

**I&C Engineering support to the Design  
Of Radwaste System  
Technical Specifications**

**Radioactive Materials Engineering Section  
PSE/PED**

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## 1 Abstract

The purpose of this contract is to acquire the service of an Instrumentation and Control (I&C) engineer for a fixed period to support the design of the ITER radwaste management systems that will be implemented in the Hot Cell Complex.

## 2 Background and Objectives

ITER radwaste will be generated in various ITER buildings such as Tokamak, hot cell (HCB), radwaste (RWB), personnel access control (PACB), and tritium plant buildings during the machine operation and maintenance periods.

ITER radwaste management systems should be designed for the treatment and storage of the intermediate-level and long-lived (Type B: in-vessel component replacement) radwaste, purely tritiated waste (tritium plant and fuelling system maintenance), low-level solid and liquid radwaste (Type A: process and housekeeping waste), and very low-level radwaste (TFA).

The Procurement Arrangement for Type A radwaste systems has to be signed on September 2014 and the necessary documents package need to be produced or updated to meet the milestone on time.

The Type B (intermediate level) radwaste management systems are accommodated in level B2 and B1 of the Hot Cell building.

The Conceptual Design Review for Type B radwaste systems is scheduled for June 2015 and the necessary documents need to be produced or updated to meet the milestone of CDR on time.

The objectives of the task are to support the radwaste management process/system design activities, Annex B and associated document package for Type A radwaste system Procurement Arrangement and CDR documentation preparation for Type B radwaste system, providing an I&C engineer.

The proposed support works should be carried out to meet the project milestones of PBS 66 Radwaste Treatment and Storage Systems.

## 3 Scope of Work

The scope of the work of this contract is to provide support to the IO staff in design activities, Annex B and associated document package for Type A radwaste system Procurement Arrangement, CDR document preparation for Type B radwaste system which is planned in June 2015.

The detailed work description is given in Section 5 below.

## 4 Estimated Duration

The duration of this contract shall be 1 year (220 working days) starting from June 2014.

## 5 Work Description

An I&C engineer is expected to provide the support to the ITER RMES (Radioactive Materials Engineering Section) staff members on the following work scope:

- Update of Type A control room design to support ANNEX B scope
- Type B Radwaste System I&C design for CDR
- Type B control room design
- Purely tritiated system tracking system design
- Perform engineering design validation activities on electrical system
- Generating and updating necessary documents (I&C field) for Type B radwaste management system Conceptual Design Review
- Assisting in producing I&C design data for equipment and process designs
- Assisting in updating interface sheets (I&C/electrical field)
- Supporting the section's related other activities

## 6 Required Skills

The following criteria will be examined:

- 10 to 15 years' experience in the following fields:
  - Experience in developing and implementing I&C device or system in nuclear facilities (preferred the experience on developing hot cells or radwaste management systems).
  - Experience in design process management and control
- Knowledge/skills in the following:
  - I&C including control suite design (plus knowledge on electrical system)
  - Performing engineering studies
  - Nuclear safety
- Good level of autonomy
- Knowledge of Fusion reactors technology is an advantage.

## 7 List of deliverables and due dates

The I&C engineer shall work closely with the ITER RMES staff members throughout the contract period and produce a progress report every four weeks based upon the work description (see chapter 5) and clarified with the IO-TRO each beginning of the 4 weeks period.

The list of deliverables and target date are the following:

- Within 2 month: Update of Type A control room design to support ANNEX B scope
  - Update of functional and non-functional requirements
  - Update of technical specifications
- Within 4 month: Type B I&C design
  - Functional and non-functional requirements
  - Plant control system specifications

- Interface specifications with the Central I&C System
- Interlock I&C specifications
- Occupational safety I&C specifications
- Nuclear safety I&C specifications
- Within 6 month: Type B control room design
  - Functional and non-functional requirements
  - Technical specifications
- Within 7 month: Perform engineering design validation activities on electrical system: Systems involved;
  - Updating the electrical load list considering equipment characteristics; nuclear, mechanical, safety classification, and specific load requirement
  - Defining the electrical cable requirements
  - Assisting in developing/updating the single line diagram design
- Within 8 month: Purely tritiated system tracking system design Description document
- Within 10 month: generating and updating necessary documents (I&C field) for Type B radwaste management system Conceptual Design Review: presentations of the achieved results

Further details of the deliverables shall be established by the IO-TRO at the beginning of the relevant work period.

## 8 Acceptance Criteria

The reports shall be reviewed by the IO-TRO for acceptability: adequacy between the deliverables.

## 9 Report and Document Review criteria

Reports as deliverables shall be stored in the ITER Organization's document management system, IDM by the Contractor for acceptance. A named ITER Organization's Contract Technical Responsible Officer is the Approver of the delivered documents.

The Approver can name one or more Reviewers(s) in the area of the report's expertise.

The Reviewer(s) can ask modifications to the report in which case the Contractor must submit a new version.

## 10 Specific requirements and conditions

The official language of the ITER project is English. Therefore all input and output documentation relevant for this Contract shall be in English. The Contractor shall ensure that all the professionals in charge of the Contract have an adequate knowledge of English, to allow easy communication and adequate drafting of technical documentation. This requirement also applies to the Contractor's staff working at the ITER site or participating to meetings with the ITER Organization.

**The work shall require the presence of the Contractor's personnel at the site of the ITER Organization, 13067 St Paul-lez-Durance, France, for the duration of the contract.**

Documentation developed shall be retained by the contractor for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as analysis and/or modelling, etc shall be reviewed and approved by the IO prior to its use, it should fulfil IO document on calculation code for safety analysis.

For all deliverables submitted in electronic format the Contractor shall ensure that the release of the software used to produce the deliverable shall be the same as that adopted by the ITER Organization.

Financial proposal: The daily rate shall include all travelling and accommodation costs.

The engineer provided for on-site duties shall keep the normal daily working hours of the ITER Organization.

## 11 Work Monitoring / Meeting Schedule

The I&C engineer shall report to the ITER Organization TRO and the RMES section leader. Meetings shall be held as and when deemed necessary by the ITER RMES staff.

## 12 Quality Assurance (QA) requirement

The organisation conducting these activities should have an ITER approved QA Program or an ISO 9001 accredited quality system.

The general requirements are detailed in [ITER Procurement Quality Requirements \(ITER\\_D\\_22MFG4\)](#).

Prior to commencement of the task, a Quality Plan must be submitted for IO approval giving evidence of the above and describing the organisation for this task; the skill of workers involved in the study; any anticipated sub-contractors; and giving details of who will be the independent checker of the activities (see [Procurement Requirements for Producing a Quality Plan \(ITER\\_D\\_22MFMW\)](#)).

Prior to commencement of any manufacturing, a Manufacturing and Inspection Plan must be approved by ITER who will mark up any planned interventions (see [Requirements for Preparing and Implementing a Manufacturing and Inspection Plan \(ITER\\_D\\_22MDZD\)](#)).

Deviations and Non-conformities will follow the procedure detailed in [ITER Requirements Regarding Contractors Deviations and Non Conformities \(ITER\\_D\\_22F53X\)](#).

Prior to delivery of any manufactured items to the IO Site, a Release Note must be signed in accordance with [ITER Requirements Regarding Contractors Release Notes \(ITER\\_D\\_22F52F\)](#).

Documentation developed as the result of this task shall be retained by the performer of the task or the DA organization for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as analysis and/or modelling, etc. shall be reviewed and approved by the IO prior to its use, in accordance with [Quality Assurance for ITER Safety Codes \(ITER\\_D\\_258LKL\)](#).

## 13 References / Terminology and Acronyms

### 13.1 References

- [RD1] RPrS (3ZR2NC v3.0)
- [RD2] SRD-66 (Radwaste Treatment and Storage) from DOORS (2EWUFD v3.3)
- [RD3] Updated design descriptions: Type B and purely tritiated waste management systems (ITER\_D\_3TBNLV v1.0)
- [RD4] Updated design description : Type A Solid Radioactive Waste Treatment and Storage System (3QQYND v2.1)
- [RD5] Updated design description : Type A Liquid Radioactive Waste Treatment and Storage System (3QQK2U v2.1) (current)
- [RD6] Control Room Requirements for Type A Radwaste System (45PETF v1.1) (current)
- [RD7] I&C Design Requirements for Type A Radwaste System (ITER\_D\_98HF3F v1.0)
- [RD8] Radwaste Plant system I&C Overview (FFTNTB v1.3)
- [RD9] User's control requirements for Type B radwaste system (LY8T7D v1.1)

### 13.2 Terminology and Acronyms

In the following table denominations and definitions are given of all the actors, entities and documents referred to in this Specification, together with the acronyms used in this document.

| <u>Denomination</u>                        | <u>Definition</u>   | <u>Acronym</u> |
|--|---|----------------|
| ITER Organization                          | For this Contract the ITER Organization   | IO-            |
| ITER Organization Task Responsible Officer | Person delegated by the IO-RO for all technical matters, but limited to one specific task order | IO-TRO         |
| Radioactive Materials Engineering Section  | Radioactive Materials Engineering Section   | RMES           |
| I&C  | Instrumentation and Control   | I&C            |
| Conceptual Design Review                   | Conceptual Design Review  | CDR            |