Replacement Research Reactor Project

VERIFICATION OF DESIGN, CONSTRUCTION, PRE-COMMISSIONING AND STAGE A COMMISSIONING ACTIVITIES UNDER THE FACILITY LICENCE CONSTRUCTION AUTHORISATION (F0118)

Prepared By
Australian Nuclear Science and Technology Organisation

2 November 2004

ANSTO		Document N°: **RRRP-7200-EBEAN-008-REV0** Revision: **0**		
Replacement Reactor Project		Document Title: Verification of Design, Construction, Pre-Commissioning and Stage A Commissioning Activities under the Facility Licence Construction Authorisation (F0118)		
REVISION SHEET		Ref No:		
		Print name, date and sign or initial		
Revision Letter	Description of Revision	Prepared	Checked/ Reviewed	Approved
0	Original issue for submission to ARPANSA	AFX PLN	MSX RMX	GDW
Notes: 1. Revision must be verified in accordance with the Quality Plan for the job.				

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1 INTRODUCTION

The ARPANSA Construction Authorisation for the RRR covers 4 project phases:

1. Detailed Engineering Phase
2. Construction Phase
3. Pre-Commissioning Phase
4. Stage A Commissioning Phase

It should be noted that the Construction Phase incorporated civil construction activities, manufacture and procurement activities and installation activities.

The arrangements for verification of activities during each of the above phases is outlined in Figure 1 and described in detail in the following sections. Also described are the overall Quality Assurance (QA) activities that support these arrangements.

2 QUALITY ASSURANCE ACTIVITIES

Both the ANSTO project team and INVAP have Quality Management Systems (QMS) that are certified to ISO 9000:2000.

ANSTO has arranged second party audits to be conducted on INVAP/JHEDI during the various project phases to verify that construction activities were being carried out in accordance with approved specifications and documentation packages. The audits were conducted by professional certifying bodies such as DNV and NCSI. ANSTO ensured that all audit findings were properly addressed through corrective and preventive actions, which provides assurance that the Project has been implemented to approved specifications.

ANSTO has inspected the construction activities using technically and professionally qualified staff on an ongoing basis. Any deviation identified was handled through Non-Conformance Reports (NCRs) and Preventive Action Reports (PARs) consistent with international best practice for ISO 9000:2000 certified QMS.

3 DETAILED ENGINEERING PHASE

During the Detailed Engineering phase, the design of structures, systems and components was established through the preparation of design documentation including drawings, specifications, calculations, analyses, etc. This documentation was subject to a thorough review, verification and acceptance process by ANSTO in accordance with the project QMS prior to the commencement of construction activities. In addition, for Safety Category 1 and 2 structures, systems and components, this documentation was used to support requests to ARPANSA for approval to construct items important to safety to meet the requirements of ARPANSA Regulation 54 and Facility Licence, Construction Authorisation (F0118) License Condition 4.6. Approval to construct was obtained from ARPANSA prior to commencement of construction of these items.

Changes to originally accepted design arose due to practical problems experienced at site in implementing the design. Such modifications were handled by following an approved design

change process that was communicated and understood by all the participating organisations. The design change requests originating from the construction site were processed through a documented Change Advise Note (CAN). CANs were reviewed by the relevant participating project organisations and approved by the original design authority INVAP. Where a CAN was determined as constituting a change that has significant implications for safety, then prior approval was sought from ARPANSA in accordance with ARPANS Regulation 51.

The relevant documentation was revised following the approval of CAN and issued to the construction site for implementation. Records of CANs issued for the project are maintained to provide traceability to design changes.

4 CONSTRUCTION PHASE

4.1 SPECIFIC INSPECTION & TEST PLANS

During the Construction Phase, activities were controlled through the preparation and implementation of Specific Inspection and Test Plans (SITP's) in accordance with the project Construction Inspection and Test Plan (CITP). Each SITP comprised of a sequential list of the activities involved in the performance of a task, including inspection & test activities, and was prepared by the relevant contractor/subcontractor responsible for performing the work. For each activity, SITP's were required to specify the relevant reference documentation (detail engineering, codes/standards, procedures, etc), acceptance criteria, control points (witness/hold points) and the requirements for records/reports generation (check sheets, test reports, etc).

Each SITP was first prepared as an SITP template which was then used for specific tasks as required during construction. Some SITP templates were used many times, such as those for repetitive tasks like concrete placement or piping installation, while some were used just once, such as the template for manufacture of one-off components like the Reflector Vessel. In accordance with the requirements of the project QMS and the CITP, each SITP template was reviewed, verified and accepted by ANSTO prior to its implementation. Over 500 SITP templates were reviewed, verified and accepted by ANSTO during the RRR construction phase.

As part of the review, verification and acceptance process for SITP's, control points were nominated by ANSTO (and other relevant organisations) as required at key SITP activities. There were two types of control point, witness points and hold points. Where a control point was been nominated for an SITP activity, the owner of the control point was formally notified and given reasonable opportunity to be present for the activity. For witness points, the activity could proceed without approval or endorsement from the control point owner, while for hold points, the activity could not proceed without approval or endorsement from the control point owner. Control points were released by means of a representative from the relevant organisation signing off the control point at the relevant activity on the SITP. ANSTO nominated well over 1000 control points on SITP templates which were implemented throughout the construction phase to ensure that the RRR Facility was being constructed in accordance with specified requirements.

4.2 CONSTRUCTION HISTORY DOCKETS

When all activities on an SITP have been completed, the completed SITP, together with all supporting records/reports, were compiled into a document termed a History Docket, which forms the final record of the procurement, manufacture, installation or construction and a particular item or construction lot. The records contained in the History Docket also include any PARs, NCRs and CANs raised during the procurement, manufacture, installation or construction activities.

4.3 CONSTRUCTION RELEASE CERTIFICATES

Once all SITP's for a system (or in some cases certain parts of a system) have been completed, a System Construction Release Certificate (SCRC) is prepared listing all completed SITP's involved in construction of the system. SCRC's are signed off by INVAP and ANSTO (and the relevant major subcontractor, where applicable) to signify the completion of construction of a system and allowing pre-commissioning activities to proceed on the system. The SCRC's also reference the relevant History Docket against each SITP. Once all SCRC's have been completed for the entire facility, a Facility Construction Release Certificate (FCRC) is prepared listing all completed SCRC's. The FCRC signifies the completion of the construction phase and will be signed off by both INVAP and ANSTO.

5 PRE-COMMISSIONING PHASE

5.1 PRE-COMMISSIONING TEST PROCEDURES

During the Pre-Commissioning Phase, inspection and test activities are controlled primarily through pre-commissioning test procedures which describe in detail the activities involved in pre-commissioning of a system along with relevant reference documentation, acceptance criteria, and requirements for records/reports generation. Where appropriate, pre-commissioning test procedures may also refer to SITP's and checksheets which have been prepared specifically for pre-commissioning activities. As for the construction phase, all pre-commissioning test documentation is required to be reviewed, verified and accepted by ANSTO in accordance with the project QMS prior to implementation, with control points nominated as required. In general, all pre-commissioning activities are witnessed by ANSTO with hold points specified at key points to ensure that all requirements are met prior to certain activities proceeding.

5.2 PRE-COMMISSIONING HISTORY DOCKETS

When all activities in a pre-commissioning test procedure have been completed, the completed procedure together with all SITP's and records/reports are compiled into a document termed a History Docket, which forms the final record of the pre-commissioning activities. As for the construction activities, the records contained in the History Docket also include any PARs, NCRs and CANs raised during the pre-commissioning activities.

5.3 PRE-COMMISSIONING TEST RELEASE CERTIFICATES

Once all pre-commissioning test procedures for a system have been completed, a System Test Release Certificate (STRC) is prepared listing all completed procedures / SITP's involved in pre-commissioning of the system. STRC's are signed off by INVAP and ANSTO (and the relevant major subcontractor, where applicable) to signify the completion of pre-commissioning of a system. The STRC's also reference the relevant History Docket against each procedure/SITP. Once all STRC's have been completed for the entire facility, a Facility Test Release Certificate (FTRC) is prepared listing all completed STRC's. The FTRC signifies the completion of the pre-commissioning phase and will be signed off by both INVAP and ANSTO at the end of the pre-commissioning phase.

6 STAGE A COMMISSIONING PHASE

6.1 COMMISSIONING PLANS AND PROCEDURES

The overall arrangements for the management of the commissioning phase of the RRR are specified in the Commissioning Plan (CP). As per the CP, a Stage A Commissioning Plan detailing the overall requirements for Stage A commissioning activities has been prepared by INVAP and reviewed, verified and accepted by ANSTO prior to commencement of the Stage A Commissioning phase in accordance with the project QMS. In addition, for Safety Category 1 and 2 structures, systems and components, this plan has been submitted to ARPANSA to support a request for approval to commission items important to safety to meet the requirements of Facility Licence Construction Authorisation (F0118) License Condition 4.7. Approval to commission an item important to safety must be obtained from ARPANSA prior to commencement of commissioning of these items.

Stage A commissioning activities are controlled through the preparation of commissioning procedures for the various systems/subsystems of the reactor facility. Commissioning procedures are prepared in accordance with the CP and describe in detail the commissioning activities including the objective of the activities, acceptance criteria, reference documentation, responsibilities, prerequisites, step by step instructions and requirements for records generation. Commissioning procedures are required to be reviewed, verified and accepted by ANSTO in accordance with the project QMS prior to commencement of the relevant commissioning activities. All commissioning activities are effectively hold points for both INVAP and ANSTO.

6.2 STAGE A COMMISSIONING REPORT

Once all Stage A commissioning procedures have been completed, a Stage A commissioning report is prepared, providing the final record of the Stage A commissioning. The report is prepared in accordance with the CP and includes a summary of the tests carried out, including reference to the relevant Stage A commissioning procedures; a description of the limitations, problems or deficiencies observed during commissioning and their resolution; references to data collected, analyses and deviations; and the conclusions and recommendations drawn from the testing. The Stage A commissioning report signifies the completion of Stage A commissioning and will be approved by both INVAP and ANSTO at the end of the Stage A commissioning phase.

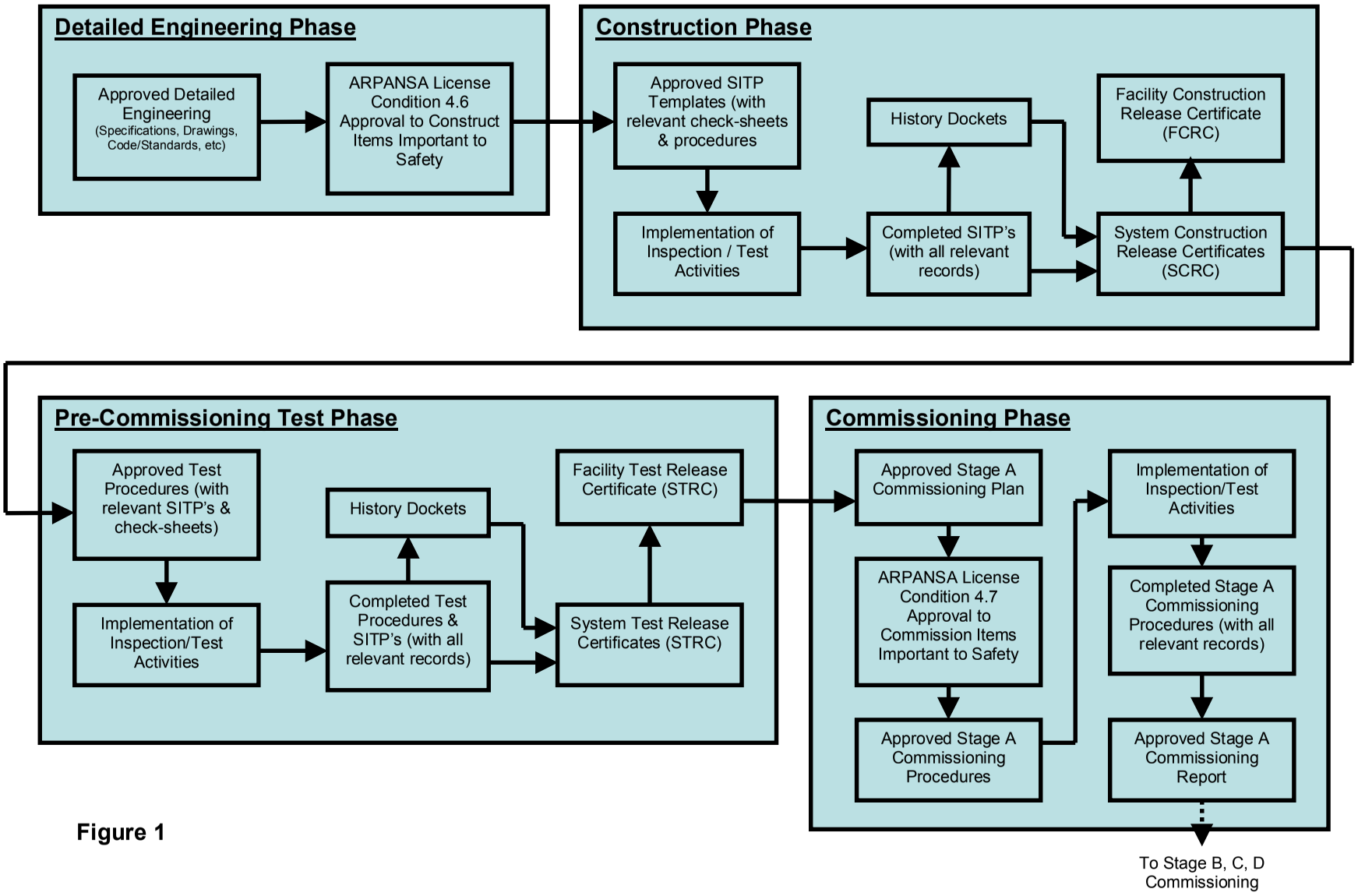
Detailed Engineering Phase
Approved Detailed Engineering (Specifications, Drawings, Code/Standards, etc)
ARPANSA License Condition 4.6 Approval to Construct Items Important to Safety
Construction Phase
Approved SITP Templates (with relevant check-sheets & procedures
History Dockets
Facility Construction Release Certificate (FCRC)
Implementation of Inspection / Test Activities
Completed SITP's (with all relevant records)
System Construction Release Certificates (SCRC)
Pre-Commissioning Test Phase
Approved Test Procedures (with relevant SITP's & check-sheets)
History Dockets
Facility Test Release Certificate (STRC)
Implementation of Inspection/Test Activities
Completed Test Procedures & SITP's (with all relevant records)
System Test Release Certificates (STRC)
Commissioning Phase
Approved Stage A Commissioning Plan
Implementation of Inspection/Test Activities
ARPANSA License Condition 4.7 Approval to Commission Items Important to Safety
Completed Stage A Commissioning Procedures (with all relevant records)
Approved Stage A Commissioning Procedures
Approved Stage A Commissioning Report
To Stage B, C, D Commissioning

Figure 1