



OsC 28th April 2017

Project Manager's Report

Safety

PPD review

- Long fairly intensive day but very productive.
- Report now issued. Conclusions mostly applicable to STFC provision of local expert effort.
- Thanks must go to PPD and John Thomason and Duncan Francis of ISIS.

C&M review – winding up – final actions in preparation – Durga R.

Review of incident completed December.

- Traced overheating of Sumitomo compressors, 1 single stray 0.2mm diameter strand of wire.

Outcomes

- Administrative controls tightened.
- Technical changes (instruction set reduction, confirmation pop-up)
- Clarification of use of SC permit.

Schedule - Liquid Hydrogen



2 issues.

1. Pressure rating of hydrogen safety volume envelope.
2. Pressure relief in event of freezing at condenser.

HAZOP required – scheduled for 16th and 17th May.
Milton Hill house?

Agreed to continue with current programme to complete Neon test – opportunity to fully test and de-bug system including controls.

Required mods to be pursued in parallel.

Hazop will consider no-mod option for short term run

Schedule - Liquid Hydrogen

Pressure rating of hydrogen safety volume

- Windows are rated minimum 6 bar, mounting structures are not.
 - Tesla did not consider asymmetric loading case – were not asked to.
 - Potential to damage FC if pressures are not managed.
 - ‘Top hat’ is flexible, but adequate.
- Must rigorously respect 1.25 bar differential pressure rating
- Upgrade to ‘quench’ pipework.
 - Capacity / Bends.
 - Routing at turbo / turbo backing line / burst disc.
 - New blow off valve x2 – in review with ISIS hydrogen working group.
- Hazop will inform scenarios for consideration.

Schedule - Liquid Hydrogen

Pressure relief in case of freezing

- New pipe added. Runs from close to absorber to above condenser near hydrogen return.
- New pipe will be heat sunk to radiation shield at 50K minimum, well above 12K freeze temperature of H₂.
- Thermal break below turret to minimise heat load.
- No active components added all functions provided in cabinet.
- 2nd turret has been opened and dis-assembled for modifications.
- Welding and x-ray testing agreed.

Tracker

Service of cold heads for cryos 1&2 complete.

- Extensive precautions to 'dry' cassettes
- Cryo 2 cooled down – cassettes show 12% & 28% 'dead' channels - reduced track finding efficiency.
- RGA measurement of cassette volume unsuccessful due to poor ultimate vacuum achievable. Now seeking to sample gas from cassette volume during upcoming pump/purge cycles and analyse by GC.

Previously decided to leave 3 & 4 alone as 4 has thermal contact issues which mitigate against thermal cycling

– however - Sunday 2nd April (not April 1st) cryo 4 cold head failed.

- Cryos 3&4 warmed and extensive precautions taken to 'dry' cassettes
- Sumitomo have reconditioned recovered cold heads and serviced cryos 3 & 4 on 27th April.

Tracker

Forward plan

- Test all cryo volumes for water – re-evaluate if not dry – possible RTV degradation.
- Cool cryos 1,3 & 4 once confirmed ‘dry’
- Hope cassettes are all 12% or better, prepare for worse.
 - Assemble US team to recondition cassettes in R9.
 - Correct expert staff required
 - Recall process is ‘try and test’ – verification of performance is only possible after 2 day cool down period – no option to verify post re-build. Previous re-builds did require some re-work after initial cooling.
- Run ISIS 2017/01

Then

- If required re-build cassettes as necessary over long summer shutdown.

Active Risk	15
Retired Risk	13

Risk

ID	Risk Description	Potential impact on project	Risk score			Ownership	Proposed Action	Post-action risk score			Comment / Conclusion
			L	I	LxI			L	I	LxI	
MICE 3	Magnetic field effecting operation of electrical equipment relating to the continued operation of the cooling channel magnet systems and detectors.	Inability to operate the cooling channel	5	5	25	MICE - UK / MAP	Installation of a partial return yoke has mitigated the major risk. Movement of the control and power supply equipment to a dedicated room outside of the magnetic field.	1	4	4	Much work has been completed. Non staff risk persists in the event of additional material being required.
MICE 4	Extended period of re-training for the lattice of magnets.	Timescales for the training period, cost of the amount of LHe required to carry out the training. Expert personnel required to be available for magnet operations over a protracted period of time.	4	5	20	MICE-UK / MAP	Magnet integration task force to define commissioning method to keep schedule and cost to a minimum.	4	4	16	Each re-cool and fill of the Spectrometer Solenoid can take upto 500l LHe, AFC remembers it's training. Each full lattice quench could cost in the region of £7K.
MICE 8	Resourcing issues from the STFC and national labs	inability to complete significant sections of work on agreed time or cost scales.	4	5	20	MICE - UK / MAP	Realised. Escalation of the issue to the STFC and DOE.	2	4	8	Project scope has changed leading to a different labour profile required to complete the project.
MICE 16	Failure of a Focus Coil Magnet	Internal cold mass or associated equipment deep within the assembly. LTS leads.	3	5	15	MICE UK	Follow all specific operational aspects as defined by the experts for the superconducting magnet	1	5	5	Investigation and fix would be extremely costly and extensive with regard to schedule.
MICE 17.1	Failure of Upstream Spectrometer Solenoid Magnet	Internal cold mass or associated equipment deep within the assembly. LTS leads.	4	5	20	MAP	New quench protection system	1	5	5	Has the same design issues as SSD, confidence improving with operation and testing with forces.
MICE 19	Failure of M2 in SSD.	Reduction in scientific output and resulting cooling effect.	3	4	12	MICE-UK / MAP	Maximise data collection before running M2.	2	4	8	Consider completing data set for one absorber.
MICE 20	Failure of Helium space feedthrough in SSD.	Reduction in scientific output and resulting cooling effect.	3	4	12	MICE-UK / MAP	Limit number of quenches	2	4	8	
MICE 23	Risk of equipment failure/breakage	Cost of repair/replacement. Time lost during recovery	3	3	9	MICE UK	Spares inventory / proper planned maintenance	3	1	3	to some degree inevitable due to age of equipment
MICE 24	Problems during magnet string commissioning	Further compromise of SSD / Delays to program	3	5	15	MICE UK	Conservative magnet settings.	3	3	9	Always recognised as a challenge - complicated and exacerbated by SSD situation
MICE 28	Inability to cool absorber to required temp	No H2 absorber / reduced science	3	5	15	H2 Group	Heat load modelling/design revision	2	5	10	improvements to heat load design.
MICE 29	Further compromise of SSD performance	Slower data-taking, more remedial action required	3	5	15	MICE-UK / MAP	Power supply improvements, feedthrough heating improvements.	3	5	15	Anomalous earth leakage and noise seen - now absent, but as yet unexplained.
MICE 30	Insufficient international manpower available.	Delay in remediation of non-UK assets and associated reduction in effort on other tasks.	4	3	12	MICE-UK / MAP	Discussion with international management to maximise staff availability.	3	3	9	Long standing issue.
MICE 38	Decreased in depth knowledge of controls and monitoring system.	Higher fraction of 'lost time' during data-taking due to longer time to troubleshoot	5	3	15	MICE	Support new team, extended period for 'run-up' in advance of ISIS run.	1	3	3	Anticipated difficulty with directing staff effort during changeover has been realised. New team in place, excellent co-operation and effort now bearing fruit.
MICE 39	Inability to install Liquid Hydrogen system in time for ISIS 2017/01	Loss of data/reduced science	4	3	12	MICE management, H2 group	Stop data-taking in ISIS 2016/05 early. Extra vacuum/cryo resource from PPD. Integration of ISIS safety to install. Top level co-operation from ISIS and PPD.	4	3	12	Schedule is very tight. Some slip likely. Possible some of ISIS 2017/01 will be lost for hydrogen but other data-taking is required (empty absorber/alignment)
MICE 40	Inability to certify pressure rating of hydrogen safety volume at sufficiently high pressure for safe operation	No safety approval, no liquid hydrogen in MICE hall	4	5	20	H2 group	Model improvements to exhaust path. Finite element model of enclosure volume to assign pressure rating beyond current Tesla spec	2	5	10	Recently uncovered discrepancy between Tesla enclosure rating (1.25bar) and thin window rating (7 bar). Require data on build from Tesla.

Risk

MICE 28 Inability to cool absorber to required temperature.

- mitigated by successful Neon test in R9
- but mods required for hall – ‘top-hat’

MICE 30 Insufficient international manpower available.

- US funding situation.

MICE 39 Inability to install Liquid H2 system in time for ISIS 2017/01.

- Planned full shift operations only for late in cycle

MICE 40 Inability to certify H2 safety volume at sufficiently high pressure rating for safe operation.

- Pressure rating unlikely to be increased
- Required rating has been decreased, looking for further reduction.

Finance

MICE Forecast for 15/16		Including Overheads	Excluding Overheads	UK Allocation 2015/16		Including Overheads	Excluding Overheads
MICE Phase 2 (Capital)	Reqns / M&O	306.58	306.58	MICE Phase 2 (Capital)	Reqns / M&O	350.00	350.00
	Travel				Travel		
	RAL TD / Other	398.40	398.40		RAL TD / Ot	350.00	350.00
	Adj / Encum	-10.03	-10.03				
		694.96	694.96			700.00	700.00
MICE Phase 2 (Resource)	Reqns / M&O	235.38	235.38	MICE Phase 2 (Resource)	Reqns / M&O	184.00	184.00
	Travel				Travel		
	RAL TD / Other	256.22	147.26		RAL TD / Ot	348.00	200.00
	Adj / Encum	10.03	10.03				
		501.63	392.67			532.00	384.00
MICE Phase 2 (Operations and Analysis)	Reqns / M&O	98.14	98.14	MICE Phase 2 (Operations and Analysis)	Reqns / M&O	105.00	105.00
	Travel	152.79	152.79		Travel	20.00	20.00
	RAL TD / Other	149.07	85.67		RAL TD / Ot	264.00	264.00
	Adj / Encum	0.00	0.00				
		400.00	336.60			389.00	389.00
Income (Common Fund + EuCARD-2)		0.00	0.00				
	Totals	1,596.59	1,424.22		Totals	#####	1,473.00
	Variance	24.41	48.78				
		2%	3%				

Against budgets	location (ex Over)	Forecast	Variance
MICE Phase 2 (Capital)	700.00	694.96	5.04
MICE Phase 2 (Resource)	384.00	392.67	-8.67
MICE Phase 2 (Operations and Analysis)	389.00	336.60	52.40
MICE Common Fund	82.00	82.00	0.00
Total	1473.00	1424.22	48.78

Finance

2016/17 underspend £48k.

- Reduced shift occupancy due to magnet commissioning and H2 install. Lower shift travel and subsistence costs.
- Lower than expected ISIS FTE usage.

2017/18

Approved to end Oct 2017 subject to budget.

- £120k from ISIS for tetrodes – wrong colour of money.
- ISIS money for triodes and ‘glasses’?
- Experiment is still in construction – STFC staff overheads?
- No capital budget – ISIS money can help here.