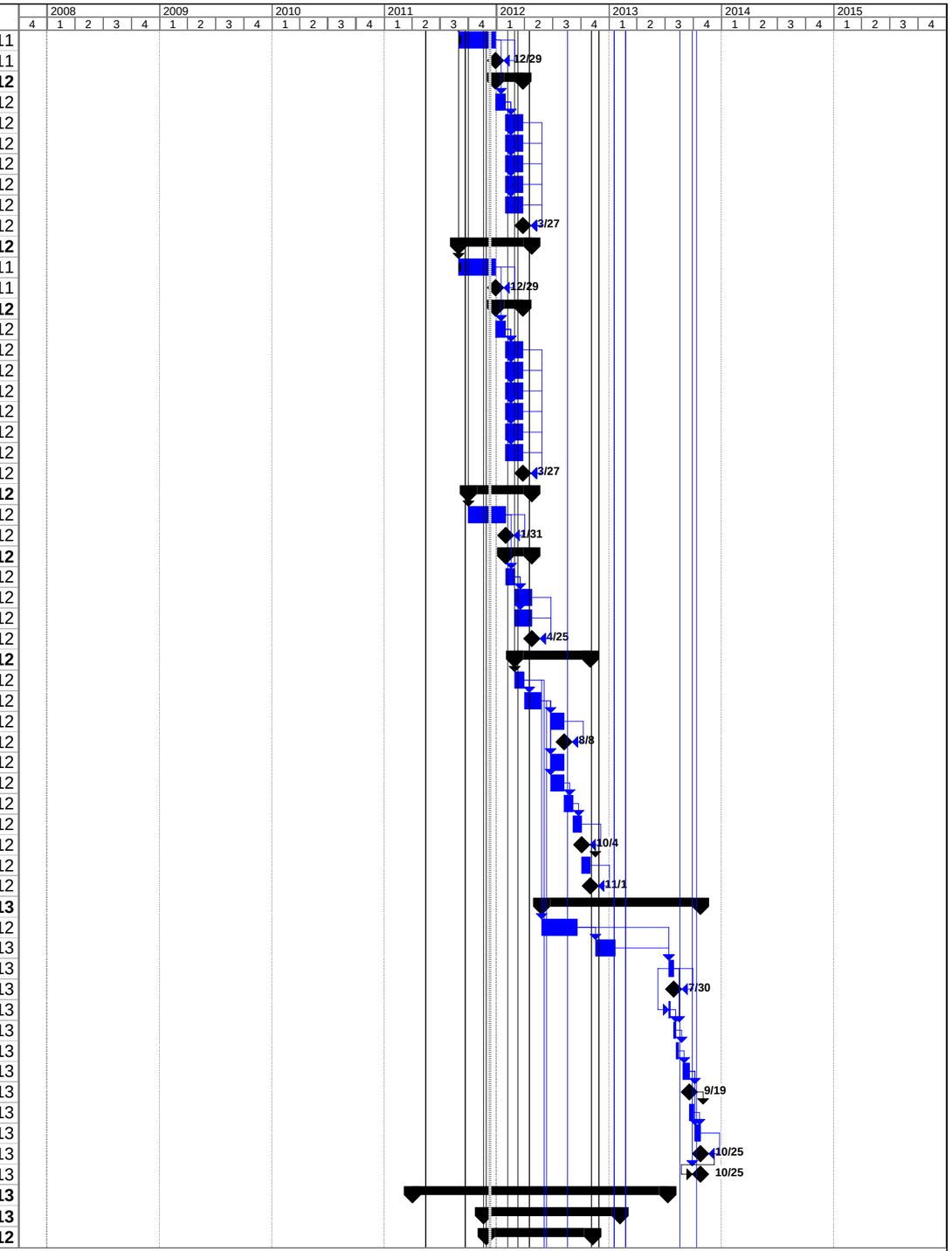
ID	WBS	Task Name	Work	Start	Finish
531	1.6.7.1	Design	120 hrs	9/1/11	12/29/11
532	1.6.7.2	PLC for valve interlock and control (GSA Pricing) Design Complete	0 hrs	12/29/11	12/29/11
533	**1.6.7.3**	**Procurement**	**25 hrs**	**12/30/11**	**3/27/12**
534	1.6.7.3.1	Prepare Specs, Requisitions and Procurement Interface	25 hrs	12/30/11	1/30/12
535	1.6.7.3.2	Processor	0 hrs	1/31/12	3/27/12
536	1.6.7.3.3	Chassis	0 hrs	1/31/12	3/27/12
537	1.6.7.3.4	Power Supply	0 hrs	1/31/12	3/27/12
538	1.6.7.3.5	Input Module	0 hrs	1/31/12	3/27/12
539	1.6.7.3.6	Output Module	0 hrs	1/31/12	3/27/12
540	1.6.7.4	All PLC for Valve Interlock and Control (GSA Pricing) Procurements delivered	0 hrs	3/27/12	3/27/12
541	**1.6.8**	**PLC for insulating turbopump operation (GSA Pricing)**	**345 hrs**	**9/1/11**	**4/25/12**
542	1.6.8.1	Design	120 hrs	9/1/11	12/29/11
543	1.6.8.2	PLC for Insulating Turbo Pump Operation (GSA Pricing) Design Complete	0 hrs	12/29/11	12/29/11
544	**1.6.8.3**	**Procurement**	**25 hrs**	**12/30/11**	**3/27/12**
545	1.6.8.3.1	Prepare Specs, Requisitions and Procurement Interface	25 hrs	12/30/11	1/30/12
546	1.6.8.3.2	Micrologix 1100 Programmable Controller	0 hrs	1/31/12	3/27/12
547	1.6.8.3.3	Input Module 16 Point input	0 hrs	1/31/12	3/27/12
548	1.6.8.3.4	Output Module 16 Point output	0 hrs	1/31/12	3/27/12
549	1.6.8.3.5	4 Channel Analog input	0 hrs	1/31/12	3/27/12
550	1.6.8.3.6	4 Channel Analog output	0 hrs	1/31/12	3/27/12
551	1.6.8.3.7	Program Cable	0 hrs	1/31/12	3/27/12
552	1.6.8.4	All PLC for Insulating Turbo pump Operation (GSA Pricing) Procurements Received	0 hrs	3/27/12	3/27/12
553	**1.6.8.5**	**Heating Blankets & Bake Out Equipment**	**200 hrs**	**10/3/11**	**4/25/12**
554	1.6.8.5.1	Design (Custom)	154 hrs	10/3/11	1/31/12
555	1.6.8.5.2	Heating Blankets & Bake Out Equipment Design Complete	0 hrs	1/31/12	1/31/12
556	**1.6.8.5.3**	**Procurement**	**46 hrs**	**2/1/12**	**4/25/12**
557	1.6.8.5.3.1	Prepare Specs, Requisitions and Procurement Interface	46 hrs	2/1/12	2/29/12
558	1.6.8.5.3.2	Special clean room heating jackets	0 hrs	3/1/12	4/25/12
559	1.6.8.5.3.3	Bake out equipment	0 hrs	3/1/12	4/25/12
560	1.6.8.5.4	All Heating Blankets & Bake Out Equipment Procurements Received	0 hrs	4/25/12	4/25/12
561	**1.6.9**	**Horizontal Test Bench (Vacuum)**	**1,600 hrs**	**3/1/12**	**11/1/12**
562	1.6.9.1	Electrical design / layout Callorabation	160 hrs	3/1/12	3/30/12
563	1.6.9.2	Mechanical Design	160 hrs	4/2/12	5/25/12
564	1.6.9.3	Installation of Instrumentation	100 hrs	6/26/12	8/8/12
565	1.6.9.4	Installation of Instrumentation Complete	0 hrs	8/8/12	8/8/12
566	1.6.9.5	Cable Pull	40 hrs	6/26/12	8/8/12
567	1.6.9.6	QC/ LC Vacuum Parts	320 hrs	6/26/12	8/8/12
568	1.6.9.7	Bake Parts	140 hrs	8/9/12	9/6/12
569	1.6.9.8	System Install/ & Leak Check	460 hrs	9/7/12	10/4/12
570	1.6.9.9	System Install/ & Leak Check Complete	0 hrs	10/4/12	10/4/12
571	1.6.9.10	Install System & Bake	220 hrs	10/5/12	11/1/12
572	1.6.9.11	Install System & Bake Complete	0 hrs	11/1/12	11/1/12
573	**1.6.10**	**Ring Installation (Vacuum)**	**4,320 hrs**	**5/28/12**	**10/25/13**
574	1.6.10.1	Mech Design	240 hrs	5/28/12	9/20/12
575	1.6.10.2	Elect design layout /interface	200 hrs	11/19/12	1/21/13
576	1.6.10.3	Ring Preparation	600 hrs	7/15/13	7/30/13
577	1.6.10.4	Vacuum Ring Preparation Complete	0 hrs	7/30/13	7/30/13
578	1.6.10.5	Cable Pull	80 hrs	7/15/13	7/19/13
579	1.6.10.6	QC/ LC Vacuum Parts	320 hrs	7/31/13	8/7/13
580	1.6.10.7	Bake Parts	240 hrs	8/8/13	8/15/13
581	1.6.10.8	System Install/ & Leak Check Particular Free	1,600 hrs	8/30/13	9/19/13
582	1.6.10.9	System Install/ & Leak Check Particular Free Complete	0 hrs	9/19/13	9/19/13
583	1.6.10.10	Particulate Free process existiing parts	500 hrs	9/20/13	10/4/13
584	1.6.10.11	Bake Install System & Bake	540 hrs	10/7/13	10/25/13
585	1.6.10.12	Bake Install System & Bake Complete	0 hrs	10/25/13	10/25/13
586	1.6.10.13	Ring Vacuum Installation Complete	0 hrs	10/25/13	10/25/13
587	**1.7**	**Cryo Systems**	**9,910 hrs**	**4/4/11**	**7/11/13**
588	**1.7.1**	**Cryomodule Horizontal Test**	**3,570 hrs**	**11/21/11**	**2/6/13**
589	**1.7.1.1**	**Cold Transfer Supply/Return Line System**	**710 hrs**	**11/30/11**	**11/9/12**



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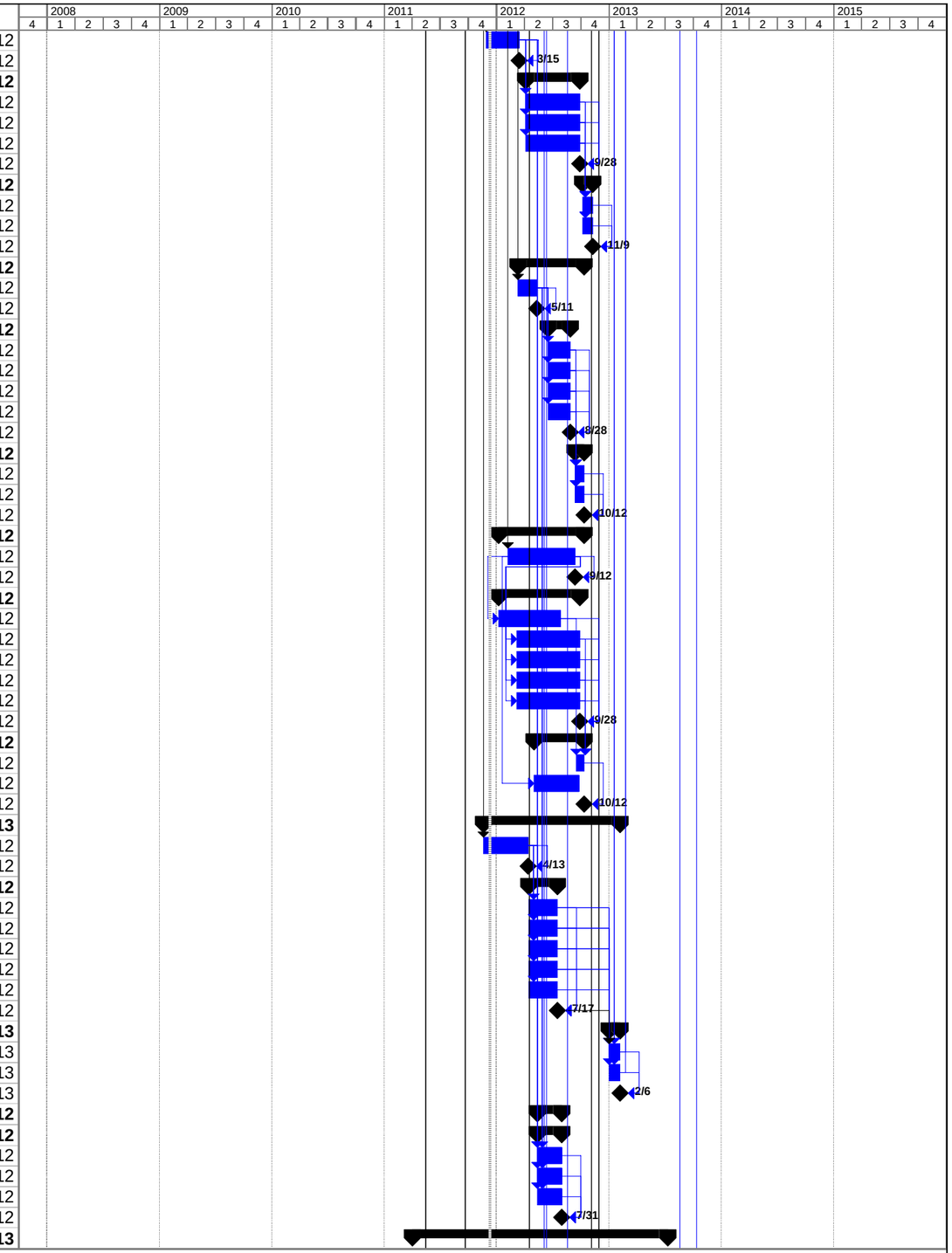
ID	WBS	Task Name	Work	Start	Finish
590	1.7.1.1.1	Design	250 hrs	11/30/11	3/15/12
591	1.7.1.1.2	Cold Transfer Supply/Return Line System Design Complete (Hor Test= HT)	0 hrs	3/15/12	3/15/12
592	**1.7.1.1.3**	**Procurement**	**0 hrs**	**4/6/12**	**9/28/12**
593	1.7.1.1.3.1	Cryo Lines	0 hrs	4/6/12	9/28/12
594	1.7.1.1.3.2	Bayonets/Taps	0 hrs	4/6/12	9/28/12
595	1.7.1.1.3.3	Piping Supports	0 hrs	4/6/12	9/28/12
596	1.7.1.1.4	All Cold Transfer Supply/Return Line System Procurements Delivered (HT)	0 hrs	9/28/12	9/28/12
597	**1.7.1.1.5**	**Cold Transfer Installation for Horizontal Test**	**460 hrs**	**10/8/12**	**11/9/12**
598	1.7.1.1.5.1	Install Cold Transfer System in Test Area	390 hrs	10/8/12	11/9/12
599	1.7.1.1.5.2	Leak Check (Vacuum)	70 hrs	10/8/12	11/9/12
600	1.7.1.1.6	Cold Transfer Installation for Horizontal Test Complete	0 hrs	11/9/12	11/9/12
601	**1.7.1.2**	**Warm Piping System**	**860 hrs**	**3/12/12**	**10/12/12**
602	1.7.1.2.1	Design	140 hrs	3/12/12	5/11/12
603	1.7.1.2.2	Warm Piping System Design Complete (HT)	0 hrs	5/11/12	5/11/12
604	**1.7.1.2.3**	**Procurement**	**0 hrs**	**6/18/12**	**8/28/12**
605	1.7.1.2.3.1	1/2" Tubing	0 hrs	6/18/12	8/28/12
606	1.7.1.2.3.2	1" NSP	0 hrs	6/18/12	8/28/12
607	1.7.1.2.3.3	1" FITTINGS	0 hrs	6/18/12	8/28/12
608	1.7.1.2.3.4	Supports	0 hrs	6/18/12	8/28/12
609	1.7.1.2.4	All Warm Piping System Procurements Delivered (HT)	0 hrs	8/28/12	8/28/12
610	**1.7.1.2.5**	**Warm Piping Installation for Horizontal Test**	**720 hrs**	**9/13/12**	**10/12/12**
611	1.7.1.2.5.1	Install Piping System in Test Area	430 hrs	9/13/12	10/12/12
612	1.7.1.2.5.2	Leak Check (Vacuum)	290 hrs	9/13/12	10/12/12
613	1.7.1.2.6	Warm Piping System Installation for Horizontal Test Complete	0 hrs	10/12/12	10/12/12
614	**1.7.1.3**	**Controls / Instrumentation**	**910 hrs**	**1/9/12**	**10/12/12**
615	1.7.1.3.1	Design	110 hrs	2/8/12	9/12/12
616	1.7.1.3.2	Controls / Instrumentation Design Complete (HT)	0 hrs	9/12/12	9/12/12
617	**1.7.1.3.3**	**Procurement**	**0 hrs**	**1/9/12**	**9/28/12**
618	1.7.1.3.3.1	I/O Cards	0 hrs	1/9/12	7/27/12
619	1.7.1.3.3.2	Misc Instrumentation	0 hrs	3/8/12	9/28/12
620	1.7.1.3.3.3	Pressure Transmitters	0 hrs	3/8/12	9/28/12
621	1.7.1.3.3.4	SC Level probe	0 hrs	3/8/12	9/28/12
622	1.7.1.3.3.5	Cables	0 hrs	3/8/12	9/28/12
623	1.7.1.3.4	All Controls / Instrumentation Procurements Delivered (HT)	0 hrs	9/28/12	9/28/12
624	**1.7.1.3.5**	**Controls / Instrumentation Installation for Horizontal Test**	**800 hrs**	**5/3/12**	**10/12/12**
625	1.7.1.3.5.1	Install Controls / Instr. in Test Area	700 hrs	9/17/12	10/12/12
626	1.7.1.3.5.2	Controls PLC logic Engineering / SCADA screens (HT)	100 hrs	5/3/12	9/25/12
627	1.7.1.3.6	Controls / Instrumentation Installation for Horizontal Test Complete	0 hrs	10/12/12	10/12/12
628	**1.7.1.4**	**Vent Stack / VJ Line Interface**	**1,090 hrs**	**11/21/11**	**2/6/13**
629	1.7.1.4.1	Design	220 hrs	11/21/11	4/13/12
630	1.7.1.4.2	Vent Stack / VJ Line Interface Design Complete (HT)	0 hrs	4/13/12	4/13/12
631	**1.7.1.4.3**	**Procurement**	**0 hrs**	**4/16/12**	**7/17/12**
632	1.7.1.4.3.1	Pipes & Fittings, Plate	0 hrs	4/16/12	7/17/12
633	1.7.1.4.3.2	Reliefs	0 hrs	4/16/12	7/17/12
634	1.7.1.4.3.3	Burst disk	0 hrs	4/16/12	7/17/12
635	1.7.1.4.3.4	G-10	0 hrs	4/16/12	7/17/12
636	1.7.1.4.3.5	Misc materials	0 hrs	4/16/12	7/17/12
637	1.7.1.4.4	All Vent Stack / VJ Line Interface Procurements Delivered (HT)	0 hrs	7/17/12	7/17/12
638	**1.7.1.4.5**	**Vent Stack / VJ Line Installation for Horizontal Test**	**870 hrs**	**1/2/13**	**2/6/13**
639	1.7.1.4.5.1	Install Vent Stack / VJ Line in Test Area	770 hrs	1/2/13	2/6/13
640	1.7.1.4.5.2	Leak Check (Vacuum)	100 hrs	1/2/13	2/6/13
641	1.7.1.4.6	Vent Stack / VJ Line Installation for Horizontal Test Complete	0 hrs	2/6/13	2/6/13
642	**1.7.1.5**	**Support Equipment**	**0 hrs**	**5/14/12**	**7/31/12**
643	**1.7.1.5.1**	**Procurement**	**0 hrs**	**5/14/12**	**7/31/12**
644	1.7.1.5.1.1	Helium bottles	0 hrs	5/14/12	7/31/12
645	1.7.1.5.1.2	Nitrogen Bottles	0 hrs	5/14/12	7/31/12
646	1.7.1.5.1.3	Helium Inventory	0 hrs	5/14/12	7/31/12
647	1.7.1.5.2	All Support Equipment Procurements Delivered (HT)	0 hrs	7/31/12	7/31/12
648	**1.7.2**	**Low Noise Helium Delivery System**	**6,340 hrs**	**4/4/11**	**7/11/13**



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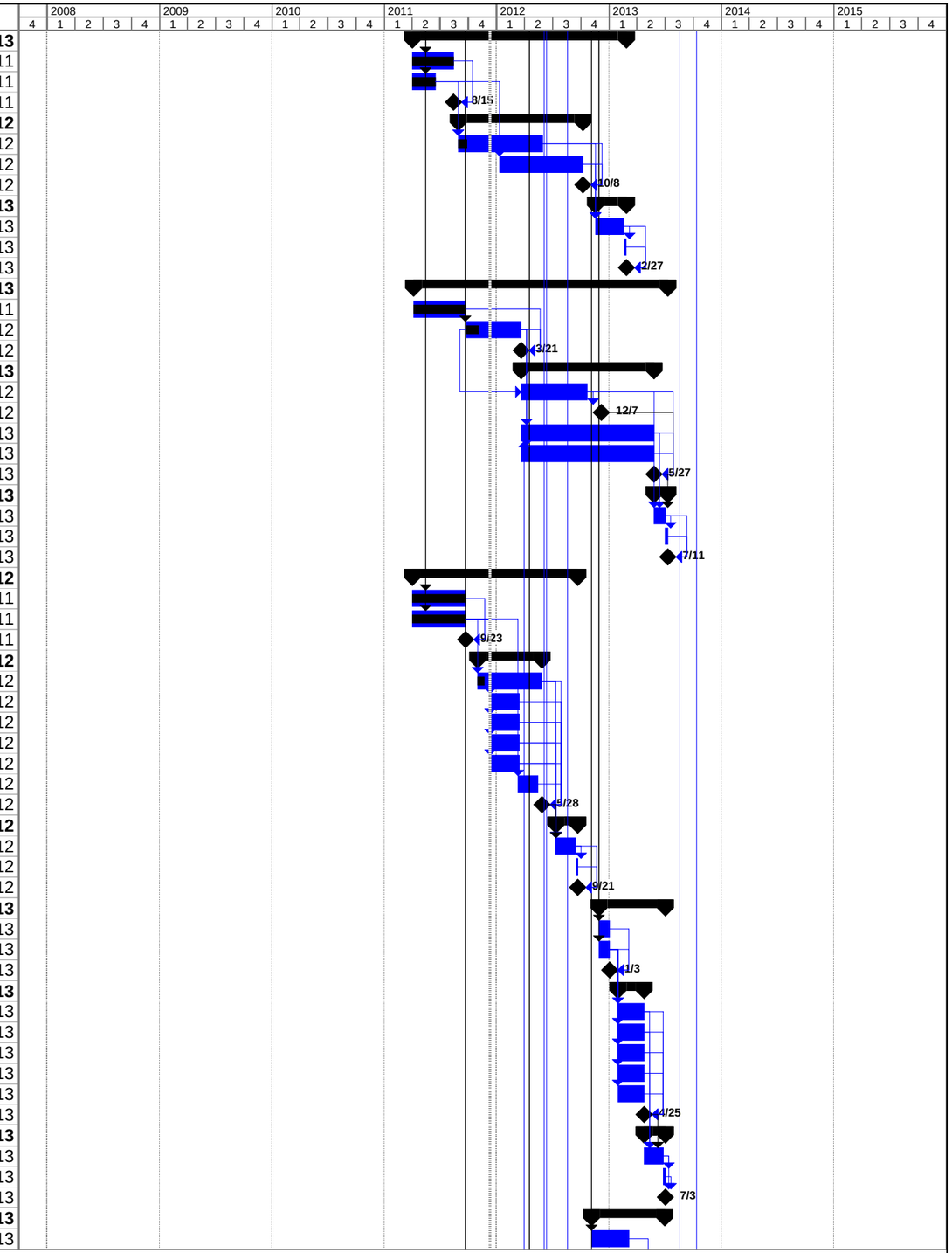
ID	WBS	Task Name	Work	Start	Finish
649	**1.7.2.1**	**Cold Transfer Supply Line System**	**430 hrs**	**4/4/11**	**2/27/13**
650	1.7.2.1.1	Design	73.5 hrs	4/4/11	8/15/11
651	1.7.2.1.2	Design	126.5 hrs	4/4/11	6/17/11
652	1.7.2.1.3	Cold Transfer Supply Line System (Low Noise) Design Complete	0 hrs	8/15/11	8/15/11
653	**1.7.2.1.4**	**Procurement**	**0 hrs**	**8/31/11**	**10/8/12**
654	1.7.2.1.4.1	Cryo Lines with Separator	0 hrs	8/31/11	5/30/12
655	1.7.2.1.4.2	Piping Supports	0 hrs	1/12/12	10/8/12
656	1.7.2.1.5	All Cold Transfer Supply Line System (Low Noise) Procurements Delivered	0 hrs	10/8/12	10/8/12
657	**1.7.2.1.6**	**Cold Transfer Supply Line Installation**	**230 hrs**	**11/19/12**	**2/27/13**
658	1.7.2.1.6.1	Install Cold Transfer System	210 hrs	11/19/12	2/19/13
659	1.7.2.1.6.2	Leak Check (Vacuum)	20 hrs	2/19/13	2/27/13
660	1.7.2.1.7	Cold Transfer Supply Line Installation (Low Noise) Complete	0 hrs	2/27/13	2/27/13
661	**1.7.2.2**	**Condenser Cryostat System**	**1,480 hrs**	**4/8/11**	**7/11/13**
662	1.7.2.2.1	Design Condenser	180 hrs	4/8/11	9/23/11
663	1.7.2.2.2	Design Cryostat & Valve Box	220 hrs	9/23/11	3/21/12
664	1.7.2.2.3	Condenser Cryostat System (Low Noise) Design Complete	0 hrs	3/21/12	3/21/12
665	**1.7.2.2.4**	**Procurement**	**0 hrs**	**3/22/12**	**5/27/13**
666	1.7.2.2.4.1	Condenser BA-Platefin	0 hrs	3/22/12	10/22/12
667	1.7.2.2.4.2	Condenser BA-Platefin Comjplete & Shipped to Cryostat Vendor for Inclusion	0 hrs	12/7/12	12/7/12
668	1.7.2.2.4.3	Condenser Cryostat & valvebox	0 hrs	3/22/12	5/27/13
669	1.7.2.2.4.4	Valve Jacket Jumper	0 hrs	3/22/12	5/27/13
670	1.7.2.2.5	All Condenser Cryostat System (Low Noise) Procurements Delivered	0 hrs	5/27/13	5/27/13
671	**1.7.2.2.6**	**Condenser Cryostat Installation**	**1,080 hrs**	**5/28/13**	**7/11/13**
672	1.7.2.2.6.1	Install Condenser Cryostat	1,060 hrs	5/28/13	7/2/13
673	1.7.2.2.6.2	Leak Check (Vacuum)	20 hrs	7/3/13	7/11/13
674	1.7.2.2.7	Condenser Cryostat System (Low Noise) Installation Complete	0 hrs	7/11/13	7/11/13
675	**1.7.2.3**	**Warm Compression System**	**790 hrs**	**4/4/11**	**9/21/12**
676	1.7.2.3.1	Design	100 hrs	4/4/11	9/23/11
677	1.7.2.3.2	Design	20 hrs	4/4/11	9/23/11
678	1.7.2.3.3	Warm Compression System (Low Noise) Design Complete	0 hrs	9/23/11	9/23/11
679	**1.7.2.3.4**	**Procurement**	**0 hrs**	**11/2/11**	**5/28/12**
680	1.7.2.3.4.1	Haug 4 cylinder oil-free compressor	0 hrs	11/2/11	5/28/12
681	1.7.2.3.4.2	Control valves	0 hrs	12/13/11	3/15/12
682	1.7.2.3.4.3	Reliefs	0 hrs	12/13/11	3/15/12
683	1.7.2.3.4.4	Piping	0 hrs	12/13/11	3/15/12
684	1.7.2.3.4.5	Filter	0 hrs	12/13/11	3/15/12
685	1.7.2.3.4.6	Shack	0 hrs	3/12/12	5/15/12
686	1.7.2.3.5	All Warm Compression System (Low Noise) Procurements Delivered	0 hrs	5/28/12	5/28/12
687	**1.7.2.3.6**	**Warm Compression System Installation**	**670 hrs**	**7/13/12**	**9/21/12**
688	1.7.2.3.6.1	Install Warm Compression System	660 hrs	7/13/12	9/14/12
689	1.7.2.3.6.2	Leak Check (Vacuum)	10 hrs	9/17/12	9/21/12
690	1.7.2.3.7	Warm Compression System (Low Noise) Installation Complete	0 hrs	9/21/12	9/21/12
691	**1.7.2.4**	**Cold Vapor Heating System**	**740 hrs**	**11/30/12**	**7/3/13**
692	1.7.2.4.1	Design	120 hrs	11/30/12	1/3/13
693	1.7.2.4.2	Design	20 hrs	11/30/12	1/3/13
694	1.7.2.4.3	Cold Vapor Heating System (Low Noise) Design Complete	0 hrs	1/3/13	1/3/13
695	**1.7.2.4.4**	**Procurement**	**0 hrs**	**1/31/13**	**4/25/13**
696	1.7.2.4.4.1	Ambient vaporizer/Dual switchable	0 hrs	1/31/13	4/25/13
697	1.7.2.4.4.2	Valves	0 hrs	1/31/13	4/25/13
698	1.7.2.4.4.3	reliefs, PSV	0 hrs	1/31/13	4/25/13
699	1.7.2.4.4.4	Reliefs, TSV	0 hrs	1/31/13	4/25/13
700	1.7.2.4.4.5	Piping and Fittings	0 hrs	1/31/13	4/25/13
701	1.7.2.4.5	All Cold Vapor Heating System (Low Noise) Procurements Delivered	0 hrs	4/25/13	4/25/13
702	**1.7.2.4.6**	**Cold Vapor Heating System Installation**	**600 hrs**	**4/26/13**	**7/3/13**
703	1.7.2.4.6.1	Install Warm Compression System	560 hrs	4/26/13	6/26/13
704	1.7.2.4.6.2	Leak Check (Vacuum)	40 hrs	6/27/13	7/3/13
705	1.7.2.4.7	Cold Vapor Heating System (Low Noise) Installation Complete	0 hrs	7/3/13	7/3/13
706	**1.7.2.5**	**Warm Piping System**	**760 hrs**	**11/6/12**	**7/1/13**
707	1.7.2.5.1	Design	240 hrs	11/6/12	3/7/13



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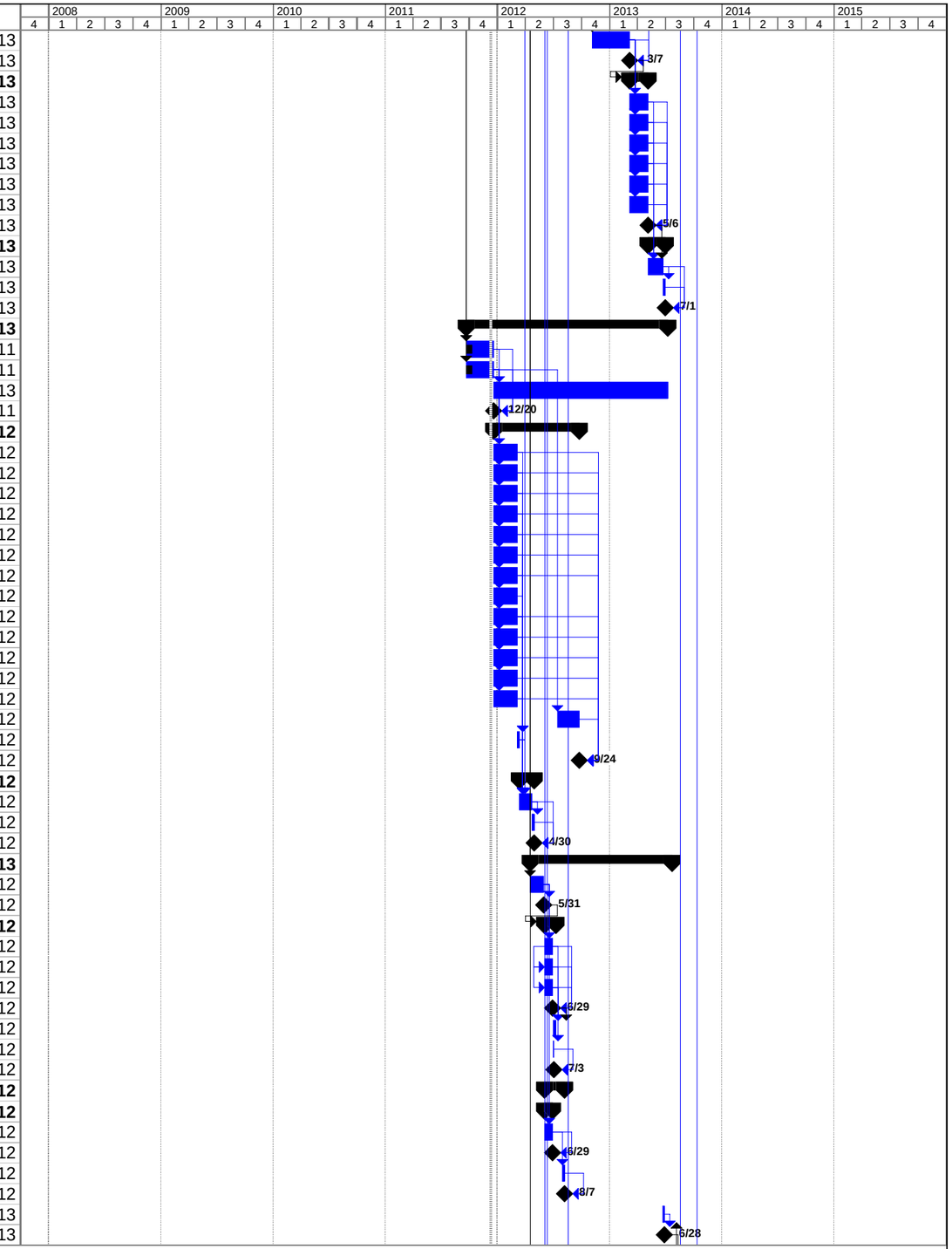
ID	WBS	Task Name	Work	Start	Finish
708	1.7.2.5.2	Design	20 hrs	11/6/12	3/7/13
709	1.7.2.5.3	Warm Piping System (LowNoise) Design Complete	0 hrs	3/7/13	3/7/13
710	**1.7.2.5.4**	**Procurement**	**0 hrs**	**3/8/13**	**5/6/13**
711	1.7.2.5.4.1	1/2" Tubing	0 hrs	3/8/13	5/6/13
712	1.7.2.5.4.2	1" NSP	0 hrs	3/8/13	5/6/13
713	1.7.2.5.4.3	3" NPS	0 hrs	3/8/13	5/6/13
714	1.7.2.5.4.4	1" FITTINGS	0 hrs	3/8/13	5/6/13
715	1.7.2.5.4.5	3" FITTINGS	0 hrs	3/8/13	5/6/13
716	1.7.2.5.4.6	Supports	0 hrs	3/8/13	5/6/13
717	1.7.2.5.5	All Warm Piping System (LowNoise) Procurements Delivered	0 hrs	5/6/13	5/6/13
718	**1.7.2.5.6**	**Warm Piping System Installation**	**500 hrs**	**5/7/13**	**7/1/13**
719	1.7.2.5.6.1	Install Warm Piping System	490 hrs	5/7/13	6/24/13
720	1.7.2.5.6.2	Leak Check (Vacuum)	10 hrs	6/25/13	7/1/13
721	1.7.2.5.7	Warm Piping System (Low Noise) Installation Complete	0 hrs	7/1/13	7/1/13
722	**1.7.2.6**	**Controls / Instrumentation**	**2,140 hrs**	**9/23/11**	**7/9/13**
723	1.7.2.6.1	Design (Designer Low Noise AIP)	240 hrs	9/23/11	12/20/11
724	1.7.2.6.2	Design (Engineering RHIC Ops)	100 hrs	9/23/11	12/20/11
725	1.7.2.6.3	Controls PLC logic Engineering / SCADA screens (Low Noise)	640 hrs	12/21/11	7/9/13
726	1.7.2.6.4	Controls / Instrumentation (Low Noise) Design Complete	0 hrs	12/20/11	12/20/11
727	**1.7.2.6.5**	**Procurement**	**0 hrs**	**12/21/11**	**9/24/12**
728	1.7.2.6.5.1	PLC Bucket	0 hrs	12/21/11	3/6/12
729	1.7.2.6.5.2	I/O Cards	0 hrs	12/21/11	3/6/12
730	1.7.2.6.5.3	Misc Instrumentation	0 hrs	12/21/11	3/6/12
731	1.7.2.6.5.4	Rack	0 hrs	12/21/11	3/6/12
732	1.7.2.6.5.5	RTD and heaters	0 hrs	12/21/11	3/6/12
733	1.7.2.6.5.6	Diodes	0 hrs	12/21/11	3/6/12
734	1.7.2.6.5.7	Lakeshore 218	0 hrs	12/21/11	3/6/12
735	1.7.2.6.5.8	SC Level probes	0 hrs	12/21/11	3/6/12
736	1.7.2.6.5.9	SC Level probes controller	0 hrs	12/21/11	3/6/12
737	1.7.2.6.5.10	Pressure Transmitters	0 hrs	12/21/11	3/6/12
738	1.7.2.6.5.11	MKS vacuum controller	0 hrs	12/21/11	3/6/12
739	1.7.2.6.5.12	MKS COLD CATHODE	0 hrs	12/21/11	3/6/12
740	1.7.2.6.5.13	MKS Pirani	0 hrs	12/21/11	3/6/12
741	1.7.2.6.5.14	Cables	0 hrs	7/16/12	9/24/12
742	1.7.2.6.6	Ship Diodes and SC Level Probes to Cryostat Vendor to Incorporate into Build	8 hrs	3/7/12	3/13/12
743	1.7.2.6.7	All Controls / Instrumentation (Low Noise) Procurements Delivered	0 hrs	9/24/12	9/24/12
744	**1.7.2.6.8**	**Controls / Instrumentation Installation**	**1,152 hrs**	**3/14/12**	**4/30/12**
745	1.7.2.6.8.1	Install Controls / Instrumentation	1,130 hrs	3/14/12	4/23/12
746	1.7.2.6.8.2	Leak Check (Vacuum)	22 hrs	4/24/12	4/30/12
747	1.7.2.6.9	Controls / Instrumentation (Low Noise) Installation Complete	0 hrs	4/30/12	4/30/12
748	**1.8**	**Conventional Facilities**	**1,136 hrs**	**4/18/12**	**7/23/13**
749	1.8.1	Design & Specification Development	160 hrs	4/18/12	5/31/12
750	1.8.2	Convent Fac Design & Specification Development Complete	0 hrs	5/31/12	5/31/12
751	**1.8.3**	**Procurement**	**0 hrs**	**6/4/12**	**7/10/12**
752	1.8.3.1	Sitework for Compressor Building	0 hrs	6/4/12	6/29/12
753	1.8.3.2	Compressor Building Structure	0 hrs	6/4/12	6/29/12
754	1.8.3.3	Compressor Building Foundation	0 hrs	6/4/12	6/29/12
755	1.8.3.4	Convent Fac Site work, Foundation & Structure Complete	0 hrs	6/29/12	6/29/12
756	1.8.3.5	Building Installation	0 hrs	7/2/12	7/10/12
757	1.8.4	Rigging for Slab Installation	16 hrs	7/2/12	7/3/12
758	1.8.5	Rigging for Slab Installation Complete	0 hrs	7/3/12	7/3/12
759	**1.8.6**	**Install power for compressor**	**80 hrs**	**6/4/12**	**8/7/12**
760	**1.8.6.1**	**Procurement**	**0 hrs**	**6/4/12**	**6/29/12**
761	1.8.6.1.1	Wire, Trays & Conduit	0 hrs	6/4/12	6/29/12
762	1.8.6.1.2	All Procured Wire, Trays & Conduits Delivered	0 hrs	6/29/12	6/29/12
763	1.8.6.2	Pull Wire, Install Tray & Conduit	80 hrs	8/1/12	8/7/12
764	1.8.6.3	Convent Fac Wire Pull, Tray & Conduit Install Complete	0 hrs	8/7/12	8/7/12
765	1.8.7	Rigging to Remove Shielding	200 hrs	6/24/13	6/28/13
766	1.8.8	Convent Fac Shielding Removed	0 hrs	6/28/13	6/28/13



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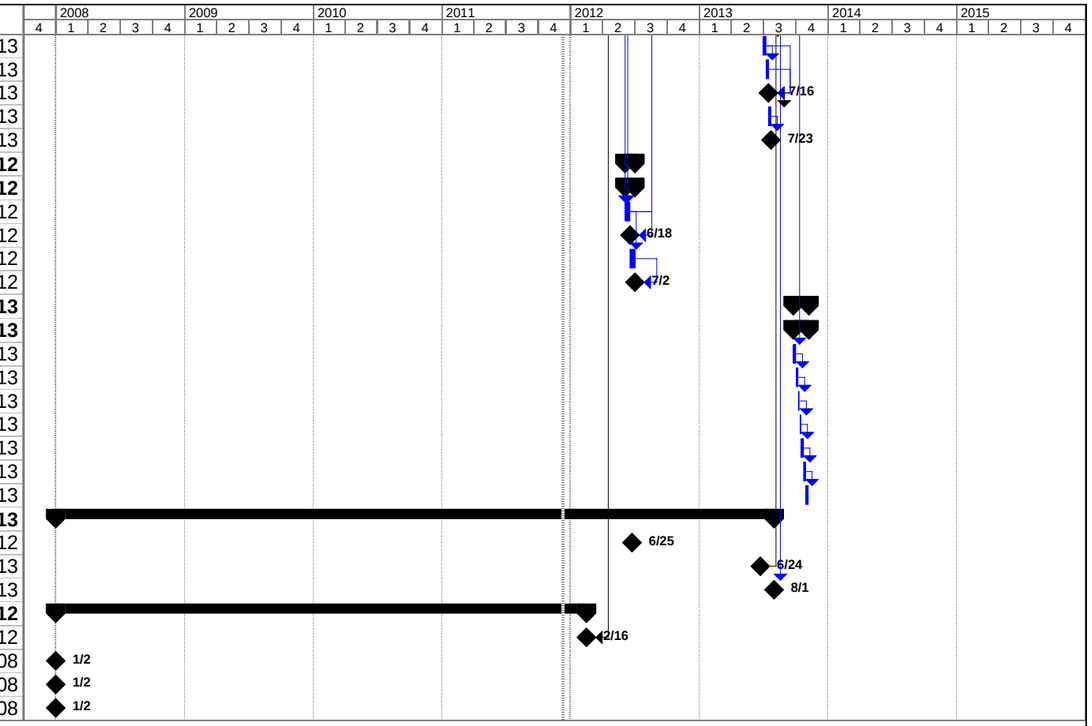
ID	WBS	Task Name	Work	Start	Finish
767	1.8.9	Rigging for Cavity Installation	200 hrs	7/1/13	7/9/13
768	1.8.10	Survey for Cavity Installation	120 hrs	7/10/13	7/16/13
769	1.8.11	Convent Fac Cavity Install and Survey Completed	0 hrs	7/16/13	7/16/13
770	1.8.12	Rigging to Replace Shielding	200 hrs	7/17/13	7/23/13
771	1.8.13	Convent Fac Shielding Replaced	0 hrs	7/23/13	7/23/13
772	**1.8.14**	**Horizontal Test Area**	**160 hrs**	**6/5/12**	**7/2/12**
773	**1.8.14.1**	**Block House**	**160 hrs**	**6/5/12**	**7/2/12**
774	1.8.14.1.1	Move and Arrange Blocks to Designated Area	160 hrs	6/5/12	6/18/12
775	1.8.14.1.2	Block House for Horizontal test completed	0 hrs	6/18/12	6/18/12
776	1.8.14.1.3	Provide Utilities to Block House	0 hrs	6/19/12	7/2/12
777	1.8.14.1.4	Block House Sourced with utilities	0 hrs	7/2/12	7/2/12
778	**1.9**	**Commissioning**	**144 hrs**	**9/25/13**	**11/8/13**
779	**1.9.1**	**Cryomodule**	**144 hrs**	**9/25/13**	**11/8/13**
780	1.9.1.1	Attach RF, instrumentation	16 hrs	9/25/13	10/3/13
781	1.9.1.2	Check connections and calibrate signals	24 hrs	10/4/13	10/9/13
782	1.9.1.3	Check controls	8 hrs	10/10/13	10/14/13
783	1.9.1.4	Check MPS, other interlocks	8 hrs	10/15/13	10/17/13
784	1.9.1.5	Cool-down to 4 K	40 hrs	10/18/13	10/24/13
785	1.9.1.6	Perform RF test	32 hrs	10/25/13	10/30/13
786	1.9.1.7	Test with beam	16 hrs	10/31/13	11/8/13
787	**1.10**	**Milestones**	**0 hrs**	**1/2/08**	**8/1/13**
788	1.10.1	2012 Summer RHIC Summer Shutdown	0 hrs	6/25/12	6/25/12
789	1.10.2	2013 Summer RHIC Summer Shutdown	0 hrs	6/24/13	6/24/13
790	1.10.3	Horizontal Test Complete	0 hrs	8/1/13	8/1/13
791	**1.10.4**	**Safety Building 912 Testing in Block House and Operation in RHIC**	**0 hrs**	**1/2/08**	**2/16/12**
792	1.10.4.1	ASSRC Review	0 hrs	2/16/12	2/16/12
793	1.10.4.2	RSC Review of 56MHz Cavity Testing and Operation	0 hrs	1/2/08	1/2/08
794	1.10.4.3	Accelerator R&D Division Head Approval for Testing	0 hrs	1/2/08	1/2/08
795	1.10.4.4	Accelerator Division Head Approval for Operation at RHIC	0 hrs	1/2/08	1/2/08



Project: J 56MHz Cavity Project Nov 4
Date: 12/9/11, 2:50 PM