



# *OsC mtg*

Alan Grant

# *MICE Finances - Forward Look*



# Budget Estimate FY2014/15 – Resource Loaded

Project Code	WP No	WP	Staff	Non- Staff	WP Total	Including Overheads@73%			Excluding Overheads					
						Staff	Non- Staff	Total	Staff	Non- Staff	Total			
STAK00014B - Resource	1	PM & PO	310	67	377	310	67	377	STAK00014B - Resource	179	67	246		
STAK00014 - Capital	2	Mechanical integration	135	85	220	1422	760	2182	STAK00014 - Capital	822	760	1582		
	3	Electrical Integration	259	193	452									
	4	Focus-coil module	101	82	183									
	5	Hydrogn Delivery System	36	61	97									
	6	RF power	237	166	403									
	7	Vacuum	29	46	75									
	8	Magnetic Mitigation	11	102	113									
9	Software and computing	14	25	39										
STAK00051 - Resource	10	Operations and analysis	335	176	511	335	176	511	STAK00051 - Resource	194	176	370		
						<b>2067</b>	<b>1003</b>	<b>3070</b>				<b>1195</b>	<b>1003</b>	<b>2198</b>

- Staff cost are STFC only
  - Includes 2.2FTE's of PPD staff - (Govans 100%, Hayes 70%, Tucker 50%)
- PPD staff not included are:-
  - 2.5FTE's - Preece 100%, Loader 50%, Ricciardi 50%, Tucker 50%
- Figures include risk mitigation costs of 205k
- Ops & Analysis staff costs assume 2 FTE of effort from ISIS - this helps to mitigate risk
- Figures do not include any external income - Common Fund or EuCard 122k



# Budget Estimate vs Current Allocation FY2014/15

OUTTURN REPORTING				Charlotte's Allocation Figure 4/2/14			
		Including O'Heads	Excluding O'Heads			Including O'Heads	Excluding O'Heads
<b>MICE Phase 2 (Capital)</b>	Reqns/M&O	760	760	<b>MICE Phase 2 (Capital)</b>	Reqns/M&O	407	407
STAK00014	Travel			STAK00014	Travel		
(STAK00058)	RAL TD/Other	822	822	(STAK00058)	RAL TD/Other	675	675
		<b>1582</b>	<b>1582</b>			<b>1082</b>	<b>1082</b>
<b>MICE Phase 2 (Resource)</b>	Reqns/M&O	67	67	<b>MICE Phase 2 (Resource)</b>	Reqns/M&O	105	105
STAK00014B	Travel			STAK00014B	Travel		
(STAK00061)	RAL TD/Other	310	179	(STAK00061)	RAL TD/Other	616	356
		<b>377</b>	<b>246</b>			<b>721</b>	<b>461</b>
<b>MICE Phase 2 (Resource)</b>	Reqns/M&O	176	176	<b>MICE Phase 2 (Resource)</b>	Reqns/M&O	184	184
STAK00051	Travel			STAK00051	Travel	15	15
	RAL TD/Other	335	194		RAL TD/Other	81	47
		<b>511</b>	<b>370</b>			<b>280</b>	<b>246</b>
	<b>Grand Total</b>	<b>2470</b>			<b>Grand Total</b>	<b>2083</b>	

- Projected shortfall in allocation £387k

## However!!

- Figures do include risk mitigation costs of 205k
- Figures do not include any external income - Common Fund or EuCard ~ 122k
- Ongoing - operational maintenance cost requirements, cranes, AC, chillers compressors need to be clearly understood



# Resource Loaded Forward Look Spend to Step VI

## Staff & Non Staff

Id	Work package Name	2014/15		2015/16		2016/17		2017/18		2018/19		2019/20		2020/21	
		Fraction	£k	Fraction	£k	Fraction	£k	Fraction	£k	Fraction	£k	Fraction	£k	Fraction	£k
<b>Total staff and non-staff by work package</b>															
<b>MICE-UK</b>															
1	Project management and project office		640.75		609.61		648.92		669.57		709.98		724.10		223.41
2	Mechanical integration		211.36		284.48		268.72		295.15		244.81		260.17		48.69
3	Electrical Integration		391.44		193.65		142.39		85.44		253.37		261.27		28.27
4	Focus-coil module		238.85		28.08		29.06		539.87		604.68		32.22		8.34
5	Hydrogen Delivery System		94.59		187.95		46.18		348.97		46.82		19.93		12.54
6	RF power		595.68		380.35		355.57		442.90		391.79		323.26		82.41
7	Vacuum		74.20		29.48		30.51		144.17		114.15		33.83		8.75
8	Magnetic Mitigation		112.98		61.23		26.62		12.03		148.22		62.89		3.33
9	Software and computing		176.12		170.10		204.34		211.14		218.18		225.47		65.75
10	Operations and analysis		981.46		1101.16		1121.30		1144.97		1182.88		1001.18		1036.22
<b>Grand totals</b>			<b>3517.43</b>		<b>3046.09</b>		<b>2873.62</b>		<b>3894.19</b>		<b>3914.88</b>		<b>2944.31</b>		<b>1517.73</b>
<b>MICE-UK</b>															
	<b>Cost of risk mitigation</b>		<b>205.00</b>		<b>160.00</b>		<b>10.00</b>		<b>50.00</b>		<b>302.00</b>		<b>338.00</b>		<b>50.00</b>
	Staff element		45.00		20.00		10.00		40.00		272.00		288.00		
	Non-staff element		160.00		140.00				10.00		30.00		50.00		50.00

- Mitigation/Contingency costs included in FY totals
- Assumes resource requirements positions are filled to deliver and operate MICE
- Essential resources:-
  - Operations Manager – *Position Filled (S Byod)*
  - Integration Scientist – *Position Filled (P Hanlet)*
  - Hall Manager – *Position Filled (J Govans)*
  - Cryo expert – *Position filled at 50% level (M Tucker)*
  - RF expert – *Position Filled (T Stanley)*
  - Agreement with ISIS for 2 technical staff this FY - increasing to 3 next FY for operations support



# STFC Staff & Non Staff Costs to Step VI

Id	Work package Name	2014/15		2015/16		2016/17		2017/18		2018/19		2019/20		2020/21	
		Fraction	£k	Fraction	£k	Fraction	£k	Fraction	£k	Fraction	£k	Fraction	£k	Fraction	£k
<b>STFC Staff effort, summary by Department</b>															
<b>MICE-UK</b>															
1	Project management and project office														
	STFC-PPD	2.50	216.74	2.50	224.33	2.50	232.18	2.50	240.30	2.25	221.79	2.25	229.55	0.63	66.61
	STFC-TD	1.90	206.43	1.90	213.65	1.90	221.13	1.90	228.87	1.90	236.88	1.90	245.17	0.48	63.44
2	Mechanical integration														
	STFC-TD	3.10	134.99	4.35	195.21	3.10	144.61	4.35	209.12	3.10	154.91	3.10	160.33	0.78	41.49
3	Electrical Integration														
	STFC-TD	5.08	258.79	2.42	134.19	2.08	117.84	1.37	85.44	1.93	120.37	1.76	109.27	0.44	28.27
4	Focus-coil module														
	STFC-PPD	0.50	27.13	0.50	28.08	0.50	29.06	0.50	30.08	0.50	31.13	0.50	32.22	0.13	8.34
	STFC-TD	1.30	66.31	0.00	0.00	0.00	0.00	1.30	73.52	0.53	29.06	0.00	0.00	0.00	0.00
5	Hydrogn Delivery System														
	STFC-TD	0.89	33.51	0.50	17.37	0.79	31.18	0.50	18.60	1.06	46.82	0.50	19.93	0.27	12.54
6	RF power														
	STFC-ASTEC	1.10	59.68	1.10	61.77	1.10	63.93	1.10	66.17	1.10	68.48	1.10	70.88	0.28	18.34
	STFC-TD	3.60	177.14	1.47	69.55	1.52	74.57	1.52	77.18	0.50	27.75	0.49	28.34	0.12	7.33
7	Vacuum														
	STFC-PPD	0.50	27.13	0.50	28.08	0.50	29.06	0.50	30.08	0.50	31.13	0.50	32.22	0.13	8.34
	STFC-TD	0.03	1.36	0.03	1.40	0.03	1.45	0.03	1.50	0.03	1.56	0.03	1.61	0.01	0.42
8	Magnetic Mitigation														
	STFC-TD	0.20	10.85	0.20	11.23	0.20	11.62	0.20	12.03	0.20	12.45	0.20	12.89	0.05	3.33
9	Software and computing														
	STFC-ASTEC	0.25	13.56	0.25	14.04	0.25	14.53	0.25	15.04	0.25	15.56	0.25	16.11	0.06	4.17
	STFC-PPD	0.00	0.00	0.00	0.00	1.00	45.95	1.00	47.56	1.00	49.22	1.00	50.95	0.25	13.18
10	Operations and analysis														
	STFC-ASTEC	0.25	23.46	0.25	24.29	0.25	25.14	0.25	26.02	0.25	26.93	0.25	27.87	0.25	28.84
	STFC-ISIS	2.00	148.42	3.00	230.42	3.00	238.48	3.00	246.83	3.00	255.47	3.00	264.41	3.00	273.67
	STFC-PPD	1.20	87.56	1.20	90.63	1.20	93.80	1.20	97.08	1.20	100.48	1.20	104.00	1.20	107.64
	STFC-TD	1.30	122.01	1.30	126.28	1.30	130.70	1.30	135.28	1.30	140.01	1.30	144.91	1.30	149.99
<b>Staff totals</b>		<b>25.69</b>	<b>1615.07</b>	<b>21.47</b>	<b>1470.51</b>	<b>21.21</b>	<b>1505.23</b>	<b>22.76</b>	<b>1640.69</b>	<b>20.59</b>	<b>1569.99</b>	<b>19.33</b>	<b>1550.65</b>	<b>9.35</b>	<b>835.92</b>
<b>Non-staff cost summary</b>															
<b>MICE-UK</b>															
1	Project management and project office		159.30		111.66		133.89		136.86		139.91		128.03		78.53
2	Mechanical integration		52.93		65.00		99.00		60.04		0.00		0.00		0.00
3	Electrical Integration		132.65		59.46		24.55		0.00		0.00		0.00		0.00
4	Focus-coil module		81.87		0.00		0.00		397.91		514.80		0.00		0.00
5	Hydrogn Delivery System		61.09		160.59		15.00		320.36		0.00		0.00		0.00
6	RF power		166.23		49.64		15.00		90.40		79.09		0.00		0.00
7	Vacuum		45.72		0.00		0.00		112.59		81.46		0.00		0.00
8	Magnetic Mitigation		102.13		50.00		15.00		0.00		135.77		50.00		0.00
9	Software and computing		25.38		10.00		10.00		10.00		10.00		10.00		10.00
10	Operations and analysis		175.93		179.95		205.29		210.36		215.56		0.00		0.00
<b>Non-staff totals</b>			<b>1003.19</b>		<b>686.29</b>		<b>517.73</b>		<b>1338.52</b>		<b>1176.58</b>		<b>188.03</b>		<b>88.53</b>
<b>Grand totals staff &amp; non staff</b>			<b>2618.26</b>		<b>2156.80</b>		<b>2022.95</b>		<b>2979.21</b>		<b>2746.58</b>		<b>1738.68</b>		<b>924.45</b>

- Figures include 2.5FTE from PPD
- Figures include 2FTE from ISIS FY14/15 – 3 FTE's there after

Osc mtg 24/4/2014



Science & Technology  
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## Resource Loaded Forward Look Spend to Step VI

- Flat cash allocation assumed - £3,050M excludes RG's
- STFC staff costs include overheads on resource project codes
  - **Wp 1 – PM & PO**
  - **Wp 10- Operations and Analysis**
- Risk mitigation costs included in Grand Totals
- Figures include 2 FTE of ISIS staff in operations & analysis wp FY14/15 – mitigates a lot of risks to the project. Rising to 3 FTE's from FY15/16 onwards.
- Figures include 4.7 FTE's of PPD staff each FY
- Income lines – Common Fund & Eu Card not included
- Proposed delivery of RFCC#2 in Sept 2019 means an allocation will be needed in 2019/20
- FC#3 large capital expenditure 2017/18/19



# Step IV Schedule





## Schedule Overview

- Schedule includes PRY for step IV following recommendations of the Magnetic Field Mitigation review panel.
- All compressors will be installed on the West Wall. Compressors will not be installed until August 2014.
- Magnet power supply and control racks will be installed in new rack room with full agreement of ISIS.
- Schedule identifies tasks with risk element & associated risk delay. Continually ongoing
- SS's & Tracker's assembled in R9 then moved to MICE Hall.
- Magnet training only begins after cooling channel and PRY is installed (this includes EMR, KL & TOF).
- 10 weeks for all magnet training after cooling channel is installed.



## Step IV Schedule - Shipping

ID	WBS	% Complete	Name	Milestone	Critical	Baseline Finish Date	Finish Date Includes Contingency 35%	Risk Level	Risk Impact
20	3	99%	Shipping	No	No	15/12/14	15/12/14		
35	3.2.2	0%	Spectrometer Solenoid Downstream	No	No	16/05/14	16/05/14		
36	3.2.2.1	0%	Downstream Solenoid arrives at RAL - milestone	No	No	08/05/14	16/05/14	(RISK)-(R3)	Late delivery - delays stepIV
41	3.3.4	0%	FC module #2 at RAL - milestone	Yes	No	01/05/14	01/05/14	(RISK)-(R3)	Late delivery - delays stepIV
42	3.4	0%	Liquid Hydrogen System	No	No	08/10/14	08/10/14		
45	3.4.3	0%	LH2 absorber #2 at RAL (KEK)	Yes	No	08/10/14	08/10/14		
54	3.8	0%	Diffuser	Yes	No	01/05/14	01/05/14		
55	3.8.1	0%	Diffuser delivered to RAL	Yes	No	01/05/14	01/05/14		
56	3.9	0%	Return Yoke	No	Yes	15/12/14	15/12/14		
57	3.9.1	0%	South side yoke frame steelwork delivered	Yes	Yes	15/04/14	11/08/14	(RISK)-(R2)	Contractor late delivery
58	3.9.2	0%	South side yoke wall material delivered	Yes	Yes	15/04/14	24/10/14	(RISK)-(R2)	Contractor late delivery
59	3.9.3	0%	North side yoke frame steelwork delivered	Yes	No	15/07/14	15/12/14	(RISK)-(R2)	Contractor late delivery
60	3.9.4	0%	North side yoke material delivered	Yes	No	15/07/14	15/12/14	(RISK)-(R2)	Contractor late delivery

- RF system - TIARA**

- RF distribution equipment delivered TH116 installed, 4616 pre amplifier installed, water services panel installed. Racks and control system now returned to Daresbury for commissioning second amplifier system.

- Upstream Spectrometer Solenoid - Delivered**

- Downstream Spectrometer Solenoid - Expected May 2014**

- AFC #2 – Expected May 2014**

- EMR – Delivered and testing complete**

- Diffuser – Available at Oxford**

- PRY – South Yoke delivery delayed frame now expected mid August, plates to follow late October. North Yoke frame & plates now expected mid December**

(Risk)-(R1) 80day delay

(Risk)-(R2) 40day delay

(Risk)-(R3) 20day delay

(Risk)-(R4) 10day delay



# Step IV Schedule - Pre Installation R9

ID	WBS	% Complete	Name	Milestone	Critical	Baseline Finish Date	Finish Date Includes Contingency 35%	Risk Level	Risk Impact
62	4	77%	<b>Pre Installation Work</b>	No	No	18/08/14	05/09/14		
76	4.4	85%	<b>AFC#1 Field tests R9</b>	No	Yes	18/08/14	05/09/14		
92	4.4.5	0%	AFC installed in R9 ready for field mapping - milestone	Yes	Yes	23/06/14	23/06/14	(RISK)-(R3)	Tesla withdraw from rectification of AFC#1
93	4.4.6	0%	Field Mapping at full field	No	Yes	11/08/14	28/08/14		
94	4.4.6.1	0%	Set-up	No	Yes	30/06/14	02/07/14		
95	4.4.6.2	0%	Mapping	No	Yes	14/07/14	22/07/14		
96	4.4.6.3	0%	AFC #1 field mapping in R9 complete	Yes	Yes	14/07/14	22/07/14		
97	4.4.6.4	0%	Absorber installation, vacuum leak check, sensor check	No	Yes	11/08/14	28/08/14		
98	4.4.7	0%	Dismantle AFC#1 in R9	No	Yes	18/08/14	05/09/14		
99	4.4.7.1	0%	Disconnect all services	No	Yes	14/08/14	03/09/14		
100	4.4.7.2	0%	Transfer to MICE Hall	No	Yes	18/08/14	05/09/14		
101	4.4.7.3	0%	AFC#1 ready for installation in MICE Hall - milestone	Yes	Yes	18/08/14	05/09/14	(RISK)-(R2)	Need working magnet if not for stepIV then
102	4.5	56%	<b>Spectrometer Solenoid - Upstream</b>	No	No	14/05/14	20/05/14		
106	4.5.4	0%	Install diffuser	No	No	14/05/14	20/05/14		
107	4.6	99%	Tracker Installation - Upstream	No	Yes	04/04/14	21/05/14		
146	4.7	0%	Upstream Solenoid & Tracker Assy complete	No	No	04/06/14	09/06/14	(RISK)-(R4)	Tracker installation may take longer than ex
147	4.8	0%	<b>Spectrometer Solenoid - Downstream</b>	No	No	06/06/14	16/06/14		
148	4.8.1	0%	Downstream Spectrometer Solenoid Installation	No	No	23/05/14	27/05/14	(RISK)-(R3)	Maybe some space floor space issues in R9
149	4.8.2	0%	Clean up area of magnetic components	No	No	13/05/14	14/05/14		
150	4.8.3	0%	Vacuum pump down	No	No	06/06/14	16/06/14		
151	4.9	0%	<b>Tracker Installation - Downstream</b>	No	No	04/08/14	29/08/14		
152	4.9.1	0%	Clear area for tracker installation	No	No	05/06/14	11/06/14		
180	4.10	0%	Downstream Solenoid & Tracker Assy complete	Yes	No	10/07/14	29/07/14	(RISK)-(R3)	Tracker installation may take longer than ex

- Trackers installed into Spectrometer Solenoids in R9 and then transferred to MICE Hall
- Upstream tracker installation complete
- AFC 1 & 2 magnet training and commissioning carried out in R9
- AFC field mapping carried out in R9 – this cannot be done in MICE Hall

(Risk)-(R1) 80day delay

(Risk)-(R2) 40day delay

(Risk)-(R3) 20day delay

(Risk)-(R4) 10day delay



# Mechanical Integration Work in Hall

ID	WBS	% Complete	Name	Milestone	Critical	Baseline Finish Date	Risk Level	Risk Impact
182	5	80%	Installation	No	Yes	20/02/15		
219	5.1.3	69%	West Wall Mezz & Compressors	No	No	09/10/14		
282	5.1.3.4.9	0%	Hall Modifications Complete	Yes	Yes	29/04/14	(RISK)-(R4)	Contractors late making hall mods
283	5.1.3.5	26%	Compressor Services (infrastructure)	No	No	30/06/14		
290	5.1.3.5.7	0%	West Mezz Compressor Installation	No	No	25/03/14		
291	5.1.3.5.8	0%	Services at South Mezz Stairs	No	No	20/03/14		
292	5.1.3.5.9	0%	Compressor water services (incl trench?)	No	No	30/06/14	(RISK)-(R2)	Contractors late completing compressor services
293	5.1.3.5.10	0%	Sign Off / Complete	Yes	No	30/06/14	(RISK)-(R2)	Contractors late completing compressor services
294	5.1.3.6	0%	Compressor & Services (feed) Support	No	Yes	03/06/14		
301	5.1.3.6.7	0%	Sign Off / Complete	Yes	Yes	03/06/14	(RISK)-(R4)	Contractors late completing compressor services
302	5.1.3.7	65%	Compressor Installation & Commissioning	No	No	09/10/14		
305	5.1.3.7.3	0%	Install Compressor AFC	No	Yes	10/06/14		
306	5.1.3.7.4	0%	Install Compressors SS1	No	Yes	26/05/14		
307	5.1.3.7.5	0%	Install Compressors SS2	No	Yes	02/06/14		
308	5.1.3.7.6	0%	Run high pressure hoses x 2 + power cable	No	No	22/09/14		
309	5.1.3.7.7	0%	Fit West Mezz Walkway Sections	No	No	25/09/14		
310	5.1.3.7.8	0%	Commissioning	No	No	09/10/14		
311	5.1.3.7.9	0%	Sign Off / Complete - milestone	Yes	No	09/10/14	(RISK)-(R4)	Delays in compressor installation - delay stepIV
312	5.1.4	67%	Rack Room 2	No	No	13/11/14		
323	5.1.4.2	72%	Buildings Work	No	No	24/06/14		
328	5.1.4.2.5	75%	Build (door, cable route in walls hall, flooring)	No	No	04/03/14		(Risk)-(R1) 80day delay
329	5.1.4.2.6	0%	New signage tidy up etc	No	No	06/03/14		(Risk)-(R2) 40day delay
330	5.1.4.2.7	0%	Snagging	No	No	13/03/14		(Risk)-(R3) 20day delay
333	5.1.4.2.10	0%	Mechanical Services flooring, cooling	No	No	24/06/14		(Risk)-(R4) 10day delay
334	5.1.4.2.11	0%	Complete	Yes	No	24/06/14		
335	5.1.4.3	55%	Services Management	No	No	01/09/14		
337	5.1.4.3.2	0%	Install cable tray & ductwork	No	No	01/09/14		
338	5.1.4.3.3	0%	Sign Off / Complete	Yes	No	01/09/14	(RISK)-(R4)	Contractors late completing services work for Rack room
339	5.1.4.4	0%	Rack Room Prep	No	No	13/11/14		
340	5.1.4.4.1	0%	Install Power & other services	No	No	29/09/14		
341	5.1.4.4.2	0%	Install Racks	No	No	10/11/14		
342	5.1.4.4.3	0%	Commission	No	No	13/11/14		
343	5.1.4.4.4	0%	Sign Off / Complete	Yes	No	13/11/14	(RISK)-(R3)	Contractors late completing prep work for Rack room



# Step IV - Installation

ID	WBS	% Complete	Name	Milestone	Critical	Baseline Finish Date	Finish Date Includes Contingency 35%	Risk Level	Risk Impact
866	5.4	50%	<b>MICE Step IV Installation</b>	No	No	11/02/15	18/03/15		
905	5.4.5	0%	<b>Return Yoke</b>	No	Yes	26/01/15	23/02/15		
906	5.4.5.1	0%	Install south side return yoke frame	No	Yes	29/08/14	04/09/14		
907	5.4.5.2	0%	Fit Yoke mount services management	No	Yes	05/09/14	15/09/14		
908	5.4.5.3	0%	Fit South Mezz front edge	No	Yes	19/09/14	02/10/14		
909	5.4.5.4	0%	Fit south side yoke plates	No	Yes	06/11/14	12/11/14		
910	5.4.5.5	0%	South side return yoke installation complete	Yes	Yes	06/11/14	12/11/14	(RISK)-(R4)	
911	5.4.5.6	0%	Install north side return yoke	No	Yes	26/01/15	23/02/15		
912	5.4.5.7	0%	North side return yoke installation complete	Yes	Yes	26/01/15	23/02/15	(RISK)-(R4)	
913	5.4.6	0%	<b>AFC - Focus coil for step IV</b>	No	Yes	11/02/15	18/03/15		
914	5.4.6.1	0%	AFC#1 Installation	No	Yes	14/01/15	09/02/15		
915	5.4.6.1.1	0%	Installation, survey & alignment of AFC#1	No	Yes	01/09/14	03/09/14		
916	5.4.6.1.2	0%	Connection of services	No	No	15/09/14	22/09/14		
917	5.4.6.1.3	0%	Cool down	No	No	14/01/15	09/02/15		
933	5.4.7	0%	<b>Upstream Spectrometer Solenoid &amp; Tracker Assy</b>	No	No	20/01/15	16/02/15		
934	5.4.7.1	0%	Install & survey upstream SS & Tracker Assy in Mice Hall	No	Yes	25/06/14	07/05/14		
935	5.4.7.2	0%	Install Virostek plate	No	No	30/06/14	13/05/14		
936	5.4.7.3	0%	Clean up area of magnetic components	No	No	06/06/14	17/04/14		
937	5.4.7.4	0%	Cool down spectrometer	No	No	20/01/15	16/02/15		(Risk)-(R1) 80day delay
938	5.4.8	0%	<b>Downstream Spectrometer Solenoid &amp; Tracker Assy</b>	No	Yes	26/01/15	23/02/15		
939	5.4.8.1	0%	Install & survey downstream SS & Tracker Assy in Mice Hall	No	Yes	13/11/14	21/11/14		(Risk)-(R2) 40day delay
940	5.4.8.2	0%	Install Virostek plate	No	No	18/11/14	27/11/14		(Risk)-(R3) 20day delay
941	5.4.8.3	0%	Clean up area of magnetic components	No	No	10/11/14	17/11/14		(Risk)-(R4) 10day delay
942	5.4.8.4	0%	Cool down spectrometer	No	No	26/01/15	23/02/15		
943	5.4.9	0%	Re-install TOF2, KL, EMR	No	Yes	02/02/15	04/03/15		
944	5.4.10	0%	<b>MICE step IV installation complete</b>	Yes	Yes	02/02/15	04/03/15		
946	6	0%	<b>Commissioning</b>	No	Yes	18/05/15	13/05/15		
947	6.1	0%	Spectrometer Solenoid preparation for lattice operation	No	Yes	09/03/15	08/04/15	(RISK)-(R2)	Items found to be non operational in field ra
948	6.2	0%	Combined magnet operation	No	Yes	13/04/15	13/05/15	(RISK)-(R2)	Extended period for training all magnets tog
949	6.3	0%	<b>Combined magnet operational tests complete - milestone</b>	Yes	Yes	13/04/15	13/05/15		

- Magnet training can only begin after North PRY is installed and control racks have been commissioned in RR2
- 5 weeks for SS – 24/7 training operations to maximise US manpower investment in UK
- 5 weeks for combined magnet operation
- Step IV cooling channel installation completion - March 2015
- Magnet commissioning complete – mid May 2015



# Step IV Critical Path - 1

% Com	WBS	Task Name	Baseline Estimated Finish	Finish	Risk Level
99%	3	Shipping	15/12/14	15/12/14	
0%	3.9	Return Yoke	15/12/14	15/12/14	
0%	3.9.1	South side yoke frame steelwork delivered	15/04/14	11/08/14	(RISK)-(R2)
0%	3.9.2	South side yoke wall material delivered	15/04/14	24/10/14	(RISK)-(R2)
77%	4	Pre Installation Work	18/08/14	05/09/14	
85%	4.4	AFC#1 Field tests R9	18/08/14	05/09/14	
0%	4.4.5	AFC installed in R9 ready for field mapping - milestone	23/06/14	23/06/14	(RISK)-(R3)
0%	4.4.6	Field Mapping at full field	11/08/14	28/08/14	
0%	4.4.6.1	Set-up	30/06/14	02/07/14	
0%	4.4.6.2	Mapping	14/07/14	22/07/14	
0%	4.4.6.3	AFC #1 field mapping in R9 complete	14/07/14	22/07/14	
0%	4.4.6.4	Absorber installation, vacuum leak check, sensor check	11/08/14	28/08/14	
0%	4.4.7	Dismantle AFC#1 in R9	18/08/14	05/09/14	
0%	4.4.7.1	Disconnect all services	14/08/14	03/09/14	
0%	4.4.7.2	Transfer to MICE Hall	18/08/14	05/09/14	
0%	4.4.7.3	AFC#1 ready for installation in MICE Hall - milestone	18/08/14	05/09/14	(RISK)-(R2)
99%	4.6	Tracker Installation - Upstream	21/05/14	21/05/14	
76%	5	Installation	11/02/15	18/03/15	
75%	5.1	Infrastructure	23/01/15	19/02/15	
99%	5.1.1	Mechanical	09/10/13	09/10/13	
64%	5.1.3	West Wall Mezz & Compressors	16/12/14	19/01/15	
99%	5.1.3.3	West Mezz Build & Associated	04/02/14	04/02/14	
99%	5.1.3.3.7	Sign Off / Complete - milestone	04/02/14	04/02/14	(RISK)-(R3)
90%	5.1.3.4	Related Hall Modifications	21/05/14	28/05/14	
42%	5.1.3.4.1	PPS	21/05/14	28/05/14	
0%	5.1.3.4.1.3	PPS (DL)	14/05/14	20/05/14	
0%	5.1.3.4.1.4	Commissioning Test and Approval	21/05/14	28/05/14	
0%	5.1.3.4.9	Hall Modifications Complete	21/05/14	28/05/14	(RISK)-(R4)
0%	5.1.3.6	Compressor & Services (feed) Support	25/06/14	15/07/14	
0%	5.1.3.6.1	Manufacture - purchase of parts	25/04/14	26/05/14	
0%	5.1.3.6.2	Install Hose - Power Management Cable trays	28/05/14	06/06/14	
0%	5.1.3.6.3	Install Hose - Power Management Cable 'Tidy'	04/06/14	17/06/14	
0%	5.1.3.6.4	Install Fans under Compressor Positions (?)	11/06/14	26/06/14	
0%	5.1.3.6.6	Wire Up Isolators in Stands	25/06/14	15/07/14	
0%	5.1.3.6.7	Sign Off / Complete	25/06/14	15/07/14	(RISK)-(R4)
58%	5.1.3.7	Compressor Installation & Commissioning	16/12/14	19/01/15	
0%	5.1.3.7.3	Install Compressor AFC	02/07/14	24/07/14	
0%	5.1.3.7.4	Install Compressors SS1	26/05/14	28/05/14	
0%	5.1.3.7.5	Install Compressors SS2	02/06/14	06/06/14	

South PRY delivery

AFC Field Mapping –  
may not be required TBA

Compressor installation –  
infrastructure work

(Risk)-(R1) 80day delay

(Risk)-(R2) 40day delay

(Risk)-(R3) 20day delay

(Risk)-(R4) 10day delay



# Step IV Critical Path - 2

% Com	WBS	Task Name	Baseline Estimated Finish	Finish	Risk Level
63%	5.1.7	Electrical & Control System version Jan 2014	23/01/15	19/02/15	
26%	5.1.7.5	Cooling Channel Compressors/Vac - Electrical & Controls	07/08/14	10/09/14	
5%	5.1.7.5.3	Vac & Compressor equipment Hall installation	07/08/14	10/09/14	
0%	5.1.7.5.3.9	Install and terminate local cabling to 3 phase outlets (19)	08/07/14	01/08/14	
0%	5.1.7.5.3.10	Install Cooling Channel Compressor/vac controls rack	10/07/14	05/08/14	
0%	5.1.7.5.3.11	AFC	03/07/14	03/07/14	
0%	5.1.7.5.3.11.1	Install local Compressors control cabling	22/07/14	20/08/14	
0%	5.1.7.5.3.11.2	Install / terminate AC distribution to rack	14/07/14	08/08/14	
0%	5.1.7.5.3.11.3	Test and certify all AC distribution	17/07/14	13/08/14	
0%	5.1.7.5.3.11.4	Install and terminate local controls cabling at Rack	24/07/14	22/08/14	
0%	5.1.7.5.3.11.5	Electrical / control commissioning of compressors/vac	30/07/14	01/09/14	
0%	5.1.7.5.3.11.6	Install cable management to Cold heads	04/08/14	05/09/14	
0%	5.1.7.5.3.11.7	Install / terminate cold head cables	07/08/14	10/09/14	
0%	5.1.7.5.3.11.8	Compressors - electrically ready	07/08/14	10/09/14	(RISK)-(R4)
11%	5.1.7.12	Rack Room 2 and Hall Installation	23/01/15	19/02/15	
0%	5.1.7.12.14	AFC Electrical / controls installation	14/01/15	09/02/15	
0%	5.1.7.12.14.3	AFC#1	24/10/14	24/10/14	
0%	5.1.7.12.14.3.1	AFC#1 Mechanically installed in MICE Hall	13/10/14	13/10/14	(RISK)-(R4)
0%	5.1.7.12.14.3.2	Finalise cable management to AFC#1	14/11/14	24/11/14	
0%	5.1.7.12.14.3.3	Install cables for AFC#1 from RR2	24/11/14	04/12/14	
0%	5.1.7.12.14.3.4	Install cable junction box	26/11/14	09/12/14	
0%	5.1.7.12.14.3.5	Terminate cables at AFC#1 & racks	10/12/14	09/01/15	
0%	5.1.7.12.14.3.6	Electrically commission Racks at RAL	07/01/15	29/01/15	
0%	5.1.7.12.14.3.7	Electrical & controls available for AFC#1 MICE Hall testing	07/01/15	29/01/15	(RISK)-(R4)
0%	5.1.7.12.14.3.8	Update drawings to AS built / installed	14/01/15	09/02/15	
0%	5.1.7.12.15	SS Electrical / controls installation	23/01/15	19/02/15	
0%	5.1.7.12.15.7	SS#2	23/01/15	19/02/15	
0%	5.1.7.12.15.7.1	SS#2 Mechanically installed in MICE Hall	13/11/14	21/11/14	(RISK)-(R4)
0%	5.1.7.12.15.7.2	Finalise cable management to SS#2	19/11/14	28/11/14	
0%	5.1.7.12.15.7.3	Install cables for SS#2 from RR2	01/12/14	15/12/14	
0%	5.1.7.12.15.7.4	Install cable junction box	03/12/14	17/12/14	
0%	5.1.7.12.15.7.5	Terminate cables at SS#2 & racks	15/12/14	15/01/15	

Large amount of work for electrical team

Dictated by the delivery and availability of key items, magnets, racks and PRY

(Risk)-(R1) 80day delay

(Risk)-(R2) 40day delay

(Risk)-(R3) 20day delay

(Risk)-(R4) 10day delay

# Step IV Critical Path - 3

% Com	WBS	Task Name	Baseline Finish	Finish	Risk Level
50%	5.4	<input type="checkbox"/> MICE Step IV Installation	11/02/15	18/03/15	
0%	5.4.5	<input type="checkbox"/> Return Yoke	26/01/15	23/02/15	
0%	5.4.5.1	Install south side return yoke frame	29/08/14	04/09/14	
0%	5.4.5.2	Fit Yoke mount services management	05/09/14	15/09/14	
0%	5.4.5.3	Fit South Mezz front edge	19/09/14	02/10/14	
0%	5.4.5.4	Fit south side yoke plates	06/11/14	12/11/14	
0%	5.4.5.5	South side return yoke installation complete	06/11/14	12/11/14	(RISK)-(R4)
0%	5.4.5.6	Install north side return yoke	26/01/15	23/02/15	
0%	5.4.5.7	North side return yoke installation complete	26/01/15	23/02/15	(RISK)-(R4)
0%	5.4.6	<input type="checkbox"/> AFC - Focus coil for step IV	11/02/15	18/03/15	
0%	5.4.6.1	<input type="checkbox"/> AFC#1 Installation	14/01/15	09/02/15	
0%	5.4.6.1.1	Installation, survey & alignment of AFC#1	01/09/14	03/09/14	
0%	5.4.7	<input type="checkbox"/> Upstream Spectrometer Solenoid & Tracker Assy	20/01/15	16/02/15	
0%	5.4.7.1	Install & survey upstream SS & Tracker Assy in Mice Hall	25/06/14	07/05/14	
0%	5.4.8	<input type="checkbox"/> Downstream Spectrometer Solenoid & Tracker Assy	26/01/15	23/02/15	
0%	5.4.8.1	Install & survey downstream SS & Tracker Assy in Mice Hall	13/11/14	21/11/14	
0%	5.4.9	Re-install TOF2, KL, EMR	02/02/15	04/03/15	
0%	5.4.10	MICE step IV installation complete	02/02/15	04/03/15	
0%	6	<input type="checkbox"/> Commissioning	18/05/15	13/05/15	
0%	6.1	Spectrometer Solenoid preparation for lattice operation	09/03/15	08/04/15	(RISK)-(R2)
0%	6.2	Combined magnet operation	13/04/15	13/05/15	(RISK)-(R2)
0%	6.3	Combined magnet operational tests complete - milestone	13/04/15	13/05/15	

(Risk)-(R1) 80day delay

(Risk)-(R2) 40day delay

(Risk)-(R3) 20day delay

(Risk)-(R4) 10day delay

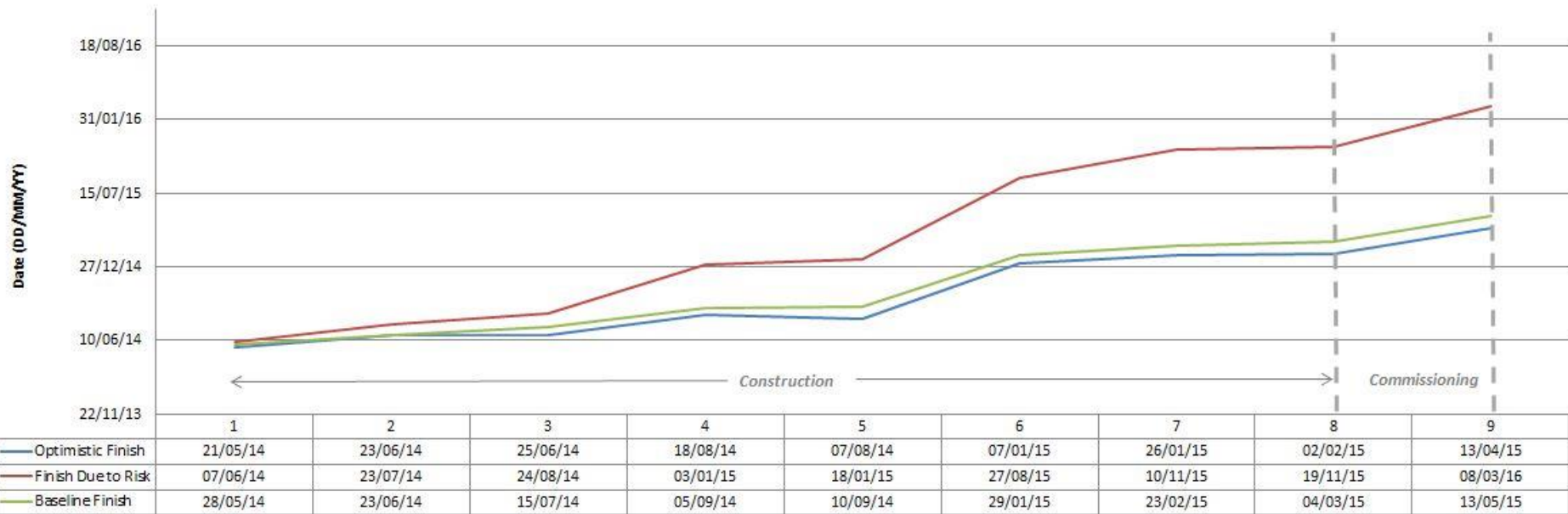




# Step IV – Critical Path (Filtered)

ID	WBS	% Complete	Name	Milestone	Critical	Optimistic Finish	Baseline Finish	Risk Level	Risk Impact	Finish due to Risk
282	5.1.3.4.9	0%	Hall Modifications Complete	Yes	Yes	21/05/14	28/05/14	(RISK)-(R4)	Contractors late making hall mods	07/06/14
92	4.4.5	0%	AFC installed in R9 ready for field mapping - r	Yes	Yes	23/06/14	23/06/14	(RISK)-(R3)	Tesla withdraw from rectification of AFC#1	23/07/14
301	5.1.3.6.7	0%	Sign Off / Complete	Yes	Yes	25/06/14	15/07/14	(RISK)-(R4)	Contractors late completing compressor services	24/08/14
101	4.4.7.3	0%	AFC#1 ready for installation in MICE Hall - mi	Yes	Yes	18/08/14	05/09/14	(RISK)-(R2)	Need working magnet if not for stepIV then stepV	03/01/15
552	5.1.7.5.3.11.8	0%	Compressors - electrically ready	Yes	Yes	07/08/14	10/09/14	(RISK)-(R4)		18/01/15
719	5.1.7.12.14.3.7	0%	Electrical & controls available for AFC#1 MIC	Yes	Yes	07/01/15	29/01/15	(RISK)-(R4)		27/08/15
912	5.4.5.7	0%	North side return yoke installation complete	Yes	Yes	26/01/15	23/02/15	(RISK)-(R4)		10/11/15
944	5.4.10	0%	MICE step IV installation complete	Yes	Yes	02/02/15	04/03/15			19/11/15
950	6.4	0%	Combined magnet operational tests complete	Yes	Yes	13/04/15	13/05/15			08/03/16

**Critical Path Tasks**



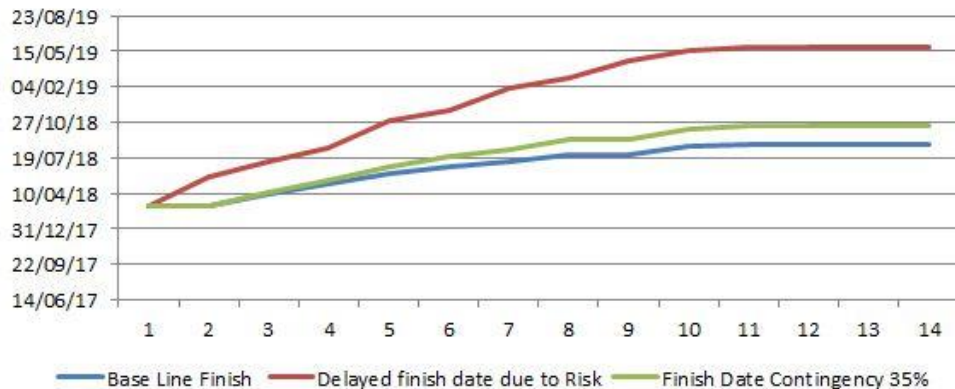
- Optimistic schedule
- 35% contingency applied to all tasks on the Optimistic schedule
- All identified risk delays scheduled
- Need to closely monitor and re-assess risks regularly



# Step V (Transitional Schedule) – Critical Path

ID	WBS	Name	Milestone	Critical	Baseline Finish Date	Finish Date Includes Contingency 35%	Risk Level	Risk Impact	Delayed Finish due to Risk
41	3.4	Cavities & RFCC's	Yes	Yes	06/03/18	06/03/18			06/03/18
42	3.4.1	Cavity & RFCC module #1 delivered to RAL	Yes	Yes	06/03/18	06/03/18	(RISK)-(R1)	Late delivery - delays stepV	25/05/18
247	5.3.7.3	Install RFFC module #1 and align	No	Yes	09/04/18	11/04/18	(RISK)-(R3)	Installation problems - Delays to step V	10/07/18
248	5.3.7.4	Cooldown RFFC #1	No	Yes	07/05/18	18/05/18			16/08/18
249	5.3.7.5	RFFC magnet test period	No	Yes	04/06/18	26/06/18	(RISK)-(R2)	Magnet test problems - Delay to step V	03/11/18
250	5.3.7.6	Connect RF wave guides	No	Yes	25/06/18	24/07/18			01/12/18
251	5.3.7.7	RF Amplifier test period	No	Yes	09/07/18	13/08/18	(RISK)-(R2)	RF amplifier test problems - Delays to step V	30/01/19
244	5.3.7	RFCC #1 Installation	No	Yes	30/07/18	10/09/18			27/02/19
252	5.3.7.8	RFFC test period	No	Yes	30/07/18	10/09/18	(RISK)-(R2)	Commissioning problems - Delays to step V	18/04/19
253	5.3.8	Spectrometer Solenoid #2 installation	No	Yes	20/08/18	08/10/18	(RISK)-(R4)	Installation issues	16/05/19
98	5	Installation	No	Yes	27/08/18	17/10/18			25/05/19
212	5.3	MICE Step V Installation	No	Yes	27/08/18	17/10/18			25/05/19
254	5.3.9	Re-install TOF2, KL & EMR	No	Yes	27/08/18	17/10/18			25/05/19
255	5.3.10	MICE step V installation complete	Yes	Yes	27/08/18	17/10/18			25/05/19

Critical Path Tasks



## Step V – Key Deliverables

- **RFCC** – March 2018, risk level 1
- **Hydrogen system 2** – Late 2015
- **RF system** – Early 2015
- **PRY** – not planned for in detail as yet!!

(Risk)-(R1) 80day delay

(Risk)-(R2) 40day delay

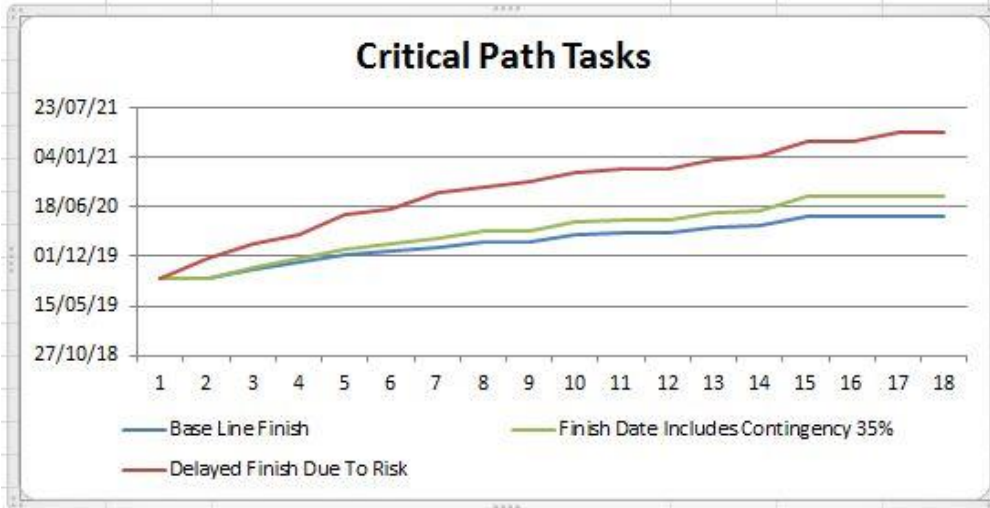
(Risk)-(R3) 20day delay

(Risk)-(R4) 10day delay

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# Step VI Schedule – Critical Path

ID	WBS	Name	Milestone	Critical	Baseline Finish Date	Finish Date Includes Contingency 35%	Risk Level	Risk Impact	Delayed Finish due to Risk
21	2.4	Cavities & RFCC's	Yes	Yes	06/09/19	06/09/19			06/09/19
22	2.4.1	Cavity & RFCC module #2 delivered to RAL	Yes	Yes	06/09/19	06/09/19	(RISK)-(R1)	Late delivery - Delays to step VI	25/11/19
202	4.3.9.3	Install RFCC module #2 and align	No	Yes	10/10/19	14/10/19	(RISK)-(R3)	Installation problems - Delays to step VI	22/01/20
203	4.3.9.4	Cooldown RFCC #2	No	Yes	07/11/19	20/11/19			28/02/20
204	4.3.9.5	RFCC magnet test period	No	Yes	05/12/19	27/12/19	(RISK)-(R2)	Magnet test problems - Delays to step VI	15/05/20
205	4.3.9.6	Connect RF wave guides	No	Yes	26/12/19	24/01/20			12/06/20
206	4.3.9.7	RF Amplifier test period	No	Yes	09/01/20	13/02/20	(RISK)-(R2)	RF amplifier test problems - Delays to step VI	11/08/20
199	4.3.9	RFCC #2 Installation	No	Yes	30/01/20	12/03/20			08/09/20
207	4.3.9.8	RFCC absorber test period	No	Yes	30/01/20	12/03/20	(RISK)-(R3)	Absorber problems	28/09/20
197	4.3.8.5	AFC #3 magnet test period	No	Yes	27/02/20	20/04/20			06/11/20
192	4.3.8	AFC #3 Installation	No	Yes	05/03/20	29/04/20			15/11/20
198	4.3.8.6	Connect R&D LH2 system	No	Yes	05/03/20	29/04/20			15/11/20
208	4.3.10	Spectrometer Solenoid #2 Installation	No	Yes	26/03/20	27/05/20	(RISK)-(R4)	Installation issues	23/12/20
209	4.3.11	Re-install TOF2, KL & EMR	No	Yes	02/04/20	05/06/20	(RISK)-(R4)	Installation issues	11/01/21
52	4	Installation	No	Yes	14/05/20	31/07/20			08/03/21
165	4.3	MICE Step VI Installation	No	Yes	14/05/20	31/07/20			08/03/21
210	4.3.12	Combined magnet operational tests	No	Yes	14/05/20	31/07/20	(RISK)-(R2)	Combined magnet operation problems	17/04/21
211	4.3.13	MICE step VI installation complete	Yes	Yes	14/05/20	31/07/20			17/04/21



## Step VI – Key Deliverables

- **RFCC** – Sept 2019, risk level 1
- **AFC** – April 2018
- **Hydrogen system 3** – Late 2017
- **RF amplifier systems** – November 2017
- **PRY** – not planned for in detail as yet!!

(Risk)-(R1) 80day delay

(Risk)-(R2) 40day delay

(Risk)-(R3) 20day delay

(Risk)-(R4) 10day delay

# Schedule Summary

	Optimistic Finish Date	Finish Date Includes Contingency 35%	Delayed Finish date due to Risks
Step IV Installation	2/2/15	4/3/15	19/11/15
Step IV magnet commissioning	13/4/15	13/5/15	8/3/16
Step V	27/8/18	17/10/18	25/5/19
Step VI	14/5/20	31/7/20	17/4/21

## Step IV

- **Critical path - driven by Hall infrastructure work, PRY and AFC mapping.**
  - Still to be agreed if the AFC needs to be mapped.
- **South PRY delivery now in two stages support structure mid August, plates late October**
- **North PRY delivery mid December**
- **Combined Spectrometer Solenoid training 5wks - 24/7 magnet operation**
- **Ongoing - identifying & quantifying risks.**
- **Risk Delay - assumes we incur all identified delays**
- **Schedule & risks need to be monitored as these will change**

