PVEC 3052 Tunnel Cleaning Unit Outstanding Issues List IDR Issue R8											
Design Review		IDR		20.04.12							
ID	**Document**	**Paragraph**	**Comment**	**Proposed action**	**Owner**	**Criticality**	**Status**	**Action by**	**Agreed closeout plan**	**ID**	**Comment / update**
	Project Launch		**Contract deliverable: n/a**								
TCT007	Project launch		LU to overhaul and free issue autocouplers and buffers to SK		AW	2	Closed	LU	23.12.10 - Buffers complete and awaiting delivery, autocouplers in work. Auto-couplers complete awaiting sector bars.	TCT007	Delivered
TCT016	Project launch		TransPlant to investigate and specify their preferred unloading arrangements. Primary concerns are i) Single sided or double-sided unloading. ii) location and method	PS / Nigel Summerfield to provide require information.	AW	2	Closed	SK / LU	Nigel Summerfield appointed to this workstream. 24.05.11 LU to specify full unloading requirement.	TCT016	Unloading must be possible from either side as there will be no locations where both can be accessed at the same time. SK IDR proposal gives this - issue closed AW 12.01.12.
	Concept Design Review		**Contract deliverable: CDR1**								
CDRG.2	General Comments		I would expect to see the bogie dynamically modelled on our track to validate ride, WRI and structural capability. PhS	SK	PhS	2	Closed	SK	SK to carry out dynamic modelling or supply comparison data of their bogie on other railways.	CDRG.2	Dynamic analysis included in IDR submissions - issue closed GH.
	Concept Design Statement		**Contract deliverable: CDR1**								
CDR1.18	CDR1 Concept Design Statement Version 1	10.9.14.5	There may be scope to reclaim reservoirs from 67TS. GR	Project to consider	GR	4	Subject to agreed closeout plan	LU	SK advise that 2x 40 litre reservoirs are required. LU to investigate. Noted awaiting LU response.	CDR1.18	
CDR1.20	CDR1 Concept Design Statement Version 1	10.9.15.2 & 10.9.15.4	With only 67% axles braked it may not be appropriate to set the TCU brake effort to achieve 1.5 m/s/s for the TCU mass. GR	Brake effort distribution between TCU and MPU to be addressed during detail design	GR	2	Subject to agreed closeout plan	SK / LU	Transfer to IDR OIL.	CDR1.20	
CDR1.21a	CDR1 Concept Design Statement Version 4.0	10.6.1	TCU mass exceeds required limits. TCU mass requirement: empty = max 45,000kg; laden = max 75,000kg. CDR1 mass: empty = 70,040kg; laden = 83,320kg (ref CDR3).		RB	3	Closed	SK		CDR1.21a	Issue covered by IDR 2.2 GH 19.01.12
CDR1.22a	CDR1 Concept Design Statement Version 4.0	10.6.4	What types of fasteners will be used? Which movable interfaces will incorporate secondary security, and what is concept design of secondary security methods?		RB	2	Subject to agreed closeout plan	SK	This item can be finalised in FRD - RB 30.03.12	CDR1.22a	Huck bolts and screws with self-locking nuts (steel) . Secondary security methods have been discussed with RB during meeting at Templar House on Jan 12th 2012. DS 29.02.12
CDR1.23a	CDR1 Concept Design Statement Version 4.0	10.6.5	What materials are used in construction of brake blocks / pads.		RB	2	Closed	SK	Issue closed - RB 04.04.12	CDR1.23a	Sintered metal, asbestos free. DE 29.02.12

CDR1.24a	CDR1 Concept Design Statement Version 4.0		I have had a look through various documents relating to the TCT but I have not seen much in relation to LU Standard 1-085 'Fire Safety Performance of Materials' although I note a reference to a document 00-500-0019. I see that more or less everything is metallic so there are no obvious compliance issues.	Please provide a n inventory of all non-metallic materials used on the TCU / MPU as part of IDR1. This will be reviewed by our Materials Engineer and will form part of the SK Compliance Statement (FDR1).	DM	2	Open	SK		CDR1.24a	Latest version 'Material List_v3' sent to AW on 03/02/2012. Version 3.1 under progess DE 29.02.12
	Concept Drawings		**Contract deliverable: CDR2**								
CDR2.18	CDR2 Concept Drawings and Models Version 1		SK to confirm that the wheel profile matches LT5 (possible thin flanges and back-to-back dimension incorrect).	SK to update CDR 2	AW	2	Closed	SK	LU send wheelset standard. Wheel set standard sent. CS to review 05-205-0005	CDR2.18	Still to be reviewed by CS Issue covered by IDR 1.23 GH 19.01.12
	Calculations		**Contract deliverable: CDR4**								
CDR4.3	CDR4 (2)	General	All - calculations do not include any bogie calculations, dynamic braking, traction power / performance, cleaning performance or electrical power requirements as required in appendix 8.	SK to update document	AW	1	Closed	SK	apparently incorrect, but the corrected version (GR) shows the brakes are adequate.. The cleaning performance calculations in CDR4 are acceptable (note 09-250-0158 and 0159 are in the CDR4 pack, not in the CDR2 pack). 02-910-	CDR4.3	For cleaning performance see 09-250-0158, 09-250-0159 (CDR 2). Bogie calculations still outstanding. Dynamic braking see CDR 4 p180-187. For traction power see 02-910-0019 (Hydraulic plan, submitted with CDR 2). For electrical power requirements see mail to Alan with subject "CDR Electrical Feedback".
CDR4.12	CDR4 (2) Stress analysis for bogie		It should be clear which bogie type has been analysed, which hasn't, and why. If all bogies are the same, then it should be clear which location has been selected for derivation of the load cases and why. NT	SK to update document	NT	1	Subject to agreed closeout plan	SK		CDR4.12	Bogie analysis still outstanding. Will be submitted for IDR. Latest calculations that address comment have been sent to LU on 13/01/12. Await feedback from NT. DE 29.02.12
CDR4.13	CDR4 (2) Stress analysis for bogie		It is not clear where the load case has come from. This should be made clear, i.e. what are the load cases and how have they been assembled (masses, accelerations etc.)? They should also tie in with the technical specification load cases, which must be referenced, and the weight schedule. Distinction should also be made between proof and fatigue load cases. If a subset of the overall load cases have been applied (e.g. no traction, braking loads, equipment	SK to update document	NT	1	Subject to agreed closeout plan	SK		CDR4.13	Bogie analysis still outstanding. Will be submitted for IDR Latest calculations that address comment have been sent to LU on 13/01/12. Await feedback from NT. DE 29.02.12
CDR4.14	CDR4 (2) Stress analysis for bogie		There is no explanation of how the load cases have been applied – in combination or separately. This should be explained. NT	SK to update document	NT	1	Subject to agreed closeout plan	SK		CDR4.14	Bogie analysis still outstanding. Will be submitted for IDR. Latest calculations that address comment have been sent to LU on 13/01/12. Await feedback from NT. DE 29.02.12
CDR4.15	CDR4 (2) Stress analysis for bogie		The material is not specified, or its properties. This should be stated. NT	SK to update document	NT	1	Subject to agreed closeout plan	SK		CDR4.15	Bogie analysis still outstanding. Will be submitted for IDR. Latest calculations that address comment have been sent to LU on 13/01/12. Await feedback from NT. DE 29.02.12
CDR4.16	CDR4 (2) Stress analysis for bogie		It may be acceptable for scoping calculations, but we will not accept the 'fatigue limit' approach for the detailed analysis. A damage summation approach using principal stresses and the SN curves from BS7608 for steel	SK to update document	NT	4	Subject to agreed closeout plan	SK		CDR4.16	Bogie analysis still outstanding. Will be submitted for IDR Latest calculations that address comment have been sent to LU on 13/01/12. Await feedback from NT. DE 29.02.12
CDR4.17	CDR4 (2) Stress analysis for bogie		There should be a commentary on the results – are the stresses within acceptable limits or not? NT	SK to update document	NT	1	Subject to agreed closeout plan	SK		CDR4.17	See CDR 4 "Strength Calculation for Main Frame" (approved by Nigel Tate). Latest calculations that address comment have been sent to LU on 13/01/12. Await feedback from NT. DE 29.02.12

	Interface Definition		Contract deliverable: CDR5								
CDR5.10	CDR 5 Interface Definition Document Version 1	2.5 Pneumatic Brake System	Interface with MPU is via train wires, main line pipe and train line pipe. Main and train line interface with MPU is via autocoupler. Pneumatic interface between the (TCU) EP brake units and the TCU brake actuators. GR	SK to include all pneumatic interfaces.	GR	2	Closed	SK(ITL)	The interfaces are identified throughout the Interface Definition Table, with the agreed process for clarifying details between LU and SK, examples include: IFGS2.4/1 jumper, IFGS2.4/3, jumpers, IFGS4.0/1 brakes, IFGS2.5/1 buffers, Electrical, pneumatic and mechanical connections were identified during the Interface Workshop. The exact details of this interface are being worked through with specific details being recorded in the Physical Interface Control Document	CDR5.10	See CDR 5 "Interface Definition Document" rewrite from Interfleet. GR to review IF/GS401
CDR5.14	CDR 5 Interface Definition Document Version 1	3.4 Bogie	With respect to the brake system it is the secure mounting of the brake equipment, the transmission and re-action of the braking forces and the ability to change brake pads and adjust the brake mechanism which are the important interface issues. GR	SK to include all braking system interfaces.	GR	2	Closed	SK(ITL)	acknowledge these interfaces and define in detail at IDR. SK believe that this point is fully addressed by the following references and can be closed. Interface Table reference IFGS4.0/1 brakes; Hazard log references: GS1.1/2 structural attachment of components,	CDR5.14	See CDR 5 "Interface Definition Document" rewrite from Interfleet. GR to review IF/GS401
CDR5.17	CDR 5 Interface Definition Document Version 1		There appears to be no acknowledgement of; a) the generation of the 24V supply needed for the control of the slow speed drive and cleaning systems or b) the 'through wiring' for the multiple operation of the legacy systems. TR	SK to update document	TR	2	Closed	SK(ITL)		CDR5.17	See CDR 5 "Interface Definition Document" rewrite from Interfleet. IDR update of interface document to include 24V control circuit and through wiring interfaces. Closed with reference to IDR TCU / MPU Iterface Control Document.
CDR5.20	CDR 5 Agreed Interface Definition Document	Gen	Please include Agreed in the title of this document as agreement is a key part of it. GH	Text added to section 1.1.2. Title will be revised following first round of review with LU, after the interfaces are actually agreed.	GH	4	Closed	SK(ITL)		CDR5.20	Issue closed - GH 19.01.12
CDR5.21	CDR 5 Agreed Interface Definition Document	1.1	The purpose of the document is to identify all interfaces with SK's scope of supply. GH	Whilst looking at the supply of the TCU, we have not identified any other interfaces than those noted in the purpose. However we have edited this text to clarify.	GH	4	Closed	SK(ITL)		CDR5.21	Issue closed - GH 19.01.12
CDR5.22	CDR 5 Agreed Interface Definition Document	2.0	Please add a note on how interfaces have been identified and why the list of interfaces is comprehensive.	Section 1.2 added.	GH	1	Closed	SK(ITL)		CDR5.22	Issue closed - GH 19.01.12
CDR5.23	CDR 5 Agreed Interface Definition Document	2.0	Please populate the comment / mitigation and status columns in Appendix A where possible at this stage.	This cannot be completed in isolation by SK. Proposed/potential safeguards have already been identified by SK. LU input is required to agree the interface and the mitigation actions. It is expected that this will be completed early in the next stage, during a series of meetings between SK and LU.	GH	3	Closed	SK(ITL)		CDR5.23	Issue closed - GH 19.01.12

CDR5.24	CDR 5 Agreed Interface Definition Document	Page 4	Page 4 – Hydrostatic Nozzle control is on car 1? AW	This was correct at the time of writing. However, the design has since been changed - table updated accordingly.	AW	3	Closed	SK(ITL)		CDR5.24	
CDR5.25	CDR 5 Agreed Interface Definition Document	Page 5	Page 5 – Purpose statement appears to exclude interfaces between the TCU and the operational environment. AW	Please refer to new section 1.2 regarding development of interfaces. There are environmental topics on the checklist which was used. 'Operational environment' is not listed as a specific separate topic, but for clarification it is considered at a specific point by point level, e.g. ride (e.g. roughness), electrical noise.	AW	1	Closed	SK(ITL)		CDR5.25	Included in Hazard Log - closed AW 12.01.12.
CDR5.26	CDR 5 Agreed Interface Definition Document	Page 7	Page 7 – Is the Gauging Assessment Plan a new deliverable? Has not been mentioned before. Need to include in the ESMP. AW	Text edited to remove the word Plan. For further background: development of any/all necessary evidence to address identified hazards and interfaces will be determined on a case by case basis by SK. Details/narrative on evidence available will be recorded as appropriate in reports and/or hazard log.	AW	1	Closed	SK(ITL)		CDR5.26	Included in Hazard Log - closed AW 12.01.12.
CDR5.27	CDR 5 Agreed Interface Definition Document	Page 9	Page 9 – What is meant by the statement “LIL to retain responsibility for the whole TCT EMC Compliance”? AW	This is an example of a recorded assumption for transparency, and for further discussions and agreement. We are working on the basis that SK will be responsible for the EMC aspects of their scope of supply, but LU will need to be responsible for the resulting EMC characteristics of the whole consist.	AW	4	Closed	SK(ITL)		CDR5.27	Matches agreed philosophy - issue closed AW 12.01.12.
CDR5.28	CDR 5 Agreed Interface Definition Document	Page 9 & 10	Page 9 & 10 – What is meant by the acronym TCP? AW	Typo, corrected, should be TCT	AW	4	Closed	SK(ITL)		CDR5.28	Assumed that with repeated use of TCP it was not a typo. Issue closed AW 12.01.12
CDR5.29	CDR 5 Agreed Interface Definition Document	Page 11	Page 11 – Risk of hydraulic fuel spill is identified. Has this been moved to the hazard log? It is recommended that LU carry a spill kit on the MPU. What do SK recommend? AW	Otherway round - it was identified in the hazard log first. Yes - spill kit is recommended. Please refer to hazard log entry GS1.5/1	AW	1	Closed	SK(ITL)	SK must advise the type of kit to be carried to deal with their oil	CDR5.29	Being managed in hazard log - issue closed AW 12.01.12.

CDR5.30	CDR 5 Agreed Interface Definition Document	Page 15	Page 15 – GS 2.0/1 – Crash worthiness and vehicle crumple - is defined in 1-180 via the interpretation given in the technical specification. AW	Your comment is noted, however this point still requires further discussion, clarification and agreement between SK and LU. i.e. Some parts of 1-180 primarily relate to passenger vehicles, SK has made an interpretation of application of the standard for the TCU, which is to be confirmed/agreed with LU as part of the interface management process. (P.S. Thank you for using line reference number...)	NT	2	Open	LU	LU (NT) to review SK(ITL) interpretation of crashworthiness requirements	CDR5.30	For ITL intepretation of this requirement see IF/GS2.0-1. AW / NT to review. Awaiting response from LU. Please confirm interpretation of the standard is acceptable, as this is not clear in either the standard 1-180 or the Annex 6 (clause 3.10.1.3). IFGS2.0/1 GUY - THIS IS FOR NIGEL NOW, I DON'T KNOW HOW TO INTERPRET THE STANDARD - AW 09.03.12
CDR5.32	CDR 5 Agreed Interface Definition Document	Page 21	Page 21 – The brake cylinders, callipers and discs are an SK item of supply , they are not free-issued by LU.	Noted. Point for further discussion during the detailed design development. This has been written to reflect SKs current understanding.	RB	1	Open	SK(ITL)		CDR5.32	Awaiting response from LU. IFGS4.0/1 Detailed parts list and mounting details to enable correct fit by SK to their vehicle. GUY - DID ROB NOT SEND THIS OVER?
CDR5.33	CDR 5 Agreed Interface Definition Document	Page 22	Page 22 – GS4.6/3 – Transit mode must override all TCU functions including emergency brake. AW	Again, a point for ongoing discussion in the detailed design. There are points of conflicting/incompatible requirements here, so decisions must be made. Issues of not applying the brakes when required are currently considered to be more significant, as the issue of overriding the emergency stop button can be addressed by simple operational procedures.	GR	1	Open	SK(ITL)	SK(ITL) / LU to agree functionality and equipment responses - meeting planned for 14.03.12?	CDR5.33	Does ITL mode switch paper answer AW's question? Awaiting response from LU. IFGS4.0/2. Proposal papers submitted for emergency stop and mode switch functions, awaiting agreement from LU. Note, there is ability to override certain functions to return the consist to transit ready status, but this does require specific operator actions. If the 'Transit', 'Handover' and 'Cleaning' mode switch positions are agreed by LU as a working proposal, please provide written confirmation that this will meet the requirements of the specification clauses 5.8 & 5.9. (Note the working equipment will also be available in 'handover' mode, and there will be no 'dead end siding' mode. TED/GILBERT NEED TO BE HAPPY, I JUST RAISED IT - AW 09.03.12

CDR5.34	CDR 5 Agreed Interface Definition Document	Page 26	P26 – Movable arms that do not automatically come back in gauge when power is lost do not meet the technical specification which Schörling claimed they complied with in their tender response. It seems that all backup and manual systems suffer the same single point failures which expose LU to the risk of causing major damage to infrastructure or the train in the event of a failure. AW	This aspect of the detailed design is ongoing. Again, a point for discussion and agreement with LU. As noted in the hazard log (GS6.6/1), the hydraulic systems will be the subject of further hazard analysis when the design is completed. (For example detailed aspects of the design have been changed at least 3 times in the last few weeks to address issues arising from the hazard identification and interface work.) We recognise that gauge management is a primary concern for LU. However, there are some incompatible/conflicting requirements identified, and the relevant trade off between	AW	1	Open	SK(ITL)	SK(ITL) / LU to agree functionality and equipment responses - meeting planned for 14.03.12?	CDR5.34	AW to review the response again - issue about gaps not E-stop. This point is considered to be closed with regard to interface management. The gauges to be worked to are noted in the Interface Definition Table - IFGS1.1/1. Hazards associated with the machine not/achieving the required working gauge are being managed through the hazard log (multiple entries e.g. PX3.0/11 collision with obstacles, PX4.0/1 control systems. (Note, to enable a manageable work list, the Interface document is to manage 3rd party interface aspects limited to actual design integration, or information exchange. The detailed design of the TCU to achieve the required gauge is purely within SK so does not appear on the interface list - but is managed through the hazard log to closure of the design.)
CDR5.35	CDR 5 Agreed Interface Definition Document	Page 33	P33 – MT 8.0 / 2: SK will need to be involved in the task analysis for waste disposal. AW	Point for discussion during the design stage. (Specifically what involvement is expected by LU.)	AW	1	Closed	SK(ITL)		CDR5.35	Discussions ongoing - issue closed AW 12.01.12
CDR5.36	CDR 5 Agreed Interface Definition Document	Page 35	P35 – OP 9.0 / 1: SK will train the LU trainers. AW	Point for discussion during the design stage.	AW	4	Closed	SK(ITL)	Yes they will train the trainers. This point is considered to be closed. (Details of the training materials etc, are the subject of separate workstreams, no further details are proposed to be recorded here.) Closed: SK comply with the specificaiton - AW 08.02.12	CDR5.36	ITL to supply ref to Training Plan.
CDR5.37	CDR 5 Agreed Interface Definition Document	Page 36	P36 – Controls to also meet legal requirements for laser system. AW	PX5.0/1 updated, laser is class 1 'eyesafe' laser.	AW	1	Closed	SK(ITL)		CDR5.37	
	Configuration Plan		**Contract deliverable: CDR6**								
CDR7 & 8	CDR7 RAMS Plan CDR8 Engineering Safety Management Plan		There is no clear relationship between the RAMS, Safety and Hazard documents. There is no 'plan' stating what will happen and when. There is no 'picture' of the overall process to be followed. To resolve these issues SK are to revise the Engineering Safety Management Plan in line with the Yellow Book appendix B2. This will involve taking content from the various plans		AW	2	Closed	SK(ITL)	SK to issue ESMP and RAM plan based on meeting 5.5.11. New version states "Section 21.10: Maintainability The TCT shall be capable of external cleaning using existing tube gauge train washers. No longer a requirement" This is still a requirement. Section 3.4.9.2 & 8.1 - does apply to SSD as this could	CDR7 & 8	See CDR 7 "RAM Strategy Plan" and CDR 8 "Energy Safety Management Plan" rewrite from Interfleet. - Closed, PS to comment on adequacy of engineering safety provisions - AW 12.01.12
	RAMS Plan		**Contract deliverable: CDR7**								
CDR7.1	CDR7 RAMS Plan		EN 1050 has been superseded by EN ISO 14121-1	Future submissions must be in accordance with EN ISO 14121-1	AW	1	Closed	SK(ITL)	The RAM Plan refers to EN50126 as the governing standard. This is considered to be appropriate for RAM activities. Risk assessment standards (14121, or 1050 which are both out of date) are not relevant in this instance. This Safety Strategy / Risk assessment method referred to in the ESMP incorporates the Hierachy of Risk Reduction. Reference 50126 is considered to	CDR7.1	

CDR7.35	CDR7 RAMS Plan	RAMS Strategy Plan	Page 16 onwards - The Hazard Identification (HAZID) is significantly different to the Hazard Analysis reviewed above. This is making extra work both for SK to update and LU to review. These need to be merged into one	Thorough analysis of all identified hazards is required. This will be done with LU at a bespoke meeting. (see CDR7.16 above)	AW	3	Closed	SK(ITL)	See CDR7.16 above. CDR (2) Need to discuss on 14.4.11	CDR7.35	Meetings held, Hazard log updated - issue closed AW 12.01.12
CDR7.44	CDR7 RAMS Plan	Safety Report	Page 5 section 3.2 - need to see a concept level fault tree now. Delaying this does not meet the requirements in the technical specification	Please provide a concept level fault tree	AW	1	Closed	SK(ITL)	CDR (2) subject to SK supplying a satisfactory document. Not closed Please refer to IDR and future subissions. The CDR stage report will not be edited further. This comment is considered to be closed. We would request that if LU do not consider this point to be addressed, that a subsequent comment be raised against a current submission report. AW - closed 08.02.12- lack of Fault tree analysus has been raised	CDR7.44	See CDR 7 "RAM Strategy Plan" and CDR 7a "Engineering Safety Report" rewrite from Interfleet .
CDR7.57A	CDR7 RAM Strategy Plan	9	Having identified the RAM requirements and declared that assessments and analyses will be carried out some description of the assessment and analysis methodologies is required. GH	Noted. Other than notes in the 'Proposed Action' column, this will be expanded on in during the Design Stage documentation.	GH	4	Closed	SK(ITL)	This report refers to the application of 50126, which includes the method which will be followed, no further details are considered to be beneficial in the report. FMEAs and FTAs where deemed applicable will be included within the IDR and FDR stage reports. This CDR stage comment is considered to be closed. ITL Jan 21 Issue closed - GH 10.02.12	CDR7.57A	
CDR7.58	CDR7 RAM Strategy Plan	9	A note is required which explains how the outcomes of the RAM assessment / analysis work will influence the emerging design. GH	Integration of all aspects of the design is addressed by effective project management and staff competence. As noted in Section 4 (roles and responsibilities), responsibilities for allocation of targets, incorporation of requirements into design, and implementation are identified. A feedback loop is inherent in the robust design processes being followed. This is applicable to all aspects of the project including RAM, hazard mitigation, HF etc.	GH	1	Closed	SK(ITL)	Issue closed - GH 10.02.12	CDR7.58	
CDR7.60	CDR7 RAM Strategy Plan	7	Please include the relevant response where the Tech Spec required confirmation in tender. GH	SK's understanding of the agreed tender responses have been added to the relevant 3 entries.	GH	3	Closed	SK(ITL)	Issue closed - GH 10.02.12	CDR7.60	

CDR7.62	CDR7 RAM Strategy Plan	3.4.9.2	Page 12 – section 3.4.9.2. The MDBF should apply to the slow speed drive. It is sensible to remove the fans from this requirement as they will not cause a 2 minute failure, but the slow speed drive could e.g. if it locks up. AW	Noted. We will consider this further. Current information (as recorded in the hazard log), suggests that this is not a credible failure mode. In any event it would be on a per-axle basis, which could be driven through for recovery.	AW	1	Closed	SK(ITL)	Slow speed drive is actually excluded in the Spec 19.4, but we have looked at it anyway. Failure of the slow speed drive is not deemed to be critical, see hazard log entries under GS.5.9/0. MDBF figures quoted in 1-180 are related to fleets of passenger stock. The TCU will on average have to operate in excess of 12 yrs to attain 250,000km. Appropriate figures are given in the IDR stage document. No further edits will be made to the RAM Strategy. This comment is considered to be closed. AW - closed 08.02.12. Spec excludes this issue as noted by ITL.	CDR7.62	Need to see FMECA to understand this - AW 12.01.12
	Engineering Safety Report		**Contract deliverable: CDR7a**									
CDR7a.1	CDR7a Engineering Safety Report	Gen	With the exception of section 7, there is little narrative for the (concept) technical safety of the design. I would expect greater extraction of the key safety hazard groupings and discussion around the general principles being adopted in the design to eliminate/mitigate the risk. The report as stands is heavily dependent upon the detail contained within the hazard log (currently unseen). PS	The broad philosophy regarding identification of mitigations is noted in sections 3.4 and 3.5.5 of the ESMP (i.e. design it out if possible). Details relating to the mitigation of each hazard are recorded in the hazard log, these will be expanded, updated and amended as necessary throughout the life of the project. At present section 7 does record those key areas which have been identified at this stage. It is recognised that this is concept design stage and there are some 'gaps' to be reviewed early in the next stage, during detailed design. Further key areas, and expanded detail will be included in the Detailed Design Stage ESR. Relevant notes and questions are	PS	1	Closed	SK(ITL)	Okay for CDR stage subject to further narrative on the key hazard groupings to be provided in the detailed design submission at IDR. Superseded by comment on IDR. PS 16.01.12	CDR7a.1	
CDR7a.2	CDR7a Engineering Safety Report	4.2	In section 4.2 it would be helpful to include a couple of lines on the approach adopted at the hazard identification sessions (i.e. 'day in the life' at the	Notes added.	PS	4	Closed	SK(ITL)	Document updated.	CDR7a.2	
CDR7a.3	CDR7a Engineering Safety Report	Gen	I understood that the output of the CDR hazard identification sessions were to be cross-checked against the pre-contract hazard identification session and	Note added, see 4.2 para 5.	PS	1	Closed	SK(ITL)	Document updated.	CDR7a.3	

CDR7a.4	CDR7a Engineering Safety Report	Appendix B	Presumably the rationale for discontinuing hazards is recorded in the Hazard Log; some are obviously out of SK's scope but others are not so clear. PS	From past experience we have found that some topics can be more effectively managed by one broad top level hazard, rather than many sub-hazards. For example EMC – application of an all encompassing EMC strategy including emissions, susceptibility and EECS (correctly written) will address all the hazard identified relating to this topic. As a result the sub hazards recorded during the identification sessions are usually discontinued or closed by reference to the 'master' hazard entry.	PS	1	Closed	SK(ITL)	Now the Hazard Log has been provided it is clear that the rationale for discontinuing hazards (e.g. duplication/consolidation, scope etc) is recorded there so this comment can be closed.	CDR7a.4	
CDR7a.5	CDR7a Engineering Safety Report	Gen	There is no mention of quality management in the report. Is the quality management report elsewhere? PS	We consider quality management to be an overarching 'given' on the project. There is information regarding quality management approach which will be applicable throughout the project provided in the	PS	1	Open	SK(ITL)	Okay for CDR stage subject to further information (e.g. summary of internal/supplier audits undertaken and any CARs raised) to be provided in the detailed design submission at IDR. PS 19.02.12 - No update provided	CDR7a.5	
CDR7a.6	CDR7a Engineering Safety Report	Gen	The Engineering Safety Report should contain / refer to the recognised risk assessment method (FMECA?) and should report on the management of all identified risks (Failure Modes?) to an acceptable resolution. GH	As noted in section 3.5 and 1.4 of the ESMP, the method of risk assessment employed is broadly in line with the yellow book, utilising structured hazard identification, recording of these hazard in a log, and risk assessing each. The risk assessment method being employed is the application of a risk matrix, as noted in section 3.5.4 - ESMP. Mitigations will be identified as appropriate. Where a risk is not initially broadly acceptable it may be appropriate to undertake further analysis in addition to the identification of further mitigation measures. At this concept design stage of the project we have identified the key risk areas (Section 7 ESR)	GH	1	Closed	SK(ITL)	Our previous response still stands. As noted this is recoded in the report section 3.5.4. The process is defined, and the results are being reported in both the hazard log, and subsequent stage Engineering Safety Reports. We anticipate that this entry is closed. ITL Jan 12. Issue closed - GH 10.02.12	CDR7a.6	
CDR7a.7	CDR7a Engineering Safety Report	Gen	Please amend the document ident to CDR7a to distinguish between this document and the RAM Strategy Plan. GH	Done	GH	3	Closed	SK(ITL)		CDR7a.7	
CDR7a.8	CDR7a Engineering Safety Report	2.3	2.3 – Add "TCU to maintenance" as a bullet point AW	Basic maintainability and operability are included by default, as part of the good design of the TCU. Specific details relating to the maintenance interface are identified in the hazard log and the Interface Log for detailed resolution.	AW	1	Closed	SK(ITL)		CDR7a.8	

CDR7a.9	CDR7a Engineering Safety Report	3.2.1	3.2.1 – This states that partially or fully releasing the speed controller activates the brake. Does this mean that the Operator has to hold the dial in a fixed position for 3 hours? The specification requires the TCU to automatically regulate its speed. AW	The controller is a dial which is rotated and ones hand can be removed. The intention of this statement is to show that a partial brake application can be made, as well as a full one. Edited to use the word	AW	2	Closed	SK(ITL)		CDR7a.9	Closed AW 12.01.12
CDR7a.10	CDR7a Engineering Safety Report	3.2.2	3.2.2, Page 9 and 7.3, page 16 – The disc brake units are not free issued by LU. Neither are the actuators associated with them. The EP Brake Unit is free-issued. See CDR5.32 AW	Noted. Point to be addressed by interface management during the detailed design stage. The report reflects SK's current understanding.	AW	4	Closed	SK(ITL)	Updated please refer to section 3.2.2 of the IDR submission. We anticipate that this entry is now closed. AW - closed 08.02.12- duplicate of CDR5.3.2.	CDR7a.10	
CDR7a.11	CDR7a Engineering Safety Report	3.2.2	3.2.2 – Page 9 – Is the intention that the TCU emergency stop will activate the MPU brake wires as well? AW	Yes. The emergency stop will activate the EP valve.	AW	1	Closed	SK(ITL)		CDR7a.11	
CDR7a.12	CDR7a Engineering Safety Report	3.3.4	3.3.4 – True that SK are not involved in waste disposal, but the key design criteria for the emptying of the vehicle is that it should be a sealed process. This is not mentioned. AW	Noted. This level of detail will be recorded in the hazard log (which contains much greater detail). Refer to OP13.0/1, PX1.1/1 & PX1.2/2.	AW	1	Closed	SK(ITL)		CDR7a.12	Improved proposal accepted for IDR. Need to understand the practicalities of unloading by FDR. Aw 12.01.12
CDR7a.13	CDR7a Engineering Safety Report	12.2	12.2 – On what grounds have these hazards been closed? GS1.4/2, GS1.4/3, PX1.1/5 and PX3.0/4 remain key concerns AW	Please refer to the actual hazard log for notes/comment. However, in general, it is because they are adequately addressed by other hazards which are still open for ongoing management. (i.e. avoiding duplication)	AW	1	Closed	SK(ITL)		CDR7a.13	Understood - issue closed AW 12.01.12
CDR7a.14	CDR7a Engineering Safety Report	Page 24	Page 24 – Does GS6.4/8 cover arcs drawn in a dusty environment? AW	Dust was not identified as being relevant to these electrical hazards. Dust explosion has been identified, and is being addressed via GS1.4/1 (which does include static). Is this a new hazard which needs to be addressed, or is this point sufficiently covered with the existing entries?	AW	1	Closed	SK(ITL)	We have happy that the identified hazard is sufficiently recorded in the hazard log for mitigations to be taken forward. Dust explosion will be covered in detail in the Fire Report, which will be the detailed analysis and mitigation for the Fire hazard - GS1.4/1. Electrical system behaviour, electrocution etc. are fully addressed by GS6.4/2 . However to allay your concerns we have also added this to the cause box. Hazard PX3.0/8 relating to nozzle - 3rd rail contact also addresses this hazard. (i.e. it assumes sufficient earth bonding / insulation for inadvertent contact, rather than an assumed safe distance - worst case approach.) We would anticipate that arcs	CDR7a.14	Dust is composed substantially of iron and is known to be conductive. It seems likely that an arc would be made more likely and would propagate more freely in the presence of a conductive material suspended in the air. GS6.4/8 is described as closed and covered in GS6.4/2 - electric shock. Arc incidents are a very different hazard to an electric shock. AW 12.01.12
Engineering Safety Management Plan			**Contract deliverable: CDR8**	**Action**							

CDR8.4	CDR8 Engineering Safety Management Plan	Appendix A	The risk matrix appears too lenient compared with the upper limit of risk tolerability for staff of 1/1000. For example a single fatality every 100 years is deemed broadly acceptable without further investigation/mitigation. I suggest the Tolerable if ALARP band is widened to include those likelihood/consequence values scored 5. PS	The matrix used was one previously applied to another LU project, which was also for a one off vehicle with a 25yr life. However, we have updated the matrix as suggested. (This has also been edited in the hazard log.)	PS	1	Closed	SK(ITL)	Document amended as suggested.	CDR8.4	
CDR8.5	CDR8 Engineering Safety Management Plan	4 Safety Lifecycle	The planned scope of the FTA and FMEA activities (which subsystems are to be covered and the intended level of detail) is still not clear from the Engineering Safety Management lifecycle table. PS	At this Concept Design stage, the subsystems to be assessed in more detail using techniques such as FTA and FMEA are not yet defined. This is part of the ongoing risk assessment process and will become clearer during the detailed design stage of the project. We would not expect to detail these systems in the Strategy document, but where additional analysis is appropriate it will be identified whilst developing mitigations for the hazards, and will be reported in the Engineering Safety Report.	PS	2	Closed	SK(ITL)	Okay for CDR stage subject to agreement with LU on the scope and type of analysis required at IDR/FDR stages. At IDR a number of areas have been selected for consideration by FMEA. To confirm these areas have been agreed with LU. PS 16.01.12 PS 19.02.12 - Comment closed against ESMP. PS to discuss with Guy Harris to ensure that extent of analysis is agreed with LU.	CDR8.5	
CDR8.6	CDR8 Engineering Safety Management Plan	4 Safety Lifecycle	The lifecycle table states the ESM planning should include consideration of the assurance required from the supply chain with respect to safety-related subsystems such as brakes, bogies and suspension. However, with the exception of LU free-issue equipment, there is no discussion of this within the safety plan or engineering safety report. PS	Please refer to section 6.5 management of suppliers and subcontractors. Details relating to individual hazard mitigations are recorded in the hazard log, where for example, if evidence is required that a component has been designed/built to an appropriate standard this is obtained from the supplier as part of the routine arrangements currently in place. Specific details are not recorded in the strategy, as	PS	2	Closed	SK(ITL)	Note that this comment was looking for SK to identify at a high-level the requirement for externally sourced safety justifications for key safety systems, not provide detailed compliance information. Okay for CDR stage, subject to clear visibility of this information in/via the hazard log at IDR stage. PS 19.02.12 - Comment closed against ESMP. To be scrutinised via hazard log and safety report.	CDR8.6	

CDR8.7	CDR8 Engineering Safety Management Plan	3.5	LU require a recognised risk assessment method to be employed to assess the identified hazards - I would expect this section to declare the use of such a recognised method (FMECA for example) and describe how this recognised method will be employed on this project to ensure all risk are eliminated or mitigated to an ALARP level. GH	As noted in section 3.5 and 1.4, the method of risk assessment employed is broadly in line with the yellow book, utilising structured hazard identification, recording of these hazard in a log, and risk assessing each. The risk assessment method being employed is the application of a risk matrix, as noted in section 3.5.4. Mitigations will be identified as appropriate. Where a risk is not initially broadly acceptable it may be appropriate to undertake	GH	1	Closed	SK(ITL)	Issue closed - GH 10.02.12	CDR8.7	FMECA to be submitted for IDR
CDR8.8	CDR8 Engineering Safety Management Plan	Page 14	Page 14 – Concept Design Stage – Establish Hazard Closure Criteria – Purpose column: “identify the criteria which must be met to allow a hazard to be closed as sufficiently mitigated” Where is this done? AW	The broad philosophy regarding identification/hierarchy of mitigations is noted in section 3.4 and 3.5.5. Details relating to each hazard are recorded in	AW	1	Closed	SK(ITL)		CDR8.8	PS to comment on adequacy of Safety Engineering provision - issue closed AW 12.01.12
	EMC Technical File / EMC Control Plan / EMC Test Plans		**Contract deliverable: CDR9**	**Action**							
CDR9.2	CDR9 EMC Technical File Galvanic Isolation		The Technical Specification (clause 10.3.1.4) requires that the outputs of the static converters are galvanically isolated from the Traction Supply. This requirement was discussed at CDR, SK agreed to propose a power supply system reviewed and endorsed by their EMC Consultant.	SK to propose power supply system that meets tech Spec intent, reviewed and endorsed by their EMC Consultant.	AL	1	Closed	SK	SK provided Power Scheme D120110415 and notes VEM_engl.doc. 27.04.11. LU confirm that the informatio provided is not sufficient to close this item in e-mail dated 28.04.11. Updated EMC Control Plan still at version 1 - SK to supply correct version.	CDR9.2	See latest version CDR 9 "EMC Technical File" We had previously requested galvanic isolation, so the concept described in the above reference (filtering, short-circuit detection, over-voltage and insulation monitoring) is not our preferred option. Therefore, whilst that concept is a feasible theoretical alternative, it should be stressed to SK and Rörden that it is essentially their choice and they retain responsibility for compliance with all specified EMC requirements, without additional charge (or delay) to LU. It is probably also wise, given the additional circuitry and complexity
CDR9.3	CDR9 EMC Technical File	Gen	The focus of this review has been the EMC Technical File (TF); it is presumed, for example, that documents such as V&V Plans necessarily include discussion of EMC, largely by reference to the TF. AL		AL	4	Closed	SK		CDR9.3	AL 04/01/12: Project and/or SK advise correctness of stated presumption. Correct, all EMC activities will be detailed within the dedicated EMC documentation - other documents will reference the appropriate EMC documents (GH).
CDR9.4	CDR9 EMC Technical File	Gen	The general structure of the TF, collating the EMC Control Plan and offspring Test Plans (subsequently other documents such as Test Reports and EMC Safety Case expected), forms a reasonable foundation for later expansion. Various aspects of the TF and its component documents appear to be still under consideration, with a number of “tbd/to be specified” and similar entries. It is especially noted that incorporated document EMC Test Plan 2010113002-4 Section 4 (revised) mentions the need to		AL	2	Open	SK		CDR9.4	AL 04/01/12: At this stage I had expected to see some progress with replacement of "tbd" and similar entries. Subject to Project agreement, SK to address with some urgency. The Table of Contents should be updated to reflect the documents other than the EMC Control Plan included in the TF. See also additional detailed comments below.

CDR9.5	EMC Control Plan 2010113002-1 V0.14	Section 7	Terms & Definitions Signal-to-noise ratio: the word “distance” is perhaps better rendered as “margin”. The word “entropy” (queried previously) is retained, reviewer not sure if this the		AL	3	Closed	SK		CDR9.5	AL 04/01/12: Satisfactorily addressed with latest text changes.
CDR9.6	EMC Control Plan 2010113002-1 V0.14	Section 8.1, 8.2...	Document references in sections 8.1 and 8.2 (possibly elsewhere) are misaligned, eg. in 8.1 item 3 document 2010113002-2 seems to be described as the HAZID report but, in 8.2, it is described as the FTA report (also noting that the doc. no. is incorrectly stated there as 201011302-x). In 8.1 item 4, document 2010113002-3 is described as a Test Plan for CONNECT compatibility assessment whilst in 8.2 that reference is described as the HAZID report. The first entry of Item 5 in the 8.1 table does not include the full range of Test Plans and 2010113002-4 is cited twice. Reviewer believes this has been queried previously, so document references need to be checked and reconciled throughout. This aspect could be simplified by creating one centralised reference list, then citing the correct		AL	3	Open	SK		CDR9.6	AL 04/01/12: Document correlation improved but SK address: Control Plan sections 8.2 & 16 (possibly elsewhere) references chapter 2.4 of TCT Appendix 4. Reviewer considers corresponding citations should be for Appendix 4 generally. Section 8.2 item 2010113002-6 correctly notes the related Test Plan is to address both electric and magnetic field exposure; however, the actual document at its current revision focusses on magnetic fields. Document scope to be expanded to consider E-field measurements and applied limits. Should the table of section 16 not include citation of NR/SP/TEL/50016? Section 17: The quoted titles of items [12]
CDR9.7	EMC Control Plan 2010113002-1 V0.14	Section 14	Section 14 – it is not clear which edition of EN 50121 is included here, BS EN 50121: 2006 is to be used by default. SK to confirm and correct as required. AL		AL	3	Open	SK		CDR9.7	AL 04/01/12: corrected in this section but needs to "flow through" into titles and content of subsidiary documents such as the Test Plans. See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12
CDR9.8	EMC Control Plan 2010113002-1 V0.14	Section 15.3	Section 15.3 – describes SK’s alternative to the requested galvanic isolation of the 400 VAC motor supply. This has been discussed previously (e-mail AL to GH cc AW 16:35 29/7/11 et seq), noting that SK are to retain		AL	1	Closed	SK		CDR9.8	AL 04/01/12: New text "Responsibility for ...Schorling Kommunal GmbH" now inserted at end of section 15.3 of EMC Control Plan 2010113002-1 19/12/2011 in IDR 19 EMC TF issue 1.00
CDR9.9	Incorporated EMC Test Plan 2010113002-4	Section 8	Section 8 - many operational test modes, eg. maintenance and fault modes are currently noted as tbd, SK to develop in due course. AL		AL	1	Open	SK		CDR9.9	AL 04/01/12: I would have expected some further progress with these aspects and appropriate text (not necessarily the final version) to have been included in the Test Plan. See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12 AL 9/3/12: Updates noted, especially request for meeting to discuss certain details. For query on LF magnetic field emission limits, refer to Directive 2004/40/EC, LU Std. 1-222 and referenced NRPB document. Suggest discussion to reconcile with proposals in updated TP6. Noted proposal to conduct the measurements on LU network, presumably SK will provide equipment and personnel. WG-20-Apr-12: LU would then suggest using the LU South Ealing Test Track for the EMC testing, noting that the alternative

CDR9.10	Incorporated EMC Test Plan 2010113002-4	Section 9.1	Section 9.1 – noting itemised constraints arising from proposed classification as “other rail vehicle”, do SK have a suitable test site in mind? AL		AL	1	Open	SK		CDR9.10	AL 04/01/12: Subject to Project input, SK to advise options. See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12 AL 9/3/12: believe covered by intention to undertake EMC testing on LU network, please confirm. WG-20-Apr-12: LU would then suggest using the LU South Ealing Test Track for the
CDR9.11	Incorporated EMC Test Plan 2010113002-4	Sectio 9.2	Section 9.2 – for clarity, the 10 dB limit reduction applies to “... radio operating frequencies including the CONNECT radio system ...”, not only CONNECT frequencies, SK to confirm intent with regard to this requirement. AL		AL	1	Open	SK		CDR9.11	AL 04/01/12: SK advise intent here. See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12 AL 9/3/12: As per CDR 9.9 comment above, LU EMC will provide data on frequencies (mainly radio systems) requiring the 10 dB limit adjustment.
CDR9.12	EMC Test Plan 2010113002-5		EMC Test Plan 2010113002-5 on signalling system compatibility - absent from sequence, SK develop and include in due course. AL		AL	1	Open	SK		CDR9.12	AL 04/01/12: At this stage I would expect at least an outline document to have been included in the revised TF. See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12 AL 9/3/12: First issue (0.1) now available, comments as follows: Basis for evaluation should by default include all NR 500xx series documents (or justify exclusion); Section 9 - post-processing parameter entries noted as discussion points; Applicable for TCT? - default is "yes"; Neasden Depot 50 Hz no longer applicable (decommissioned); Jubilee Line (inc. neasden Depot) Seltrac limit of 1 mA applies to any rail; comment on JL docking loop limit noted, LU EMC to seek clarification; current rail limits are not sufficient - where applicable, running rail and/or receiver limits must be considered; SEV relays & electro-pneumatic valves to be considered (S&CSE-ST0062); some of the ST0062 Attachment refs are wrong/incomplete, please correct; by default should include all NR asset types covered by NR 500xx series, eg. reed, 50

CDR9.13	Incorporated EMC Test Plan 2010113002-6	Section 9.2	Section 9.2 – as written, seems to imply that only Directive 2004/40/EC requirements will be addressed. The default position is that the LU EMC Standard requirements for saloon magnetic fields (dc and 50 Hz) also have to be satisfied, with consequent changes to measurement protocol and, for example, Fig 2 and Section 11 Overview of Measurements - SK to confirm intent. AL		AL	1	Open	SK		CDR9.13	AL 04/01/12: Document scope needs to be extended to include consideration of electric fields (refer response against CDR 9.6 above). SK to advise intent and address. Where there is a conflict between ICNIRP limits and those of 1-222 the latter shall take precedence. GH/RT See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12 AL 9/3/12: proposed magnetic field limits noted.
CDR9.14	Incorporated EMC Test Plan 2010113002-7	Section 8	Section 8 – the “tbd” and [...] entries need to be completed in due course. AL		AL	1	Open	SK		CDR9.14	AL 04/01/12: Reviewer considers that more progress should be apparent at this stage (refer comment against item CDR 9.9 above). See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12
CDR9.15	Incorporated EMC Test Plan 2010113002-7	Section 10	Section 10 – implies that only the operator console will be ESD tested - will PCBs and sub-systems which may be handled during maintenance operations be assessed and confirmed compliant? SK to clarify AL		AL	1	Open	SK		CDR9.15	AL 04/01/12: SK to confirm intent and include appropriate revisions. See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12 AL 9/3/12: note proposal to address sub-
CDR9.16	Test Reports etc	Gen	In due course, SK incorporate Test Reports and other defined material to complete the TF as per requirements of TCT Technical Spec Appendix 4. AL		AL	1	Open	SK		CDR9.16	AL 04/01/12: Comment stands but clearly the required test data is yet to be procured. See latest EMC deliverables (IDR Review 4, IDR 19). DE 29.02.12 AL 12/3/12: essence of previous comment
	Initial HF Study		**Contract deliverable: CDR10**	**Action**							

CDR10.10A	CDR10 HFIP and Initial HF Study	Gen	Interfleet have re-written the SK HFIP from the previous design review stage. The Interfleet document needs to include the Initial HF Study deliverables required in App 8 of the Technical Specification for CDR. These are: Operating principles including day in the life of the TCU, Control unit mock-up review report. GH	The approach taken to undertake human factors analysis of the TCU will be based on scenario analysis, including normal, degraded and emergency modes of operation (as noted in section 5.2.2). This is considered to include more aspects than a single review of a normal working day. However, please be assured that the concept of a 'day in the life' has been considered during the hazard identification process, with only one issue arising which will be reviewed in detail from a HF perspective. (Handover between operator and driver at the start and end of cleaning.) For Control unit mock-up review report, please refer to section 5.4.6. Whilst not titled 'Control unit mock-up review report' this Deliverable 3 report will include the necessary information. (Section 5.4.3 notes that end user testing will be undertaken using a mock-up.) The Deliverable 3 report will include methods used, the	GH	1	Closed	SK(ITL)		CDR10.10A	Issue closed GH 19.01.12
CDR10.11	CDR10 HFIP and Initial HF Study	2.2	The HF work needs to cover all HF interactions with the SK scope of supply, this includes Maintenance (of all SK equipment), Waste disposal, Training and associated training needs analysis, Integration of the drivers console into the driving cab desk and the workstation with the MPU, and is not limited to Driving and Cleaning Operators – the document needs to be re-written accordingly.. GB / GH As we noted at the HAZOP the machine has to be able to work in our facilities and they must ensure it can be maintained safely. SK must design it with that in mind. AW	The interface between staff the TCU has been addressed through the risk assessment process, with relevant details recorded in the hazard log. This includes maintenance, cleaning, operation and emptying. The analyses undertaken to date does not indicate any high consequence events relating to this interface which are not sufficiently addressed by correct design (e.g. provision of isolation valves, pressure relief valves, lifting points etc.) and competent staff. It is not deemed necessary to undertake more indepth assessment. We are confident that upon closure of the hazard log it will be possible to operate and maintain the TCU with ALARP risk.	GH	1	Closed	SK(ITL)		CDR10.11	Issue closed GH 19.01.12

CDR10.12	CDR10 HFIP and Initial HF Study	5.4	How does HF Design Review fit within project design review sequence.	We see this being under taken at the detailed design stage of the project, so that the design can be influenced by the findings (possibly late in this stage). There will inevitably be a degree of iteration with the final design stage, with items from the issues log being addressed.	GH	1	Closed	SK(ITL)		CDR10.12	Issue closed GH 19.01.12
CDR10.13	CDR10 HFIP and Initial HF Study	Gen	The HFIP needs to say how the outcomes of the HF assessment work will influence the emerging design. GH	Please see point above, and 5.4.2 in the HFIP. Integration of all aspects/requirements of the design is addressed by effective project management and staff competence. This is applicable to all aspects of the project including RAM, hazard mitigation, HF etc. Where appropriate issues will be	GH	1	Closed	SK(ITL)		CDR10.13	Issue closed GH 19.01.12
Human Factors Task Analysis			**Contract deliverable: CDR11**	**Action**							
CDR11.3	CDR11 Human Factors Task Analysis	6.4.6	Operational feedback must be incorporated from the various review activities back into the detailed design. After commisioning the exercise will concentrate on validating that the relevant design review activities have successfully mitigated risks associated with workload, human error, personal injury e.g. PSL etc to ALARP and has	SK to obtain Operational and Maintenance input to HF Task Analysis	CM	2	Closed	SK(ITL)		CDR11.3	See CDR 11 "Train Driver and TCU Operator Task Analysis" rewrite from Interfleet. Operators and Maintainers workshop held Nov 2011 - issue closed GH 19.01.12
CDR11.6	CDR11 Human Factors Task Analysis	Gen	Deliverable CDR11 is a Human Factors Task Analysis, it should cover all HF interactions with the TCU and should not be limited to Driving and Cleaning Operators – please change the title of the document and re-write the contents accordingly. GH	Please refer to response to CDR10.11.	GH	1	Closed	SK(ITL)		CDR11.6	Issue closed GH 19.01.12
CDR11.7	CDR11 Human Factors Task Analysis	3	Please describe how the Task Analysis illustrated in this section works. GH	To follow. Following further hazard analysis work and associated design changes, this document should be considered 'illustrative'. As noted in the HFIP section 5.2.2 the Task Analysis forms part of a broader Human Factors Analysis. This work is due to be undertaken during the detailed design stage of the project. We will provide further information regarding your question in a subsequent issue of this report.	GH	3	Closed	SK(ITL)		CDR11.7	Issue closed ref IDR 11 - GH 19.01.12
CDR11.8	CDR11 Human Factors Task Analysis	3	How is the analysis shown to be consistent and comprehensive? GH	As above - to follow in a later revision.	GH	3	Closed	SK(ITL)		CDR11.8	Issue closed ref IDR 11 - GH 19.01.12

CDR11.9	CDR11 Human Factors Task Analysis	4	How do the outcomes of the HF Task Analysis used to influence the emerging design or inform operations and maintenance activities? GH	Please refer to response to CDR10.13. Competent project management.	GH	2	Closed	SK(ITL)		CDR11.9	Issue closed GH 19.01.12
Engineering Safety Hazard Log			**Contract deliverable: CDR17**								
CDR17.1	CDR17 Engineering Safety Hazard Log		This document is copied from other documents. It is not intended to duplicate work done, it is intended to record where a hazard has been identified, who owns the hazard and what has been done to close it.	Produce a table showing 1: Reference number. 2: Hazard name and description. 3: Hazard Owner. 4: Close out action.	AW	3	Closed	SK(ITL)	CDR (2) Not closed. Some of the content from this document should be removed and used in the Engineering Safety Management Plan. The rest will be developed after the SK – LU hazard and safety meeting. Hazard owner not identified in Hazard Log. Can be deferred to IDR.	CDR17.1	See CDR 17 "Hazard Log" which has been sent by Interfleet for revision. Assigned to company not individuals - doc issue. Issue closed AW 12.01.12
CDR17.1A	CDR17 Hazard Log	General	The outline structure and headline numbering appears similar to that adopted in the interface document. Is there scope for confusion in the numbering system between the two		PS	3	Closed	SK(ITL)		CDR17.1A	Closed at IDR - PS 16.01.12
CDR17.2	CDR17 Hazard Log	General	Please confirm whether the list been crosschecked against the machinery		PS	2	Closed	SK(ITL)	Confirmed at CDR review meeting.	CDR17.2	
CDR17.3	CDR17 Hazard Log	General	Presumably the final document will include a cover sheet, journal of changes etc?		PS	3	Open	SK(ITL)		CDR17.3	There is no indication of changes between versions (e.g. By colour coding text). This is included in the electronic version. (Thought it was included on the CDR submission pdf) Individual changes were not marked at IDR submission as too much was edited. As recorded in the journal, it was considered to be a full reissue. PS 19.02.12 - I think the cover sheet has
CDR17.4	CDR17 Hazard Log	General	Whilst not essential, the table could benefit from further post-workshop processing. For example: a) The layout based around equipment subsystems and topics (as covered in the workshops?) results in some repetition of hazards: e.g. loss of suction is covered under both PX2.2/4 (Failure of the fan) and PX1.3/x (Nozzle & suction). There is also potential discrepancy between the proposed safeguards; PX1.3/5 notes that loss of suction is revealed and results in a warning lamp on the control desk, is this true for fan failure as well (what level of suction loss is required to illuminate this inidcator lamp)? b) The hazards are not always clearly safety hazards, for example PX1.3/6 (Ineffective collection due to tunnel ventilation) resulting in ineffective cleaning of the tunnels. It is not clear why this issue remains open when PX1.1/5 (Solid dust in machine) has		PS	3	Open	SK(ITL)		CDR17.4	Long response, please see supplementary page. PS 19.02.12 - Please see my equally long response back.
CDR17.5	CDR17 Hazard Log	General	There are clearly a lot of open Interfleet queries on the design. Some of these are as a result of the maturity of the design but some appear to be because responses are awaited from SK. Where		PS	2	Closed	SK(ITL)		CDR17.5	Superseded. PS 16.01.12

CDR17.6	CDR17 Hazard Log	GS1.6/2	The safeguard text implicitly assumes that the vehicle is not required to transit over surface routes during adverse		PS	2	Closed	SK(ITL)		CDR17.6	As noted in the mitigation text - closed by compliance with basic ride considerations.
CDR17.7	CDR17 Hazard Log	GS2.2/1	Are there no requirements relating to overriding of the MPU during a collision or is this unecessary as the inner MPU vehicle is unmanned?		PS	2	Open	SK(ITL)		CDR17.7	We are waiting for response from LU on this point, see comment CDR5.30. We expect that the MPU has override protection to protect persons on board. The TCU does not have override protection as there are no persons on it. PS 19.02.12 - This can be closed when confirmed in response to the open query
CDR17.8	CDR17 Hazard Log	GS2.7/x	I would expect SK to provide details of failure modes of the TCU that could result in the vehicle becoming stranded and the proposed recovery mechanisms.		PS	2	Closed	SK(ITL)		CDR17.8	Many of the failure modes of the TCU which could leave it stranded are common with other railway rolling stock. It is not considered to be beneficial to list these out in detail, when almost infinite combinations of failures could occur together. As recorded in the current draft of the hazard log operational controls are required for review by a competent person on a case by case basis. More critical systems, which are especially peculiar to the TCU are addressed separately, for example, failure of the nozzles out of gauge - PX3.0/3 PS 19.02.12 - Closed. I suspect this is a lack of familiarity with your hazard log structure, as the items of most interest are actually
CDR17.9	CDR17 Hazard Log	GS3.0/4	What about secondary retention arrangements?		PS	2	Closed	SK(ITL)		CDR17.9	Mountings will be in accordance with LU standards, which require secondary retention. This will be addressed in detail by the assurance process. No more details will be provided in the hazard log, as this point is considered to be fully addressed by compliance with standards and the process to demonstrate compliance.
CDR17.10	CDR17 Hazard Log	GS3.2/x	There is no mention of periodic inspection & maintenance controls? (This also applies more generally)		PS	2	Closed	SK(ITL)		CDR17.10	But see comment at IDR. PS 16.01.12
CDR17.11	CDR17 Hazard Log	GS4.0/2	What about grade of piping/jointing arrangements to avoid air contamination? Is this covered by LU specification?		PS	2	Open	SK(ITL)		CDR17.11	Typically contamination occurs at the compressor which is LU supply. If the system is sufficiently air tight to maintain pressure, there is no route for contamination. This hazard was discontinued accordingly as this is not considered to be a credible hazard. Pipe contamination is a build and test hazard - appropriate controls need to be in place such as; removal of burs / swarf when pipes
CDR17.12	CDR17 Hazard Log	GS4.0/x	A number of these entries are noted as discontinued but this status is not		PS	3	Closed	SK(ITL)		CDR17.12	PS 16.01.12
CDR17.13	CDR17 Hazard Log	GS4.6/2&3	The Technical Specification states that LU will free-issue the EP brake units. There are other components of the EP		PS	2	Closed	SK(ITL)		CDR17.13	Closed on basis that the equipment is to LU specification. PS 16.01.12

CDR17.14	CDR17 Hazard Log	GS4.6/5	This implies that activation of the TCU Emergency Stop activates the Emergency Brake. More detail is required on how this is implemented and can therefore be overriden if required to allow recovery (see also comment against G2.7/x),		PS	3	Open	SK(ITL)	Please include an outline of the Emergency Stop arrangements in the hazard log.	CDR17.14	SK (ITL) to identify where inforamtion rquired from LU. As referenced in the hazard log, please refer to the Emergency Stop paper for more details. Awaiting reply from LU regarding agreement of interface/integration design. PS 19.02.12 - Okay. I assume this paper will
CDR17.15	CDR17 Hazard Log	GS5.10/1	How does the emergency stop work to remove drive? Is this by disengagement of the hydrostatic clutch?		PS	2	Closed	SK(ITL)		CDR17.15	
CDR17.16	CDR17 Hazard Log	GS6.6/1	As the nozzles are dual fed, is there any possibility for control conflicts from the two wagons?		PS	2	Open	SK(ITL)		CDR17.16	Erroneous comment. The hydrostatic system is still under development. Mitigation text will be updated when the design is more advanced.
CDR17.17	CDR17 Hazard Log	GS6.6/1	Direct human intervention to assist retraction of nozzles may not be possible in the tunnel environment.		PS	2	Open	SK(ITL)		CDR17.17	noted. PS 19.02.12 - Awaiting hazard log update.
CDR17.18	CDR17 Hazard Log	GS8.7/1	This suggests that the communication system only functions when the TCU is in working mode. I would expect the comms systems to be available regardless of mode of operation, particularly as they are powered off the 24V battery system.		PS	2	Closed	SK(ITL)	Please clarify that cab-cab communication is unaffected by TCU operational mode.	CDR17.18	Please refer to the IDR draft of the hazard log. The mitigation is clear. As stated, the cab to cab comms are direct hard-through wires which are not affected by TCU status. (Note the cab to cab communications are totally separate and nothing to do with the TCU 24V system)
CDR17.19	CDR17 Hazard Log	PX1.2/6	The hazard should address the possibility that debris is deposited in the points, such that point detection is still made but the gauge is restricted towards the heel of the switch (LU does not typically have supplementary detection)		PS	2	Closed	SK(ITL)	Note that the text stating that "LU does not have detection on its switch blades" is erroneous.	CDR17.19	Design mitigation is developed, with operational controls to address residual issues. Text edited to reflect detection on the 'heel' of the switch.
CDR17.20	CDR17 Hazard Log	PX2.2/1	What about containment?		PS	2	Closed	SK(ITL)		CDR17.20	
CDR17.21	CDR17 Hazard Log	PX3.0/11	The example provided was APR (Absolute Position Reference) swing brackets.		PS	3	Open	SK(ITL)		CDR17.21	Reference/e.g. added, please see latest draft of the hazard log ref PX3.0/11 PS 19.02.12 - The version provided at IDR
CDR17.22	CDR17 Hazard Log	PX4.0/1	Clearly more detail is required on the PLC architecture, functions and associated SIL requirements.		PS	2	Open	SK(ITL)		CDR17.22	Ongoing PS 19.02.12 - carried forward to next review.
Detail drawings and schematics			**Contract deliverable: IDR1**								
IDR1.1	IDR1 Detail drawings and schematics	Gen	Drawing pack: No electrical or hydraulic drawings or schematics received		GH	1	Closed	SK		IDR1.1	Issue covered by IDR1.19 and IDR1.24 - closed GH 19.01.12
IDR1.2	IDR1 Detail drawings and schematics	09-250-0183	Sector bar assembly not shown (01-110-0010...		GH	2	Closed	SK	Iss C drawing shows sector bar detail - closed GH 09.03.12	IDR1.2	Done (NB)
IDR1.3	IDR1 Detail drawings and schematics	09-250-0164	Please show clearances to positive rail.		GH	1	Open	SK	Iss B drawing does not show positive rail.	IDR1.3	Done (NB)
IDR1.4	IDR1 Detail drawings and schematics	09-150-0083	The lock bolt can move to the locked position when the arm is in the deployed position giving a false 'stowed and locked' signal		GH	1	Open	SK	Why rely on software when a limit switch would prove the cleaning heads to be stowed and locked? Item to be considered in FMECA	IDR1.4	The lock bolt can not move into locked position until the hydraulic cylinder reaches transport position. (Software solution)
IDR1.5	IDR1 Detail drawings and schematics	09-150-0081	Please show the deployed cleaning heads in the smallest tunnel.		GH	2	Closed	SK	Iss B sheet 2 shows deployed cleaning heads in smallest tunnel - closed GH 09.03.12	IDR1.5	Done (NB) Sheet 2 added
IDR1.6	IDR1 Detail drawings and schematics	09-150-0077	What are the cooling fans for?		GH	1	Open	SK	This is not in line with Tech Spec clause 10.2.12. SK to produce a reasoned argument why this clause has not been met and submit	IDR1.6	For the hydraulic system (NB)

IDR1.7	IDR1 Detail drawings and schematics	09-150-0069	2-way direction of emergency propulsion control not required – forward only		GH	3	Closed	SK	Iss D drawing ok - closed GH 09.03.12	IDR1.7	Done, drawing has been corrected (NB)
IDR1.8	IDR1 Detail drawings and schematics	09-150-0030	TCU wheel treads not at same level as MPU wheel treads.		GH	1	Open	SK	Drawing 09-150-0030 not included, 0036 not correct - GH 09.03.12	IDR1.8	MPU wheels were shown inaccurate. Drawing has been corrected.
IDR1.9	IDR1 Detail drawings and schematics	09-150-0020	Will brake disc foul gauge when wheels wear?		GH	1	Open	SK		IDR1.9	At the moment yes. Under examination. Propositions: either smaller brake disks or twisting of the drive.
IDR1.10	IDR1 Detail drawings and schematics	09-150-0016	Why is 400V connected end-to-end on TCU?		GH	1	Closed	SK	Iss B drawing ok - closed GH 09.03.12	IDR1.10	(Wrong) old drawing. Proper one has been added to latest package.
IDR1.11	IDR1 Detail drawings and schematics	09-150-0012	No hydraulic details – please provide details of hydraulic valve block and detail schematic of hydraulic system.		GH	2	Closed	SK	Closed GH 09.03.12	IDR1.11	See hydraulic schematic. This drawing is only an overview for the batteries.
IDR1.12	IDR1 Detail drawings and schematics	09-150-0010	Compressor rafts shall not be bolted under main frame. All maintainable interfaces / equipment shall have secondary retention mechanisms to retain equipment if primary mounting		GH	1	Open	SK		IDR1.12	Will be done, see next IDR-Review drawing package
IDR1.13	IDR1 Detail drawings and schematics	03-555-0051	Indication of fire system healthy / alarm needed.		GH	2	Closed	SK	Iss D drawing ok - closed GH 09.03.12	IDR1.13	Done (NB)
IDR1.14	IDR1 Detail drawings and schematics	03-555-0036	Revised concept for refuse bins to be included please (02-100-0032 also).		GH	2	Closed	SK	Closed GH 09.03.12	IDR1.14	Drawing no longer valid. Concept has been changed.
IDR1.15	IDR1 Detail drawings and schematics	02-100-0026	What coupling arrangement will be used on the middle car? (03-465-0019)		GH	2	Closed	SK	Closed GH 09.03.12	IDR1.15	Coupler similar to drawing 46470
IDR1.16	IDR1 Detail drawings and schematics	02-100-0025	Please show sector bar assembly at auto-coupler position(s).		GH	2	Closed	SK	Closed GH 09.03.12	IDR1.16	Done (NB)
IDR1.17	IDR1 Detail drawings and schematics	01-110-0010	What part of the TCU has been dimensioned at 220mm above rail?		GH	3	Closed	SK	Closed GH 09.03.12	IDR1.17	Additional protection shield for the hydraulic tank against damages.
IDR1.18	IDR1 Materials list v2	Materials list v2	Is this the schedule of non-metallic materials? If so it needs to contain all relevant information relating to the fire		GH	1	Closed	SK	Ref CDR1.24a - closed GH 09.03.12	IDR1.18	Material List_v3 has been sent out 03.02.2012 to AW. Version 3.1 under progress.
IDR1.19	IDR1 Detail drawings and schematics	Gen	Drawing pack: No electrical drawings or schematics received	TR will draft an overall control circuit scematic at high level. This will be done to initiate the necessary electrical detail	TR	2	Closed	SK / LU	Initial electrical scematics included in IDR 4 submissions - issue closed. GH	IDR1.19	Under Progress
IDR1.20	IDR1 Detail drawings and schematics	Gen	Methods of fitting of free-issued couplers are not shown. SK shall fit all coupler components in accordance with existing LUL design.	Fit coupler components in accordance with existing LUL design; use fixings specified on current LUL drawings.	RB	2	Subject to agreed closeout plan	SK	Detail not shown at this stage. This item can be finalised in FRD - RB 30.03.12	IDR1.20	Await specification from LU
IDR1.21	IDR1 Detail drawings and schematics	Gen	Autocoupler and drawbar couplers, free-issed by LUL, will require access from above the coupler carriers to insert/remove coupler pin.	SK to incorporate into their design floor access panels, or any other means of accessing the coupler pin on autocoupler and drawbar couplers.	RB	2	Subject to agreed closeout plan	SK	Detail not shown at this stage. This item can be finalised in FRD - RB 30.03.12	IDR1.21	See 02-100-0027
IDR1.22	IDR1 Detail drawings and schematics	Gen	Underframe mounted equipment does not have sufficient secondary retention.	Revise design of mounting of underframe equipment to incorporate secondary retention system. A possible solution, utilising permanently fitted brackets and equipment rafts resting on top of these, has been discussed at the review meeting.	RB	1	Open	SK		IDR1.22	See 03-555-0028 Partly addressed: Mounting of compressors (drawings 02-100-0025 & 04-205-0016) is satisfactory. The method of strenghtening the raft at the mounting point is also good. But mounting of hydraulic tank and compressor for air filter (drawings 03-555-0027 & 03-555-0017) is still lacking the means of secondary retention. If arrangement similar to air compressor mounting cannot be incorporated, then SK shall consider provision of safety straps. These should be

IDR1.23	IDR1 Detail drawings and schematics	05-205-0004	Wheel profile shown in drawing 05-205-0004 is not LT5.	SK to use LT5 wheel profile, to LUL drawing 92667.	RB	2	Subject to agreed closeout plan	SK		IDR1.23	(Wrong) old drawing. Proper one has been added. Drawing 05-205 -0005: detail of wheel profile shown does not fully comply with LT5 (tolerances not shown), but simply captures the main dimensions. Wheels should not be turned to this drawing, but to LUL drawing
IDR1.24	IDR1 Detail drawings and schematics	Hydraulic system	Missing: Circuits; Schematic of circuit showing isolations	To be supplied. We need to see a schematic of the circuit and any isolations to determine what would happen due to failure in different areas of the hydraulic system 26.01.12	NAS (TL)	1	Closed	SK	NAS response 02/04/2012: Noted issue closed.	IDR1.24	SK response 30/01/2012 The hydraulic-circuit pumps to the motors are self-contained circuits, so are the feed pumps to the tank. See drawings 02-910-0019 and 04-255-0004 We need to see a schematic of the circuit
IDR1.25	IDR1 Detail drawings and schematics	09-250-0166	This drawing shows the horizontal curving performance of the TCU on the worse horizontal curve - can we have a similar drawing(s) showing the vertical performance of the TCU on worse	To be supplied	AW	2	Closed	SK		IDR1.25	Done (NB), See Sheet 2 and 3. Closed - drawings presented as requested.
IDR1.26	IDR1 Detail drawings and schematics	gen	All recent drawings are shown with the movable heads exposed. Earlier drawings showed them encased. Please confirm that the heads will be guarded so far as practicable.	To be supplied	AW	2	Subject to agreed closeout plan	SK		IDR1.26	See 01-110-0011. Closed for IDR. Note that for FDR structural arrangements will need to be considered (damage/deflection when encountering strong winds in a tunnel)
IDR1.27	IDR1 Detail drawings and schematics	gen	The emergency drive units are shown on the centre car. Is there sufficient traction available when the car is empty? Could these not be mounted nearer to the hydraulic and electrical systems to minimise the chances of failures as		JW	2	Open	SK		IDR1.27	Yes sufficient traction will be available. The units are already mounted as close as possible to the electrical pump. Is there a calculation to demonstrate this?
IDR1.28	IDR1 Detail drawings and schematics	05-405-0118	05-405-0118 – is it possible to make these into blow-off panels to mitigate the risk of explosion?		AW	2	Closed	SK		IDR1.28	Will be investigated. Please provide more details. Will there be sufficient sealing? This will be an output of the fire work. SK to engage Nicole Hoffman and UTC Kidde. AW 040412
IDR1.29	IDR1 Detail drawings and schematics	02-100-0030	02-100-0030 – what is the estimated weight of the panels that must be removed to access the filter? These must be included in the human factors work. This is also true of the filters		AW	2	Subject to agreed closeout plan	SK		IDR1.29	50kg. This is too heavy to lift by hand. Some means of manual handling will be required so provision must be made for attachment points.
IDR1.30	IDR1 Detail drawings and schematics	02-100-0031	02-100-0031 – the heavy waste containers shown (crossed out) have a hopper arrangement underneath to dump the dust into a skip. The more recent presentations do not show this. How are the containers (both dust and		AW	2	Closed	SK		IDR1.30	New drawing issued showing hatch as discussed. AW 040412
IDR1.31	IDR1 Detail drawings and schematics	02-100-0031	02-100-0031 – What is the estimated weight of the containers?		AW	4	Closed	SK		IDR1.31	approx. 250kg. Closed.
IDR1.32	IDR1 Detail drawings and schematics	03-465-0028	03-465-0028 – The specification required no forced air cooling. Clearly this is not possible with the SK design, but the FMECA must consider what happens if the cooling element becomes		AW	2	Open	SK		IDR1.32	Will be part of IDR 10 'RAM Report'
IDR1.33	IDR1 Detail drawings and schematics	03-555-0027	03-555-0027 – does part 05-405-132 need secondary retention? Could it be welded to avoid the associated risk?		AW	2	Closed	SK		IDR1.33	Possible, but only one side as it couldnt be demounted for maintenance or reparation. Please advise. RB Issue - IDR1.22. AW 040412

IDR1.34	IDR1 Detail drawings and schematics	09-250-0166	09-250-0166 – Hogging / sagging		AW	2	Closed	SK		IDR1.34	Done (NB), See Sheet 2 and 3 Copy of IDR 1.25 - closed
IDR1.35	IDR1 Detail drawings and schematics	09-250-0179	09-250-0179 – how critical is the unknown dimension shown in blue? This may vary widely over the network?		AW	2	Closed	SK		IDR1.35	The whole area is covered by the scanner and the suction shoes will adjust to the environment, so it should not be a problem. Details of scanner are discussed elsewhere. Closed.
IDR1.36	IDR1 Detail drawings and schematics	09-250-0189	09-250-0189 – what is the estimated weight of the panels that must be removed to access the fan chamber? Are they provided with features for mechanised handling? How do staff reach the upper panels to work on them? Is an access platform required? These		AW	2	Open	SK		IDR1.36	One panel cover sheet = 20kg One complete unit = 160 kg (what is this unit?) Access platform is required. Noted. Please specify the height of platform required.
IDR1.37	IDR1 Detail drawings and schematics	Gen	Moveable parts of the TCT which could infringe/encroach on the above gauge profiles under any circumstances must be physically locked in their stowed condition. Particular attention must be paid to moveable parts which could encroach on the F1 profile, as failure		WM	2	Open	SK		IDR1.37	
IDR1.38	IDR1 Detail drawings and schematics	Gen	Doors which could infringe the LG1 profile must be locked.		WM	2	Open	SK		IDR1.38	
IDR1.39	IDR1 Detail drawings and schematics	Gen	Locking devices should be designed to ‘fail safe’.		WM	2	Open	SK		IDR1.39	
IDR1.40	IDR1 Detail drawings and schematics	Gen	Has any thought been given to damage which may occur to the extending parts if there is a strike with a fixed structure? Could the damage incurred prevent the TCT from being correctly stowed?		WM	2	Open	SK		IDR1.40	
IDR1.41	IDR1 Detail drawings and schematics	Gen	Schörling were going to supply drawings of the collector bins and the sealing mechanism. Did they ever do this?		WM	2	Open	SK		IDR1.41	
IDR1.42	IDR1 Detail drawings and schematics	09-250-0192	Can 600 x 600 x 350 box be smaller - to give clearance to existing equipment. Small detail of the box mounting and contents would be helpful.		GH	2	Open	SK		IDR1.42	
IDR1.43	IDR1 Detail drawings and schematics	09-250-0022 / 0023	If the connection of the members to the main frame is a maintenance interface then a connection bracket arrangement similar to the compressor raft will be required.		GH	2	Open	SK		IDR1.43	

IDR1.44	IDR1 Detail drawings and schematics	04-205-0016	Has the compressor raft and brackets been subject to structural analysis and been shown to be fit for purpose?		GH	2	Open	SK		IDR1.44	
IDR1.45	IDR1 Detail drawings and schematics	04-195-0023 / 0021 / 0020 04-155-0002 04-142-0266	Have these support frames and brackets been subject to structural analysis and been shown to be fit for purpose?		GH	2	Open	SK		IDR1.45	
IDR1.46	IDR1 Detail drawings and schematics	02-980-0021	The EP Brake system schematic is okay, no problems.		TR	2	Closed	SK		IDR1.46	
IDR1.47	IDR1 Detail drawings and schematics	02-980-0023A & 02-980-0023B	The representation of the EP Brake circuit onto a wiring schematics is not complete as the pressure switch brake relay and the two pressure switches are not shown at each end of the (3-car) unit.		TR	2	Open	SK		IDR1.47	
IDR1.48	IDR1 Detail drawings and schematics	02-980-0020	The 'Emergency Stop' schematic is beginning to show me more of the cleaning system as a whole; this particular diagram has some minor errors on it mainly associated the location of equipment on cars rather than specifically electrical. I'll mark up a		TR	2	Open	SK		IDR1.48	
IDR1.49	IDR1 Detail drawings and schematics	02-980-0019	The Power Supply Control schematic hasn't changed from the previous submission even though I suspect that some of the detail has been transferred to drawing 02-980-0020.		TR	2	Open	SK		IDR1.49	
IDR1.50	IDR1 Detail drawings and schematics	TCU control power supply	I'm still concerned that Schorling are perhaps unaware of the requirements for the power supply to their kit. I have seen some information from them on a 'battery charger' that they intend to supply to charge their 24V battery from the 50V Control Supply on the outer MPU cars; this appeared to be fairly lightweight and I suspect that it wouldn't pass the surge & transient tests called up in RIA 12 or the shock & vibration tests in RIA 20. I also question the need for a 24V battery – a properly		TR	2	Open	SK		IDR1.50	Refer to IDR 8.4 - TR 28.03.12
	Updated weight schedule		**Contract deliverable: IDR2**								
IDR2.1	IDR2 Updated weight schedule		Why has the vehicle weight increased?		GH	4	Closed	SK	Closed GH 09.03.12	IDR2.1	Reinforcements in the body frame and bogies. DS 29.02.12
IDR2.2	IDR2 Updated weight schedule	(10.6.1)	Mass of TCU cars exceeds mass specified in section 10.6.1 of the TRS.	eed to formalise weight with cor	RB	3	Subject to agreed closeout plan	SK	This item can be finalised in FRD - RB 30.03.12	IDR2.2	Weight can be formalised through a concession when design has been completely accepted. DS 29.02.12

Carbody structural analysis report			**Contract deliverable: IDR3**								
IDR3.1	IDR3 Carbody structural analysis report					1	Open			IDR3.1	Report has been submitted. Await feedback from NT
Bogie structural analysis report			**Contract deliverable: IDR4**								
IDR4.1	IDR4 Bogie structural analysis report					1	Open			IDR4.1	Report has been submitted. Await feedback from NT
	Dynamic analysis report		**Contract deliverable: IDR5**								
IDR5.1	IDR5 Dynamic analysis report					1	Open			IDR5.1	Report has been submitted. Await feedback from NT
	Braking Calculations		**Contract deliverable: IDR6**								
IDR6.1	IDR6 Braking calculations	IDR 6	Still use the original 75 Tonnes mass figure for TCU		GR	1	Closed	SK	Noted that IDR6 now uses a TCU mass of 87.22 Tonnes - issue closed GR 20.04.12	IDR6.1	See updated version of IDR 6 (Version 1.2, sent with IDR Review 4). DS 19.02.12
IDR6.2	IDR6 Braking calculations	IDR 6	Calculation of Auxiliary Reservoir capacity is not correct (see calculation previously provided). It does not take account of the pressure which needs to be achieved in the brake cylinders for the brake application to be effective. The IDR indicates a 40 l reservoir for TCU vehicles 1 and 3 with a total brake cylinder volume (both vehicles of 6.88		GR	1	Closed	SK	The braking calculation has been amended to include a figure for the underframe and bogie pipework; the resulting emergency brake BCP is 3.81 bar (absolute) hence 2.81 bar (gauge) which is above the 2.5 bar calculated as required to meet the emergency braking performance - issue closed GR	IDR6.2	See updated version of IDR 6 (Version 1.2, sent with IDR Review 4). DS 19.02.12
	Traction calculations		**Contract deliverable: IDR7**								
IDR7.1	IDR7 Traction calculations	IDR 7	Mass of TCT used in these calculations is quoted as 160 Tonnes – given the TCU is now 78T and the 2 * MPUs will surely be more than 82 T in total? (I would have expected nearer 120T based on 30 T per DM car.). The estimated total mass of TCT should be reviewed (200T?) and these calculations amended as necessary.		GR	1	Closed	SK	Noted that these calculations now use a TCT mass of 207 Tonnes - issue closed GR 20.04.12	IDR7.1	See updated version of IDR 7 (Version 1.2, sent with IDR Review 4) . DS 19.02.12

IDR7.2	IDR7 Traction calculations	2	Performance calculations and data for the slow speed drive need to be expanded and related specifically to the individual requirements of the Tech Spec section 10.2, e.g. normal slow speed range of operation during cleaning; loss of one MPU unit ; 100 metre movement in emergency. Each of these shall include reference to the limiting parameter(s) to show that no part of the system is at risk of failure by operating outside of any load/time boundary. It is also requested that the root calculations	Clarification required on the following; 1) Derivation of the "Rolling friction force", including assumptions made regarding MPU as well as TCU ? 2) What is "Flow force" ? 3) Any allowance for curvature of track ? 4) What sources of information are used for the Tractive Power Chart up to 53.15 km/h ?	JW	1	Open	SK		IDR7.2	See updated version of IDR 7 (Version 1.2, sent with IDR Review 4) . DS 19.02.12 JW review 23.03.12 - see proposed action column.
IDR7.3	IDR7 Traction calculations	IDR 7	Traction Calculations – Says nothing about the emergency drive. Concerned that 15t of tare train doesn't give enough traction to push it up a hill?		AW	2	Closed	SK		IDR7.3	See updated version of IDR 7 (Version 1.2, sent with IDR Review 4) . DS 19.02.12 Document states "Tractive power charts for normal and emergency propulsion are delivered in a separate document." - Closed AW 040412 - JW is reviewing traction performance
	Updated agreed interface definition document		**Contract deliverable: IDR8**								
IDR8.1	IDR8 Updated agreed interface definition document	Gen	This does not appear to address the interface between the TCU (as a cleaning consist) and the tunnel infrastructure (to be cleaned)		GR	1	Open	SK(ITL)		IDR8.1	Please refer to the Interface report regarding the process which has been followed to identify the interfaces. The tunnel infrastructure has very definitely been considered. This is recorded at a sub-system level, including for example: IFGS gauge, IFGS EMC (signalling interface), IFGS track damage (axle load), IFGS1.6/6 wheel profile etc. (Note. As noted in response to the CDR submission above, to enable a manageable work list, the Interface document is to manage 3rd party interface aspects limited to actual design integration, or information exchange. The detailed design of the TCU to achieve the required gauge is purely within SK so does not appear on the interface list - but is managed through the hazard log through to closure of the design, including validation testing.) Response has not addressed the intent of the issue which was to obtain information
IDR8.2	IDR8 Interface Definition	IFPX 4.0/1	Content appears to be out of date/inconsistent with the Safety Report Section 6.5		PS	2	Closed	SK(ITL)		IDR8.2	There are inconsistencies between the status of similar topics in the Interface management process and hazard log, this is expected. Process explained in meetings/telephone conversations.

IDR8.3	IDR8 Interface Definition	Auto-coupler terminal boxes	Where are the terminal boxes located? The flexible conduits from the autocouplers and the cables contained therein will terminate in these boxes so the outline installation design is required; the two autocouplers are now in the workshop being overhauled and the contact blocks are to be rewired to our requirements. The lengths for the conduits and cables are therefore needed so that this work can progress.	SK to provide information and include within interface definition document	TR	2	Open	SK(ITL)		IDR8.3	Refer to meeting 03/02/12 in Hanover: Details regarding connection box have been clarified between TR and Fred Wenske from Kaesemodel. New drawing from Kaesemodel will be sent in Week 8. Fuse specs have been sent to TR on Feb 17th (Mail "+0/-52V"). "Drawings connection box" sent to LU Feb 22. DE 29.02.12 23 March - The comment above refers to the two 3-way fuse / connection box for the cab
IDR8.4	IDR8 Interface Definition	SK 24V battery and converter	What are the dimensions and weight of Shorling's 24V battery and the associated converter that we will install onto the MPU? Details of where they will be installed is on out agenda for our visit, but the key dimensions, and weight, would be useful in advance along with an indication of whether Shorling would prefer it to be located on the 'Inner' car (MPU2) or close to the Cleaning Console on the 'outer' car (MPU1); my preference is on the 'inner' car as that is where our supply will be available to power their converter.	SK to provide information and include within interface definition document	TR	2	Open	SK(ITL)		IDR8.4	1. Battery in the MPU: 2 x 12 Volt / 210 Ah: length / width / height 518 x 291 x 242 mm. Weight: 70k 2. Battery in the TCU: 2 x 12 Volt / 210 Ah length / width / height 518 x 291 x 242 mm. Weight: 70k. During meeting in Hanover TR was given the dimensions of the batteries. He will come back to SK with a proposal, where the batteries should be located. Mail has been sent to TR regarding battery box and mounting details on Feb 14th. DE 29.02.12 23 March - Battery details okay; charger
IDR8.5	IDR8 Interface Definition Physical Interface Control Document	2.4	Emergency stop - detail of interface between e-stop buttons and SCAT EP brake; Vigilence system - interface between vigilence system and cleaning control		TR	2	Open	SK(ITL)		IDR8.5	Await feedback from LU for E-Stop paper 23 March - TedR's sketch 'Em Stop via SCAT v2 20120323.pdf' shows LU's preferred method of achieving the required functionality. Sent to SK by AW on 23/3/12. - TR 28.03.12
Updated configuration control document			**Contract deliverable: IDR9**								
IDR9.1	IDR9 Updated configuration control document		Would like to see this in action when we visit. Document only contains a commitment to do it, not evidence.		AW	1	Open	SK		IDR9.1	AW visit in Hanover 01-02/02/12. Can this point be closed? DE 29.02.12 Happy with all except 5.4, e.g. PPG paint work was agreed but this config item was lost and incorrect paint used. Need to ensure that agreed configuration items are recorded and are not overlooked. Please show where agreed items are recorded, such that they are tracked through to implementation.
	RAM report		**Contract deliverable: IDR10**								
IDR10.1	IDR10 RAM report	Gen	Many of the tables have no entries at all		GH	1	Open	SK(ITL)	The report was initially released to show format. The tables are being populated in tandem with the design. Updated tables will be included in	IDR10.1	
IDR10.2	IDR10 RAM report	FMEA table	FMEA table – please provide evidence / justification why 'risk acceptability' allocations are correct.		GH	2	Open	SK(ITL)	FMEAs will be revisited and further detail added and included within subsequent re-issues of the report - ITL Jan 12	IDR10.2	
IDR10.3	IDR10 RAM Report	3.3	The statement that the disk brake units are free-issue by LU to SK contradicts the statement in the Interface Definition IFGS 4.0/1 that SK provide brake actuator, disk and isolation cocks.		PS	2	Open	SK(ITL)		IDR10.3	Noted, this statement will be revised in the next re-issue PS 19.02.12 - carried forward to next review.

IDR10.4	IDR10 RAM Report	5 - 9	Sections 5 through 9 are very incomplete for this IDR stage.		PS	1	Open	SK(ITL)		IDR10.4	See comment for IDR10.1 PS 19.02.12 - carried forward to next review.
IDR10.5	IDR10 RAM Report	Appendix 1	The entry in the Detection Method column is frequently the local effect of the failure rather than the detection method. E.g, HY.2.1.1 "Lack of drive to the hydrostatic pumps for the compressors 1-4 (wagon 1) or 5-8		PS	1	Open	SK(ITL)		IDR10.5	See comment for IDR10.2 PS 19.02.12 - carried forward to next review.
IDR10.6	IDR10 RAM Report	Appendix 1	The corrective action column does not address immediate mitigation that might be available.		PS	2	Open	SK(ITL)		IDR10.6	See comment for IDR10.2 PS 19.02.12 - carried forward to next review.
IDR10.7	IDR10 RAM Report	Appendix 1	Where failures result in nozzles out of position, no mention is made of the 'stowed and locked' status of the equipment being interlocked with traction via the door proving circuit.		PS	2	Open	SK(ITL)		IDR10.7	See comment for IDR10.2 PS 19.02.12 - carried forward to next review.
IDR10.8	IDR10 RAM Report	Appendix 1	In the Preventive and Minimising Measures column it would assist to state the proposed periodicilty of checks when "Check according to the maintenance plan" is recorded.		PS	2	Open	SK(ITL)		IDR10.8	See comment for IDR10.2 PS 19.02.12 - carried forward to next review.
IDR10.9	IDR10 RAM Report	Appendix 1	HY.5.1.1 Is a single drive capable of propelling the train up the maximum gradient?		PS	2	Open	SK(ITL)		IDR10.9	See comment for IDR10.2 PS 19.02.12 - carried forward to next review.
IDR10.10	IDR10 RAM Report	Appendix 1	HY.5.2.x What is the basis of claiming a zero failure rates per million km for these items?		PS	1	Open	SK(ITL)		IDR10.10	See comment for IDR10.2 PS 19.02.12 - carried forward to next review.
IDR10.11	IDR10 RAM Report	Appendix 1	HY.5.2.2 I would expect potential for a deployed emergency traction wheel to cause damage to the TCT or infrastructure during transit. What is the rationale for claiming no effect in the Train column?		PS	1	Open	SK(ITL)		IDR10.11	See comment for IDR10.2 PS 19.02.12 - carried forward to next review.
IDR10.12	IDR10 RAM Report	Appendix 1	PN.2.1.2 Should the reference to compressor bracket "seizure" be to "failure", noting secondary retention under the mitigation measures column? Why does this have no effect on the TCU or train?		PS	1	Closed	SK(ITL)		IDR10.12	Bracket will be removed in accordance with the methodology regarding structural items stiplulated in section 4 PS 19.02.12 - Closed.
IDR10.13	IDR10 RAM Report	Appendix 1	In a number of cases the effect on reliability is noted as "None" and another consequence such as "inefficient cleaning". Does inefficient cleaning not count as a reliability failure?		PS	1	Open	SK(ITL)		IDR10.13	See comment for IDR10.2 PS 19.02.12 - carried forward to next review.
IDR10.14	IDR10 RAM Report	Appendix 1	PN.4.1.1 If a suction gate valve fails closed, are the associated air jets inhibited?		PS	1	Open	SK(ITL)		IDR10.14	Local air jets are inhibited if the gate valve fails to open, See also comment 10.2 PS 19.02.12 - Thank you. Carried forward to next review.

IDR10.15	IDR10 RAM Report	Appendix 1	BG.4.1.1 arissed?		PS	1	Closed	SK(ITL)		IDR10.15	An arissed wheel is where a sharp edge is formed between 2 surfaces meeting at an angle PS 19.02.12 - Thank you for the explanation. Closed
IDR10.16	IDR10 RAM Report	RAM Report	RAM report – table in 5, 6.1, 7, 8 and 9 are incomplete. Needs to be completed and fed back into the design / hazard logs.		AW	1	Closed	SK(ITL)		IDR10.16	see Comment 10.1. Closed, duplicate of 10.1 040412 AW
IDR10.17	IDR10 RAM Report	FMECA	FMECA omits laser system, software, motor speed control, filter / container clog detection (fire precaution) or the bolts that hold the axles/ wheels together.		AW	1	Open	SK(ITL)		IDR10.17	See comment 10.2 Wheel bolts themselves will not be considered within the RAM report, since these are a propriatary item and is part of the standard assumption/exclusion regarding mechanical attachments Noted. Other items still must be closed. AW040412 - need to
IDR10.18	IDR10 RAM Report	gen	Gauge hydraulics receive superficial coverage inadequate for the risk to the service and railway infrastructure. No indication of failure paths being established to a level that could be used to improve the design.		AW	1	Open	SK(ITL)	Other reports / papers are being produced to describe the operation of the hydraulic system in relation to gauge control. FTA also being undertaken to indentify failures that can result in nozzle impact with the infrastructure. This will be included within subsequent issues of the report.	IDR10.18	AW - can be closed subject to receipt of the document described.
	Human factors report		**Contract deliverable: ID11**								
IDR11.1	IDR11 Human factors report	Maintenance Workshop 11	Maintenance workshop 11. “OPEN POINT: LU still have to determine the best method for disposal of dust and waste from the TCU. The maintainers request that they come into contact with the smallest amounts of dust possible. LU HF are responsible for the end users activities once the waste is removed from the TCU. SK are only responsible for the end user tasks associated with the TCU itself and therefore the following, which were noted during the meeting for further consideration by LU, are outside SK’s scope of work:” – this contradicts contract clauses 8.2.3, 8.2.6 and 8.2.7. LU have taken lead in this area to allow SK to focus on the machine but SK cannot ignore it entirely.		AW	1	Open			IDR11.1	In our opinion this statement does not contradict with the requirement to provide a costed solution. Etc. The risks associated with dust etc. are fully addressed via the hazard log (Section PX onwards). The boundary between SK and LU HF assessments are still considered to be as recorded in the HFIP and minutes. SK is considering that the task is theoretically possible, however, LU still need to look at this in detail in the context of the other activities which are undertaken at the location. Please also note that SK are awaiting agreement in principle for the revised waste solution which relates to containers which will be removed from site for emptying, therefore, some of the exact points in the list - minutes 11 will need to be revisited
IDR11.2	IDR11 Human factors report	Maintenance Workshop 20	Maintenance workshop 20 OPEN POINT: SK can assist the maintainers remotely if a broadband connection is available. LU should look into the provision or availability of broadband at their chosen maintenance location(s). – Would be good to have some more information on this.		AW	1	Closed		In the event that this functionality is indeed provided, details will be provided in the maintenance manuals. Please note that this point relates primarily to fault finding, not general maintenance. As this point relates to additional functionality which is outside the technical Spec, and is outside the scope of the HF assessment, we would anticipate that this comment will be closed, and any subsequent	IDR11.2	
	Training needs analysis		**Contract deliverable: IDR12**								

IDR12.1	IDR12 Training needs analysis	Gen	Progress with HF deliverables is well behind what would be expected at this stage of the project – IDR 12 & 20 should be complete to allow any resulting design changes to be incorporated prior to FDR		GH	1	Closed	SK(ITL)	IDR 12 and 20 have been submitted (early Jan 2012). Awaiting reply from LU. ITL Jan 12. Issue closed - GH 10.02.12	IDR12.1	
	Physical configuration audit specification		**Contract deliverable: IDR13**								
IDR13.1	IDR13 Physical configuration audit specification	Gen	The physical configuration audit specification should set out the approach and list all methods that SK will use to demonstrate that the "as built" TCU has been made to the drawings/design.		GH	1	Open	SK		IDR13.1	See latest version of IDR 13, sent out with Review 4. DE 29.02.12
IDR13.2	IDR13 Physical configuration audit specification	Gen	PFCA Specification – an appendix showing which records have been generated and their certificate number would be good evidence that the process is being managed.		AW	4	Closed	SK		IDR13.2	See latest version of IDR 13, sent out with Review 4. DE 29.02.12 Closed, thank you.
	Functional configuration audit specification		**Contract deliverable: IDR14**								
IDR14.1	IDR14 Functional configuration audit specification	Gen	The functional configuration audit specification should set out the approach and list all methods that SK will use to demonstrate that the "as built" TCU delivers the required functions.		GH	1	Open	SK		IDR14.1	See latest version of IDR 14 sent out with Review 4. DE 29.02.12
IDR14.2	IDR14 Functional configuration audit specification	Gen	software, braking, EMC filters, fire, safety systems, bogies, suspension all seem to be missing. I had definitely expected more detail at this point.		AW	1	Closed	SK		IDR14.2	See latest version of IDR 14, sent out with Review 4. DE 29.02.12 can be closed for this stage but will require further development.
Sub-system FAT specification			**Contract deliverable: IDR15**								
IDR15.1	IDR15 Sub-system FAT specification	Gen	Testing on the LU railway is listed as the means to demonstrate that components are fit for purpose. This must be done before the machine is delivered to LU. It will never be allowed onto the railway		GH	1	Open	SK		IDR15.1	See latest version of IDR 15, sent out with Review 4. DE 29.02.12
IDR15.2	IDR15 Sub-system FAT specification	Gen	Test schedule is insufficient.	SK to submit detailed test scedule. Static tests must include, among others, checking height of the couplers, and vehicle gauging.	RB	1	Subject to agreed closeout plan	SK	This item can be finalised in FRD - RB 30.03.12	IDR15.2	See latest version of IDR 15, sent out with Review 4. DE 29.02.12
IDR15.3	IDR15 Sub-system FAT specification	Gen	testing has been discussed. Need more detail of what will be done.		AW	1	Closed	SK		IDR15.3	See latest version of IDR 15, sent out with Review 4. DE 29.02.12 can be closed for this stage but will require further development.
Obsolescence mitigation plan			**Contract deliverable: IDR16**								
IDR16.1	IDR16 Obsolescence mitigation plan	Gen	Obsolescence Mitigation is how LU deal with items that we cannot buy in future. That is to say, when a manufacturer stops making parts for it, how do we make sure the machine does not		GH	1	Open	SK		IDR16.1	See latest version of IDR 16, sent out with Review 4. DE 29.02.12
IDR16.2	IDR16 Obsolescence mitigation plan	Gen	IDR 16 – needs development!		AW	1	Closed	SK		IDR16.2	See latest version of IDR 16 sent out with Review 4. DE 29.02.12 Demonstrates progress towards an acceptable document. Closed.
Vehicle log book specification			**Contract deliverable: IDR17**								

IDR17.1	IDR17 Vehicle log book specification					1	Open			IDR17.1	IDR 17 sent out with IDR Review 4
	Engineering safety report		**Contract deliverable: IDR18**								
IDR18.1	IDR18 Engineering safety report	Gen	No reasons are given why almost every hazard is “very low”.		GH	1	Closed	SK(ITL)	Process controls discussed in meeting. We are following the hierarchy of risk reduction. It is our recollection that this point was closed in the meeting. If you require further information please	IDR18.1	Closed GH 26.01.12 covered by application of principles detailed in report.
IDR18.2	IDR18 Engineering safety report	Gen	No indication that intolerable hazards will be addressed in design. Every hazard mitigation is “check” which is the lowest type of safety measure and only acceptable once all other methods (design out, guard, technical backups		GH	1	Closed	SK(ITL)	Process controls discussed in meeting. We are following the hierarchy of risk reduction. It is our recollection that this point was closed in the meeting. If you require further information please	IDR18.2	Closed GH 26.01.12 - remaining open points indicate design is not optimal and is being reviewed.
IDR18.3	IDR18 Engineering safety report	Gen	No mention of critical failure modes such as compressors falling from the vehicle.		GH	1	Closed	SK(ITL)	Structural attachment of all the items which have the potential to fall off are addressed by several general hazard log entries, including GS1.1/1 gauge infringement, GS1.1/2 detachment/partial detachment of equipment, GS3.0/4 loss of bogie mounted equipment. The method of mitigation is known i.e. compliance with LU standards for secondary retention and structural standards, with review by LU. The actual work to provide the documentation to LU for review is ongoing. Is it possible to close this report	IDR18.3	GH to review GS1.1/2
IDR18.4	IDR18 Engineering safety report	3.1.3	Section 3.1.3 – it would be useful to state explicitly that the emergency recovery is powered by the batteries and state that it has the capability of moving the TCT X metres on level track (or if		GR	4	Open	SK(ITL)	Noted. To follow. (This will probably be recorded in the hazard log mitigation/description of the machine.) Response is noted	IDR18.4	
IDR18.5	IDR18 Engineering safety report	6.4	Section 6.4 – is it intended that the fire suppression system can be manually activated from both internally and externally? For how long will the fire suppressant discharge before being exhausted?		GR	2	Open	SK(ITL)	This level of detail will not be recorded in the Engineering Safety Report. Please refer to the Fire Report when issued for specific details of fire assessment, justification and technical details. Response is considered	IDR18.5	
IDR18.6	IDR18 Engineering Safety Report	1.4	I would expect a final safety report following testing and closure of the hazard log and possibly one prior to testing to cover the safety of the test arrangements.		PS	1	Closed	SK(ITL)		IDR18.6	The stages recorded reflect the deliverables listed Appendix 8 of the Technical Specification. PS 19.02.12 - okay. PS to discuss with Guy Harris. Any Safety issues not closed out at FDR and recorded in FDR 8 Engineering Safety Report must be dealt with at subsequent

IDR18.7	IDR18 Engineering Safety Report	3.4.3	Typo - First paragraph does not make sense.		PS	3	Closed	SK(ITL)		IDR18.7	We will look at a wording clarification for subsequent edition of the report. It is technically correct as is. Revised text will be: "Each of the cleaning control desks are powered by 24Vdc battery, this provides normal working power, and also provides backup power for use in the event of power loss within the MPU. Under normal working conditions the 24V battery is supplied from the MPU's 50Vdc auxiliary system (via 24V converter)."
IDR18.8	IDR18 Engineering Safety Report	6	At IDR I would expect visibility of (at least) outline safety justifications for the key areas of concern (as outlined in 6.15), I recognise that these are somewhat reliant on the FMEAs and		PS	1	Open	SK(ITL)		IDR18.8	Noted. PS 19.02.12 - carried forward to next review.
IDR18.9	IDR18 Engineering Safety Report	6.4	There is no Fire system FMEA in the RAM Report submitted as part of IDR.		PS	1	Open	SK(ITL)		IDR18.9	Noted. PS 19.02.12 - carried forward to next review.
IDR18.10	IDR18 Engineering Safety Report	6.4	There is no mention of the potential (or otherwise) for ignition of atomised hydraulic oil following its release under high pressure. (This is only passingly mentioned under hazard log GS6.6/3.		PS	1	Open	SK(ITL)		IDR18.10	Atomised hydraulic oil hazard is fully addressed by GS6.6/3. Indeed details were added following identification of this point by AW at a previous meeting. This is not just a passing reference, it is considered to be fully addressed, with mitigations identified. Standard design practice to periodically replace certain hoses, avoid chaffing points in the design and provide protection where possible is considered to be sufficient mitigation for this point. No further reasonably practicable mitigations have been identified by SK.
IDR18.11	IDR18 Engineering Safety Report	6.6	"A full Finite Element Analysis (FEA) [of the bogie frame] has/will be undertaken and the results submitted to LU for approval." I take it that the FEA is still a work in progress and this is a holding		PS	1	Closed	SK(ITL)		IDR18.11	At the time of writing this was a holding statement, however we can confirm that this package has now been submitted to LU. PS 19.02.12 - closed
IDR18.12	IDR18 Engineering Safety Report	6.9	EECS? (Not defined in Section 9)		PS	1	Closed	SK(ITL)		IDR18.12	EECS removed from title. PS 19.02.12 - closed
IDR18.13	IDR18 Engineering Safety Report	6.9	Can the assumption of no passing traffic be relied upon for areas where LU operate in close proximity to other lines? (e.g. Piccadilly Line Heathrow T5)		PS	1	Open	SK(ITL)		IDR18.13	No this is a consideration of the EMC safety case - ITL to update document. 26.01.12 This statement was as a result of comments in the Human Factors workshop regarding the working scenario. It is suggested that this point is closed, as EMC is a separate workstream and such details will be addressed in full there. PS 19.02.12 - Please clarify the statement
IDR18.14	IDR18 Engineering Safety Report	6.11	Please provide further detail of the proposed/tentatively agreed emergency stop functionality and mode switch functionality within this report and the hazard log.		PS	1	Open	SK(ITL)		IDR18.14	Working details of the Mode Switch and Emergency Stop will remain within the detailed papers. They will be reissued once the interfacing details are agreed with LU. General description will be provided where appropriate in the hazard log mitigations in Section GS8.8/0, however, this will refer out to the detailed papers as appropriate.

IDR18.15	IDR18 Engineering Safety Report	Section 1.4 page 7	Section 1.4 page 7 states: “Final Design Review (FDR), This review is conducted to evaluate the final detailed design developed to meet the requirements of the Technical Specification.” - does this include demonstration of hazards identified that have been designed out?		AW	1	Closed	SK(ITL)	Mitigation development is a process control. We are following the Hierarchy of Risk Reduction, which requires hazards to be designed out where possible as the first step. The only evidence for this, is that at present some of the hazards are still open, as the process of mitigation development has not been concluded. No further evidence will be provided. This is a process/management point and is	IDR18.15	
IDR18.16	IDR18 Engineering Safety Report	3.1.1 Page 9	3.1.1 Page 9 describes an anti-wheelspin system. This is not described elsewhere in any detail. Include in FMECA.		AW	1	Closed	SK(ITL)	Hazards associated with the anti-wheel spin system (which is only operational when the TCU is active, at a maximum speed of 10kph) are recorded in GS1.6/5 & GS4.11. The consequences of incorrect application of the wheel spin system have not been deemed sufficiently significant to warrant an FMEA.	IDR18.16	
IDR18.17	IDR18 Engineering Safety Report	3.1.3 Page 9	3.1.3 Page 9 states that the emergency drive panel is hand-held. This will require anti-vandalism measures (damage to cable, dropping etc)		AW	1	Closed	SK(ITL)	The anti-vandalism mechanism is expected to be the lock on the MPU door. As with all other equipment it will be mounted securely to avoid damage/falling down during transit. Additionally will be located in a panel under the main control console, which LU may choose to attach anti-tamper seals to. For information - no edits are proposed to the report. AW - Closed. SK have requested that they can mount the panel within the console under a cover. This removes this issue as the	IDR18.17	
IDR18.18	IDR18 Engineering Safety Report	3.3.4 page 11	3.3.4 page 11 – “Onward waste disposal is outside SK’s scope”. – See comments against IDR 11		AW	1	Closed	SK(ITL)	The design for the ability to remove the waste is within SK scope, as will be described in subsequent revisions when this design method is clarified. Onward waste disposal, i.e. sending the waste to landfill etc. is outside SK scope. This statement will remain. AW - Closed - agreed that waste to landfill / recycling is outside SK	IDR18.18	
IDR18.19	IDR18 Engineering Safety Report	3.3.5 Page 12	3.3.5 Page 12 – The power for the control panel is derived from a battery which is fed from the MPU 50Vdc auxiliary supply and transformed down to 24Vdc. How does the operator know the		AW	1	Closed	SK(ITL)	Yes - battery charge is part of the pre-departure check list, indication of status is displayed on the console. Hazard log, GS6.10/5. AW - closed 08.03.12	IDR18.19	
IDR18.20	IDR18 Engineering Safety Report	6.3 Page 21	AW - 6.3 Page 21 – “The system features pressure relief valves at key locations to divert any over pressure back in to the main tank, if there is a problem with the whole system the pressure relief is provided on the main tank to discharge fluid to the track”. Is		NS	1	Subject to agreed closeout plan	SK(ITL)		IDR18.20	This is standard hydraulic practice. Over pressure relief is mandatory requirement. Discharge to track has been chosen due to location, to avoid the likelihood of discharge onto people. This is an extremely unlikely event. AW - need Nigel S comment
IDR18.21	IDR18 Engineering Safety Report	6.4 Page 22	6.4 Page 22 – Are the Fire system 24v batteries the same as the recovery drive 24V batteries? Risk if one discharges the other.		AW	1	Closed	SK(ITL)		IDR18.21	Yes they are the same batteries. The 24V circuit is rated for its duty cycle. Max time to be stabled without charge will be defined - see hazard log entry GS6.10/5. Not acceptable to the fire engineer. Fire system

IDR18.22	IDR18 Engineering Safety Report	6.13 page 28	6.13 page 28 – “vigilance system will activate tripping the emergency stop” - Given the discussions to date, would it be safer if the vigilence initiated an auto-stop and retract nozzles as per a standard handover? That leaves the TCT ready for immediate transit and		AW	1	Closed	SK(ITL)	Issue closed - GH 10.02.12	IDR18.22	
	Hazard Log		**Contract deliverable: IDR18a**								
IDR18a.1	IDR 18a Hazard Log	GS1.6/1	GS 1.6/1 – Poor Ride – noted that wheel unloading is included under this section. The hazard related to wheel unloading is derailment rather than poor ride. Has predicted wheel unloading performance been subject to review?		GR	1	Open	SK(ITL)	Derailment noted as consequence - ITL to update hazard log. 26.01.12	IDR18a.1	We have reviewed the hazard log to consider editing this entry, however for consistency it will be left as is. There are many events/hazards which could result in derailment, poor ride is one of many (~25). From experience we have found that breaking the hazards down by subsystem results in a robust method for hazard identification, and for management of the issues arising. One big 'derailment' hazard, would either be very unwieldy to address, or would simply be closed by cross referencing many other entries. To maintain consistency with the rest of the hazard log, derailment is considered to be a 'consequence' of wheel unloading. Please be assured that the process of mitigation identification does consider the hazard, the cause and the consequences aspects. No edits proposed. SK confident that this point is fully covered.
IDR18a.2	IDR 18a Hazard Log	GS 3.3/1 & GS 3.3/2	GS 3.3/1 and GS 3.3/2 – as above, the issue of wheel unloading appears to have been treated more as a ride issue than a derailment risk. I am not convinced that “Incorrect performance of the suspension” is an appropriate hazard – the hazard is surely “derailment” and one cause could be the incorrect performance of the suspension. The hazard log may need to be reviewed accordingly.		GR	1	Open	SK(ITL)		IDR18a.2	We have reviewed the hazard log to consider editing this entry, however for consistency it will be left as is. There are many events/hazards which could result in derailment, poor ride is one of many (~25). From experience we have found that breaking the hazards down by subsystem results in a robust method for hazard identification, and for management of the issues arising. One big 'derailment' hazard, would either be very unwieldy to address, or would simply be closed by cross referencing many other entries. To maintain consistency with the rest of the hazard log, derailment is considered to be a 'consequence' of wheel unloading. Please be assured that the process of mitigation identification does consider the hazard, the cause and the consequences aspects.
IDR18a.3	IDR 18a Hazard Log	GS 4.4/2	GS 4.4/2 – the disc brakes on TCU are fitted to vehicles 1 and 3 – not 1 and 2 as stated.		GR	3	Closed	SK(ITL)	Edited - closed. Noted - issue closed GR 10.02.12.	IDR18a.3	

IDR18a.4	IDR 18a Hazard Log	GS 5.3/2	GS 5.3/2 – the train being gapped does not result in an un-braked train since although the hydrostatic brake is no longer effective, both the normal EP brake and emergency brakes remain fully available to the train operator. The application of either system would require the crew to respond to the situation and manually apply the brake		GR	1	Open	SK(ITL)		IDR18a.4	Hazard mitigations relating to gapping are still under development. The intention was to record the fact that the brakes would be removed by the system not the operator, but would require operator intervention to reapply them. This will be edited in subsequent revision (when further information is obtained regarding gap management), using the term 'coasting' instead. Note that in order for the "(hydrostatic) brakes to be removed by the system" they would first have had to have been applied (by the system) - it might well be the case that the train goes into the gap powered by the slow speed drive; the loss of all traction power (train gapped) would result in the loss
IDR18a.5	IDR 18a Hazard Log	GS 5.3/3	GS 5.3/3 – in this scenario, while only half of the hydrostatic brake power will be available, the normal EP brake and emergency brakes remain fully available		GR	4	Open	SK(ITL)		IDR18a.5	Hazard mitigations relating to gapping are still under development. The intention was to record the fact that the brakes would be removed by the system not the operator, but would require operator intervention to reapply them. This will be edited in subsequent revision (when further information is obtained regarding gap management), using the term 'coasting' instead. Note that in order for the "(hydrostatic) brakes to be removed by the system" they would first have had to have been applied (by the system) - it might well be the case that the train goes into the gap powered by the slow speed drive; the loss of all traction power (train gapped) would result in the loss
IDR18a.6	Hazard Log	General	I note the progress but there are still a large number of incomplete entries in the design control measures field which is incompatible with the IDR stage.		PS	1	Open	SK(ITL)		IDR18a.6	PS 19.02.12 - carried forward to next review.
IDR18a.7	Hazard Log	CDR Outstanding Issues	Please can I have a response to my CDR comments on the hazard log?		PS	1	Closed	SK(ITL)		IDR18a.7	PS 19.02.12 - Closed.
IDR18a.8	Hazard Log	GS1.6/4	It is not clear what the actual status of the controls are. The hazard log states "The TCU is capable of negotiating the maximum track curvature presented...based on computer simulation relating to track data provided by LU" with status closed pending completion of LU design scrutiny, whereas the Interface Management Report states that provision of evidence		PS	1	Closed	SK(ITL)		IDR18a.8	As noted in telephone conversations and at meeting 26/1/12, the different in status between the hazard log and interface table is expected, and relates to the respective processes they record. (Closed pending - means the route to adequate mitigation is known, but the task is 'pending'. This status allows focus to be applied to the genuinely open points at this
IDR18a.9	Hazard Log	GS1.6/5	Should the scope of this hazard include the emergency drive mechanical interface with the rail?		PS	1	Open	SK(ITL)		IDR18a.9	Full review of hazard applicability/coverage for recovery traction device has been completed with the hazard log updated accordingly.
IDR18a.10	Hazard Log	GS2.4/7	Where the hazard log provides controls but the associated status field is Open, I have assumed that the proposed control is not yet enacted.		PS	4	Closed	SK(ITL)		IDR18a.10	Correct. This will be the case right through to testing and validation. PS 19.02.12 - Closed.

IDR18a.11	Hazard Log	GS3.2/5	Note incomplete entry		PS	3	Open	SK(ITL)		IDR18a.11	Please provide more details of your query. We consider this aspect will be fully addressed by the LU design scrutiny process, to demonstrate compliance with standards. PS 19.02.12 - "Solid monoblock construction
IDR18a.12	Hazard Log	GS3.4/1	Does the MPU have lifeguards? I don't believe they are fitted to 72TS or 67TS.		PS	1	Closed	SK(ITL)		IDR18a.12	Noted. Comment can be closed. Whether or not the MPU has lifeguards, the TCU does not. LU to address the MPU side. PS 19.02.12 - Closed
IDR18a.13	Hazard Log	GS4.0/1	Between this hazard log and the Interface Management Document it is not clear whether the design of the interface between TCU & MPU is finalised.		PS	1	Closed	SK(ITL)		IDR18a.13	No it is not. There are many details to be investigated and agreed by both parties. A process to achieve this has been identified and is being followed. This comment relating specifically to compressed air is identified and being managed by the Interface/Integration
IDR18a.14	Hazard Log	GS4.6/5	Please provide outline description of the Emergency Stop arrangements.		PS	3	Open	SK(ITL)		IDR18a.14	See Emergency Stop Paper. PS 19.02.12 - Okay. I assume this paper will be formally issued with a document reference that will be included in the hazard
IDR18a.15	Hazard Log	GS5.9/2 GS5.9/3	Pedantic but if there is a requirement to check and top up fluid levels how is the gearbox & clutch maintenance free?		PS	2	Closed	SK(ITL)		IDR18a.15	This is a standard industry term where these items typically require periodic disassembly and overhaul. PS 19.02.12 - Closed
IDR18a.16	Hazard Log	GS6.6/3	You need to provide a much stronger argument for the acceptability of the pressurised hydraulic fluid and its flammability if released under pressure. Is the likelihood too high and the consequence too low?		PS	1	Open	SK(ITL)		IDR18a.16	Atomised hydraulic oil hazard is fully addressed by GS6.6/3. Indeed details were added following identification of this point by AW at a previous meeting. This is not just a passing reference, it is considered to be fully addressed, with mitigations identified. Standard design practice to periodically replace certain hoses, avoid chaffing points in the design and provide protection where possible is considered to be sufficient mitigation for this point. No further reasonably practicable mitigations have been identified by SK.
IDR18a.17	Hazard Log	GS8.8/2	Please confirm whether the EP application is by energisation of a TCU/MPU line therefore not fail safe.		PS	1	Closed	SK(ITL)		IDR18a.17	The interaction with the EB will be whatever LU specify, this aspect of the design is LU scope. PS 19.02.12 - accepted. Comment to be
IDR18a.18	Hazard Log	GS8.8/2 GS8.8/3	Please provide more of a synopsis of the E-stop paper in the hazard log.		PS	3	Open	SK(ITL)		IDR18a.18	Noted, also see Emergency Stop Paper. PS 19.02.12 - Okay. I assume this paper will be formally issued with a document reference that will be included in the hazard
IDR18a.19	Hazard Log	GS8.8/6 GS8.8/7	Please update with known solution.		PS	3	Open	SK(ITL)		IDR18a.19	Please refer to the Mode Switch Paper. Awaiting confirmation from LU regarding Integration/Interfacing design aspects. Will be updated in due course. PS 19.02.12 - Okay. I assume this paper will
IDR18a.20	Hazard Log	GS8.8/9	Please provide detail of how the reset will be performed or the situation recovered if the control system crashes in the tunnel.		PS	1	Open	SK(ITL)		IDR18a.20	A response to this point will be included in the software mitigation refer to PX4.0/1. (Additional cause also added to PX4.0/1) PS 19.02.12 - carried forward to next review.

IDR18a.21	Hazard Log	MT6.0/1	I note that +30C is the requirement in the specification, but does this limit operation? The summer tunnel temperature on the Victoria Line has been known to exceed 30C.		PS	2	Closed	SK(ITL)		IDR18a.21	We will comply with the specification. PS to discuss with Guy Harris. Spec refers to E6161 which states ambient tunnel temperature up to 35^{o}C
IDR18a.22	Hazard Log	OP2.0/1	If it is necessary to allow isolation of the fire system, should there be an interlock between the fire system status and traction in a similar manner to the compartment locks?		PS	2	Closed	SK(ITL)		IDR18a.22	Standard industry arrangements for interlocking, isolation, automatic functions and operator actions, and good design in general will be applied. The reference to system isolation relates to occasional maintenance tasks, and as with many maintenance tasks, requires
IDR18a.23	Hazard Log	PX1.3/5	What about partial loss through a localised blockage? Would these be detectable via the pressure switches or rely upon CCTV for detection? (See also CDR17.4)		PS	2	Closed	SK(ITL)		IDR18a.23	No, localised blockages would not be identified. As noted in PX1.3/1. The hazard referenced in the hazard relates to dust plume, and the loss of one or two nozzles is not considered to be a material problem. Operator CCTV observation is a back up to this. No edits proposed to mitigation text.
	EMC Technical file		**Contract deliverable: IDR7**								
IDR19.1	IDR19 EMC Technical file	Gen	EMC – must consider what can be done to mitigate the inability to test on our infrastrucutre. Must also consider what testing we can actually do on our railway. We cannot start up a 1.2MW machine for depot test when the railway power and signalling are connected to the same substation.		AW	1	Closed	SK	Carry over to FDR	IDR19.1	Phone conference with AW and URoerden on 03/02/12: Agreement that final testing only makes sense on LU ground and its environment. LU needs to find a way. DE 29.02.12. EMC work to be continued. Note that some testing must be done prior to arrival on LU site otherwise the machine simply cannot be powered up.
	Training plan		**Contract deliverable: IDR7**								
IDR20.1	IDR20 Training plan		Progress with HF deliverables is well behind what would be expected at this stage of the project – IDR 12 & 20 should be complete to allow any resulting design changes to be		GH	1	Closed	SK	IDR 12 and 20 have been submitted (early Jan 2012). Awaiting reply from LU. Issue closed - GH 10.02.12	IDR20.1	
	Updated verification and validation plan		**Contract deliverable: IDR7**								
IDR21.1	IDR21 Updated verification and validation plan		I would recommend that this document is developed to provide greater detail about the testing which will be undertaken. For example, in terms of the brake equipment, all of the following tests would need to be included:-		GR	1	Closed	SK	Noted that the suggested items for test have been aded to IDR21 and IDR 15. It is noted that the pneumatic checks on the TCU pipework are in IDR21; it might be more appropriate for these to be part of the FAT - IDR 15 - issue	IDR21.1	See latest version of IDR21, sent out with IDR Review 4. DE 29.02.12

IDR21.1a	IDR21 Updated verification and validation plan		TCU • static tests on each bogie with brake equipment, using a regulated air supply to confirm the application and release of the friction (disc) brake and the correct operation of the disc brake actuator • on the two TCU cars fitted with brake equipment, static tests o to set the EP brake application and release times o to check the capacity of the auxiliary reservoir o to set the emergency brake application time o to confirm that the brake equipment on both bogies on each car responds to the operation of the EP brake valves o to confirm that the brake equipment on		GR	1	Closed	SK	Noted that the suggested items for test have been aded to IDR21 and IDR 15. It is noted that the pneumatic checks on the TCU pipework are in IDR21; it might be more appropriate for these to be part of the FAT - IDR 15 - issue closed GR 20.04.12	IDR21.1a	See latest version of IDR21, sent out with IDR Review 4. DE 29.02.12
IDR21.1b	IDR21 Updated verification and validation plan		TCT • static tests with the TCU and TCT coupled together o to check the correct interface and connection of main line and train line throughout the train o to check the correction of the emergency brake throughout the train o to check the correct operation of the EP brake from each outer cab of the TCT		GR	1	Closed	SK	Noted that the suggested items for test have been aded to IDR21 and IDR 15. It is noted that the pneumatic checks on the TCU pipework are in IDR21; it might be more appropriate for these to be part of the FAT - IDR 15 - issue closed GR 20.04.12	IDR21.1b	See latest version of IDR21, sent out with IDR Review 4. DE 29.02.12
IDR21.1c	IDR21 Updated verification and validation plan		Equally, pneumatic tests would be needed to confirm the integrity of the pipework.		GR	1	Closed	SK	Noted that the suggested items for test have been aded to IDR21 and IDR 15. It is noted that the pneumatic checks on the TCU pipework are in IDR21; it might be more appropriate for these to be	IDR21.1c	See latest version of IDR21, sent out with IDR Review 4. DE 29.02.12
IDR21.2	IDR21 Updated verification and validation plan		needs to be written.		AW	1	Closed	SK		IDR21.2	See latest version of IDR21, sent out with IDR Review 4. DE 29.02.12 Closed for IDR. Note for FDR.
IDR22	**Miscellaneous**		**Laser System**							**IDR22**	
IDR22.1	Laser System	Gen	The information in the SICK LMS100 Operating Instructions covers the size of obstacles detected in section 3.5.2 in the direction of the scan but has no information in the orthogonal direction (direction of travel). From our experience with a Leica / Amberg GRP5000 which scans at 50 Hz but moves more slowly than the TCT in cleaning mode we are aware that the system can miss 8mm bolts as the scan progresses along the tunnel. Calculating the distance per scan at 6 kph (1.667 m/s) with a scan rate of 25Hz (the lower of both shown in the Operating Instructions gives 1.667 / 25 =		JM	2	Open	SK		IDR22.1	The fine detailed design of the laser measuring and control system is ongoing. Appropriate details and assurances will be provided in due course. Your comments are noted.
IDR22.2	Laser System	Gen	With our laser measurement system we are aware that the system can fail to detect tunnel lights with transparent covers – the laser detects the back of the light fitting rather than the transparent cover. Please confirm that the system will detect lights with transparent covers.		JM	2	Open	SK		IDR22.2	The fine detailed design of the laser measuring and control system is ongoing. Appropriate details and assurances will be provided in due course. Your comments are noted.

IDR22.3	Laser System	Gen	The Leica / Amberg GRP5000 system has problems where the detector gats dazzled where a highly reflective object is scanned – please confirm the SICK LMS100 does not have this problem		JM	2	Open	SK		IDR22.3	The fine detailed design of the laser measuring and control system is ongoing. Appropriate details and assurances will be provided in due course. Your comments are noted.
IDR22.4	Laser System	Gen	The Leica / Amberg GRP5000 system also has problems when it detects a cross passage (void) behind the cable run and gives unreliable results. Will this cause a problem for the SICK detectors ?		JM	2	Open	SK		IDR22.4	The fine detailed design of the laser measuring and control system is ongoing. Appropriate details and assurances will be provided in due course. Your comments are noted.
IDR23	**Miscellaneous**		**Hydraulic System**							**IDR23**	
IDR23.1	Hydraulic System	Gen	Missing: Maximum Operating Conditions; Pressures in fully charged system	To be supplied	NAS (TL)	2	Closed	SK	max. hydr. pressure 420 bar Working pressure 100 – 360 bar. Closed NS 26.01.12	IDR23.1	
IDR23.2	Hydraulic System	Gen	Missing Maximum Operating Conditions; Temperatures of hydraulics	To be supplied	NAS (TL)	2	Closed	SK	working temperature 40° - 80°C >80°C hydr. pumps stop. Closed NS 26.01.12	IDR23.2	
IDR23.3	Hydraulic System	Gen	Missing: Safety; Leaks (feed back sytem or complete drainage)	To be supplied	NAS (TL)	2	Open	SK		IDR23.3	NAS response 02/04/2012 See IDR23.5 SK response 30/01/2012 Visual oil level indicator (oil glass) and electronic oil-deficiency indicator (when 110 liters of oil are missing in the tank) Oil level indicator and low oil Indicator. Complete drainage of Hydr. oil via drain valves on the oil Tanks
IDR23.4	Hydraulic System	Gen	Missing: Safety; COSHH data sheets	To be supplied	NAS (TL)	2	Closed	SK	NAS response 02/04/2012: Noted issue closed.	IDR23.4	SK response 30/01/2012 See Panolin oil specs attached Which components? Oil.
IDR23.5	Hydraulic System	Gen	Missing: Safety; Spillage and containment methods	To be supplied	NAS (TL)	2	Open	SK		IDR23.5	NAS response 02/04/2012: 110L seems too much of a loss (impact on safety, environment) Why can't it be less? SK response 30/01/2012 In the event of failure approx. 110l of oil would flow out, after that the hydr. system automatically stops. During maintenance work on the hydraulic
IDR23.6	Hydraulic System	Gen	Missing: Safety; Alarms Safety cut-outs Isolations after rupture or leak	To be supplied	NAS (TL)	2	Open	SK		IDR23.6	NAS respone 02/04/2012 See IDR23.5 SK response 30/01/2012 The hydr tank is installed under the body frame. After 110l have been spilled the pumps automatically stop to work We need to understand what would prevent the complete discharge of 400L of oil in the
IDR23.7	Hydraulic System	Gen	Missing: Safety; FMECA for hydraulic system	To be supplied	NAS (TL)	2	Closed	SK	Will be part of IDR 10 RAM report. Closed NS 26.01.12.	IDR23.7	
IDR23.8	Hydraulic System	Gen	Missing: Safety; Safety Integrity Level rating Failure modes	To be supplied	NAS (TL)	2	Closed	SK	Not available. Clsoed NS 26.01.12.	IDR23.8	
IDR23.9	Hydraulic System	Gen	Missing: Construction and Specifications; Reservoir size and capacity	To be supplied	NAS (TL)	2	Closed	SK	1300 x 750 x 465 mm / appr. 400l. Closed NS 26.01.12.	IDR23.9	

IDR23.10	Hydraulic System	Gen	Missing: Construction and Specifications; Requirement for baffles	To be supplied	NAS (TL)	2	Closed	SK	NAS response 02/04/2012: Noted drawings reviewed and ok - issue closed.	IDR23.10	SK response 30/01/2012 The tank is positioned inside of the body frame and additionally protected with a steel shield from the underside. See also drawing 04-255-0004 Protection against damage and heat. We need to understand the internal
IDR23.11	Hydraulic System	Gen	Missing: Construction and Specifications; Type of couplings being used	To be supplied	NAS (TL)	2	Closed	SK	Drip free hydr. Couplings according to ISO/DIN EN 4413. Closed NS 26.01.12.	IDR23.11	
IDR23.12	Hydraulic System	Gen	Missing: Construction and Specifications; Materials used	To be supplied	NAS (TL)	2	Closed	SK	Stainless steel or galvanized steel . Closed NS 26.01.12.	IDR23.12	
IDR23.13	Hydraulic System	Gen	Missing: Construction and Specifications; Hose type and material	To be supplied	NAS (TL)	2	Closed	SK	Special high-pressure hydraulic. Hoses according to ISO/DIN EN 4413. Closed NS 26.01.12.	IDR23.13	
IDR23.14	Hydraulic System	Gen	Missing: Construction and Specifications; Type of oil specified	To be supplied	NAS (TL)	2	Closed	SK	Panolin HLP 46. Closed NS 26.01.12.	IDR23.14	
IDR23.15	Hydraulic System	Gen	Missing: Construction and Specifications; Containment of spillage	To be supplied	NAS (TL)	2	Closed	SK	During maintenance work on the hydraulic system use suitable drip pans. Closed NS 26.01.12.	IDR23.15	
IDR23.16	Hydraulic System	Gen	Missing: Maintainability; Filling method	To be supplied	NAS (TL)	2	Closed	SK	Via sealing cover on the hydr. Tank. Clsoed NS 26.01.12.	IDR23.16	
IDR23.17	Hydraulic System	Gen	Missing: Maintainability; How are reservoir levels checked (manual or automatic)?	To be supplied	NAS (TL)	2	Closed	SK	Manual via inspection glass on the hydr. tank. Closed NS 26.01.12.	IDR23.17	
IDR23.18	Hydraulic System	Gen	Missing: Maintainability; Methods of emptying or discharge of oil	To be supplied	NAS (TL)	2	Closed	SK	Clsoed NS 26.01.12.	IDR23.18	
IDR23.19	Hydraulic System	Gen	Missing: Maintainability; Replacing/cleaning of filters	To be supplied	NAS (TL)	2	Closed	SK	Unscrew the filter on the hydr. pumps and hydr. tanks and replace it; first time after 250 hours, after that yearly check. Closed NS 26.01.12.	IDR23.19	
IDR23.20	Hydraulic System	Gen	Missing: Maintainability; Maintainability how often, where, how	To be supplied	NAS (TL)	2	Closed	SK	Unscrew the filter on the hydr. pumps and hydr. tanks and replace it; first time after 250 hours, after that yearly check. Closed NS 26.01.12.	IDR23.20	
IDR23.21	Hydraulic System	Gen	Missing: Standards; Constucted to what standards list applicable BS and Euro Norms?	To be supplied	NAS (TL)	2	Closed	SK	According to EN ISO 4413 – 2011(BS 5244 + BS 4575) very old Standards 1986 / 2007 1978 / 1998 replaced by EN ISO 4413. Closed NS 26.01.12.	IDR23.21	
IDR24	**Miscellaneous**		**Cleaning System**							**IDR24**	
IDR24.1	Cleaning System	Gen	SK to demonstrate the effectiveness of their cleaning system in disturbing and collecting dust and refuse - Nozzle effectiveness	SK to carry out demonstration of nozzle effectiveness.	AW	1	Open	SK	SK demo took place at Hannover works Jan 12, demo to be repeated and record successful results in demo report against GH notes provided 08.02.12	IDR24.1	Under progress
IDR24.2	Cleaning System	Gen	SK to demonstrate the effectiveness of their cleaning system in containing all dust disturbed - filter effectiveness. Demonstration of filter capability required, given 10µm filter mesh size	SK to carry out demonstration of filter effectiveness.	AW	1	Open	SK	SK demo of filter performance needed for all flow rates and filter conditions to be present in operation.	IDR24.2	Under progress
IDR25	**Miscellaneous**		**Software**							**IDR25**	
IDR25.1	Software	Gen			AW	1	Open	SK		IDR25.1	

IDR26	Miscellaneous		Fire Strategy							IDR26	
IDR25.1	Fire Strategy	Gen			AW	1	Open	SK		IDR25.1	