Memorandum / Note

Technical Specification : Engineer Services to Support ITER Radwaste Management System Designs

The purpose of this contract is to acquire the engineer services for a fixed period to assist in design activities of the ITER radwaste management systems that will be implemented in the Hot Cell building and Radwaste building.

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<tr>
<td><strong>Name</strong></td>
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<td><strong>Author</strong></td>
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Document Security: level 1 (IO unclassified)

RO: Na Byung-Chan

Read Access: AD: Division - Procurement and Contract - EXT, AD: Division - Plant Engineering, AD: Division - Procurement and Contract, AD: Section - Radwaste Treatment and Storage, AD: Section - Safety Analysis and Assessment, project administrator, RO
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<th>Title (Uid)</th>
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1 Abstract

The purpose of this contract is to acquire the services of three engineers for a fixed period to assist in design activities of the ITER radwaste management systems that will be implemented in the Hot Cell building and Radwaste building.

2 Background and Objectives

The entire ITER radwaste management systems (treatment and storages) should be commissioned and ready before actual wastes are produced.

As for the Type B (intermediate-level and long-lived) radwaste process, major potential system components which will be implemented in the hot cell building basement level 2 are as follows:

1. Buffer storage: basket and area sizes;
2. Size-reduction cutting: component handling system, cutting machine and associated dust collecting system;
3. Basket-filling: component handling system;
4. Tritium sampling and determination: sampling tool, sampling preservation and storage, sampling transportation system, sample preparation apparatus, measurement apparatus and instrumentation, sample analysis laboratory infrastructure;
5. Tritium removal: high-temperature oven and associated handling system, oven cooling, gas treatment system;
6. Pre-packaging: basket bolting equipment, decontamination and inspection system;
7. Basket radioactivity characterization: characterization instrumentation and infrastructure;
8. Basket stacking: basket transportation and handling system;
9. Record keeping and tracking: computer security system.

The major Type A (low-level) radwaste management systems are accommodated in the radwaste building. The liquid radwaste management system is located in the basement level and the solid radwaste management system including the 6 month capacity temporary storage of conditioned radwastes are in the L1 level. The Type A radwaste sample analysis laboratory is located in the L2 level.

The objectives of the tasks are to support the ITER Type B and Type A radwaste management process and system design activities, providing a nuclear engineer, a mechanical engineer and an I&C engineer.

The proposed support works should be carried out to meet the project milestone 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 of the ITER Type B and Type A radwaste management systems. The detailed work description is given in Section 5 below.
4 Estimated Duration

The contract is for a minimum of 120 work days over a period of 24 weeks from the signature date for each engineer. The contract duration could be extended depending on the quality of services provided and the ITER budget situation.

5 Work Description

The three engineers, a nuclear engineer, a mechanical engineer and an I&C engineer, are expected to provide the support to the ITER radwaste treatment and storage section’s staff members on following work scope, respectively:

- A nuclear engineer
  - Performing safety validation activities on worker exposure, equipment shielding, pipeline routing, and ALARA analysis
  - Assisting in producing nuclear design data for equipment and process designs
  - Assisting in producing the documents (nuclear field) required for Conceptual Design Review
  - Assisting in nuclear safety related activities such as support to ITER safety team for preparing answers to Safety Authority or Group Permanent actions
  - Assisting in establishing and updating ITER internal waste management guidance and criteria to meet the ANDRA and EDTSF acceptance criteria for waste disposal and interim storage
  - Assisting in activities related to waste transport issues inside and outside ITER nuclear fence
  - Reviewing nuclear design aspects of HAZOP analysis
  - Providing support to monitor design contracts and support for section’s schedule management (Strategic Management Plan and Detailed Work Schedule)

- A mechanical engineer
  - Performing engineering design validation activities on equipment fixing, load drop analysis, HAZOP analysis, pipe/equipment stress analysis
  - Assisting in producing mechanical design data for equipment and process designs
  - Assisting in remote handling compatibility assessment of equipment operation and maintenance
  - Assisting in defining the design requirements
  - Assisting in updating interface sheets
  - Assisting in producing the documents (mechanical field) required for Conceptual Design Review
  - Assisting in the definition of the design documentation
  - Assisting in verification on design compliance vs. requirement
  - Assisting design review setup

- An I&C engineer
  - Performing engineering I&C design activities on
o developing the instrumentation and control design including control and monitor points from the processes, required instrumentation design, control logic, and control equipment

o developing the signal system design considering data communication with CODAC, nuclear safety function system, equipment-control console, and PBS 23 RH system

o defining the I&C cable requirements

o define the control room operational and maintenance plan: installation schedule, number of operators, maintenance requirement and frequency

- Performing engineering electrical design activities on
  
o updating the electrical load list considering equipment characteristics; nuclear, mechanical, safety classification, and specific load requirement

o defining the electrical cable requirements

o developing the cable management design (for power, instrument, control cables) in the red zone considering RH compatibility

o developing the single line diagram design

- Assisting in updating interface sheets (I&C/electrical field)

- Assisting in producing the documents (I&C/electrical field) required for Conceptual Design Review

6 Required Skills

The engineers providing the services should meet the following requirements:

- A nuclear engineer
  
  • Degree in nuclear engineering,
  
  • Minimum of 3 years but preferably 5 years experiences in nuclear system designs,
  
  • Experience in developing and implementing radwaste process and equipment in nuclear facilities (preferred the experience on developing hot cells or radwaste management systems).
  
  • Knowledge/skills in the following are an advantage:-
    
    o Nuclear system design,
    
    o Radwaste management,
    
    o Nuclear safety and regulations
    
    o Knowledge in CAD design.
  
  • Excellent knowledge of English, to allow easy communication and adequate drafting of technical documentation.

- A mechanical engineer
  
  • Degree in Mechanical engineering,
  
  • Minimum of 3 years but preferably 5 years experiences in mechanical design field,
- Experience developing and implementing mechanical 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 are an advantage:
  - Mechanical design
  - Performing engineering studies
  - Knowledge in CAD design
- Excellent knowledge of English, to allow easy communication and adequate drafting of technical documentation.

- An I&C engineer
- Degree in I&C engineering or electrical engineering,
- Minimum of 3 years but preferably 5 years experiences in I&C design field,
- Experience 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 are an advantage:
  - I&C including control suite design (plus knowledge on electrical system)
  - Performing engineering studies
  - Knowledge in CAD design
- Excellent knowledge of English, to allow easy communication and adequate drafting of technical documentation.

7 List of deliverables and due dates

The service engineers shall work closely with the ITER RWTS staffs throughout the period and produce a progress report every four weeks based upon the work description (see chapter 5) and clarified with IO-TRO each beginning of the 4 weeks period. The contract shall have the following deliverables and due dates:

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Deliverable description</th>
<th>Due date</th>
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<tbody>
<tr>
<td>D1</td>
<td>Progress report D1</td>
<td>T0 + 4 weeks</td>
</tr>
<tr>
<td>D2</td>
<td>Progress report D2</td>
<td>T0 + 8 weeks</td>
</tr>
<tr>
<td>D3</td>
<td>Progress report D3</td>
<td>T0 + 12 weeks</td>
</tr>
<tr>
<td>D4</td>
<td>Progress report D4</td>
<td>T0 + 16 weeks</td>
</tr>
<tr>
<td>D5</td>
<td>Progress report D5</td>
<td>T0 + 20 weeks</td>
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<tr>
<td>D6</td>
<td>Progress report D6</td>
<td>T0 + 24 weeks</td>
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Further details of the deliverables shall be established by the IO-TRO at the beginning of the relevant work period.

8 Acceptance Criteria

The deliverables shall be reviewed by the IO-TRO for acceptability.
9 Specific requirements and conditions

In response to this call for expertise the company/individual shall provide:

- Financial proposal
- Profile (and/or CV) of key personnel involved in execution of the work activity

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.

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.

The work shall require the presence of the Contractor’s personnel at the site of the ITER Organization, Cadarache, 13108 St Paul-lez-Durance, France, for the duration of the contract.

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 will involve all travelling and accommodation costs.

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

10 Work Monitoring / Meeting Schedule

The control system engineer shall report to the ITER Organization TRO and the RWTS section leader. Meetings shall be held as and when deemed necessary by the ITER RWTS staff.

11 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).

12 References / Terminology and Acronyms

12.1 References

[RD1] Updated design descriptions: Type B and purely tritiated waste management systems (ITER_D_3TBNLV v1.0)
[RD2] Updated design description: Type A Solid Radioactive Waste Treatment and Storage System (ITER_D_3QQYNQ v1.0)
[RD3] Updated design description: Type A Liquid Radioactive Waste Treatment and Storage System (ITER_D_3QQK2U v1.0)
[RD4] Control Room Requirements for Type A Radwaste System (45PETF v1.1) (current)
[RD5] I&C Design Requirements for Type A Radwaste System (ITER_D_98F53F v1.0)

12.2 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.

<table>
<thead>
<tr>
<th>Denomination</th>
<th>Definition</th>
<th>Acronym</th>
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<tbody>
<tr>
<td>ITER Organization</td>
<td>For this Contract the ITER Organization</td>
<td>IO-</td>
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<tr>
<td>ITER Organization Task Responsible Officer</td>
<td>Person delegated by the IO-RO for all technical matters, but limited to one specific task order</td>
<td>IO-TRO</td>
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<tr>
<td>Radwaste Treatment and Storage</td>
<td>Radwaste treatment and storage system</td>
<td>RWTS</td>
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