1 Outline

It is proposed that all IDD designs should go through one or more formal review processes, defined as:

- Preliminary Design Review (PDR) – review of the conceptual design;
- Critical Design Review (CDR) – review of the engineering design;
- Final Design Review (FDR) – review of the detailed design.

The objectives and benefits of the review process are:

(i) To ensure alternatives are considered, rather than committing too early to a particular design solution;
(ii) To ensure specifications and requirements are clear and agreed by all relevant parties from the start of the project;
(iii) To prevent "mission creep" of the project requirements;
(iv) To maximise "buy-in" of stakeholders, including scientists and technicians;
(v) To draw on and disseminate the knowledge of experienced staff, including scientists and technicians;
(vi) To give a forum to discuss – and encourage – new and innovative design solutions;
(vii) To hold engineers to account and give an opportunity to challenge assumptions;
(viii) To provide an opportunity to educate less experienced engineers;
(ix) To recognise design errors at the earliest possible stage and take corrective actions as appropriate;
(x) To document the design and record the rationale behind decisions.

Small, fast-turnaround projects will not require three full reviews. The Project Manager (PM) – under the supervision of their Group Leader (GL) - will determine which reviews should be held and who should be invited.

2 PDR

Review of the conceptual design. This review should be completed satisfactorily before significant commitment to detailed engineering analysis or the generation of full 3D models.

2.1 Objectives

(i) Confirm the requirements and specification, technically as well as time and cost;
(ii) Present the outline concept design or designs – with a clear preferred option if multiple designs are presented;
(iii) Review and agree the technical viability of the chosen conceptual design and its suitability to advance to the engineering design phase;
(iv) Review and agree the expected timescale and cost;
(v) Review the risk profile and agree its acceptability;
(vi) Initiate purchase of long lead time items as appropriate.

2.2 Material Presented

(i) A summary of the requirements and key points of the specification as understood by the design team;
(ii) An outline of the conceptual design or designs, in the form of sketches, preliminary CAD model, or other appropriate format;
(iii) The major technical, schedule, and budget risks - with mitigation measures;
(iv) Supporting calculations, with any assumptions made;
(v) Initial hazard assessment;
(vi) Details of any long lead time equipment which needs to be purchased before the CDR, with justification;
(vii) Interfaces with other equipment - including dependent features such as connecting systems, floor, and crane requirements;
(viii) Preliminary procurement, assembly, test, and commissioning plan.

2.3 Attendees

There is a wide variety of activities undertaken at ISIS, and as such deciding who should attend should not be viewed as a prescriptive process. The attendance at the design review should be decided by the project manager with consultation from the group leader, ensuring that relevant stakeholders are adequately engaged.

Expected	**Consider**	**Specialist advice as required**
Project manager Design engineer(s) Design Group Leader (Chair) User Critical friend (peer reviewer)	Customer (budget holder) Technician(s) Operator (could be multiple people such as vacuum, survey, electrical operations, controls, *etc.*) Owners of reliant, connected, or affected equipment	Examples could include: • Radiation protection adviser • Nominated pressure engineer • Nominated lifting engineer • Safety adviser • etc

2.4 Deliverables

Meeting minutes should be taken by the project manager or a nominated deputy, and stored with the project Technical File along with all presentation material.

The design Group Leader will decide if the review has been passed. If the review was satisfactory, the project can be released to the next stage. Otherwise, the GL may request further work to be done and for the review to be reconvened at a later date.

Items with very long lead times where procurement has to begin before the CDR for schedule reasons will be identified together with justification and risk mitigation for early purchase.

3 CDR

Review of the engineering design. This review should take place when engineering calculations and 3D modelling (or general assembly drawings) have been completed, but before significant commitment to the detailed design.

3.1 Objectives

(i) Reconfirm that the design satisfies the project requirements and specification;
(ii) Review and agree the technical viability of the engineering design and its suitability to advance to the detailed design phase (the expectation is that there will be no significant changes);
(iii) Review and agree the expected timescale and cost;
(iv) Review the risk profile and agree its acceptability;
(v) Initiate purchase of long lead time items as appropriate.

3.2 Material Presented

(i) A summary of the key points of the specification;
(ii) A summary of the PDR (if held);
(iii) A presentation of the design solution, as appropriate including (but not limited to)
- Key design features;
- Assembly procedures and lifting arrangements;
- P&I diagram;
- Flows, pressures, temperatures;
- Circuit diagrams;
- Test procedures;

(iv) Outstanding technical, schedule, and budget risks - with mitigation measures;
(v) Final supporting calculations, with any assumptions made (will be more detailed than the PDR);
(vi) Analysis results including any FEA;
(vii) Results of any relevant testing;
(viii) Hazard assessment – what hazards exist and why are they acceptable;
(ix) Details of any long lead time equipment;
(x) Interfaces with other equipment - including dependent features such as connecting systems, floor, and crane requirements;
(xi) Procurement, assembly, test, and commissioning plan.

3.3 Attendees

There is a wide variety of activities undertaken at ISIS, and as such deciding who should attend should not be viewed as a prescriptive process. The attendance at the design

review should be decided by the project manager with consultation from the group leader, ensuring that relevant stakeholders are adequately engaged.

Expected	**Consider**	**Specialist advice as required**
Project manager Design engineer(s) Design Group Leader User Critical friend (peer reviewer) Technician(s)	Customer (budget holder) Operator (could be multiple people such as vacuum, survey, electrical operations, controls, *etc.*) Owners of reliant, connected, or affected equipment	Radiation protection adviser Nominated pressure engineer Nominated lifting engineer Safety adviser

3.4 Deliverables

Meeting minutes should be taken by the project manager or a nominated deputy, and stored with the project Technical File along with all presentation material.

The design Group Leader will decide if the review has been passed. If the review was satisfactory, the project can be released to the next stage. Otherwise, the GL may request further work to be done and for the review to be reconvened at a later date.

Outstanding long lead time items will have been identified and should be released for procurement.

4 FDR

Review of the detailed design. This review should take place when the 2D detailed drawings have been completed, but before committing to significant procurement.

4.1 Objectives

(i) Reconfirm that the design satisfies the project requirements and specification;
(ii) Review any changes to the design since the CDR;
(iii) Review and agree the technical viability of the design and its suitability to advance to the procurement phase;
(iv) Review and agree the expected timescale and cost;
(v) Review the risk profile and agree its acceptability.

4.2 Material Presented

(i) A summary of the key points of the specification;
(ii) A summary of the preceding review (CDR or PDR);

(iii) A revised presentation of the design solution – highlighting any changes since the CDR - as appropriate including (but not limited to)
- Key design features;
- Assembly procedures and lifting arrangements;
- P&I diagram;
- Flows, pressures, temperatures;
- Circuit diagrams;
- Test procedures;

(iv) Outstanding technical, schedule, and budget risks - with mitigation measures;
(v) Final hazard assessment – what hazards still exist and why are they acceptable;
(vi) Interfaces with other equipment - including dependent features such as connecting systems, floor, and crane requirements;
(vii) Procurement, assembly, test, and commissioning plan.

4.3 Attendees

There is a wide variety of activities undertaken at ISIS, and as such deciding who should attend should not be viewed as a prescriptive process. The attendance at the design review should be decided by the project manager with consultation from the group leader, ensuring that relevant stakeholders are adequately engaged.

Expected	**Consider**	**Specialist advice as required**
Project manager Design engineer(s) Design Group Leader User Critical friend (peer reviewer) Technician(s)	Customer (budget holder) Operator (could be multiple people such as vacuum, survey, electrical operations, controls, *etc.*) Owners of reliant, connected, or affected equipment	Radiation protection adviser Nominated pressure engineer Nominated lifting engineer Safety adviser

4.4 Deliverables

Meeting minutes should be taken by the project manager or a nominated deputy, and stored with the project Technical File along with all presentation material.

The design Group Leader will decide if the review has been passed. If the review was satisfactory, the project can be released for procurement. Otherwise, the GL may request further work to be done and for the review to be reconvened at a later date.