Contract for Conceptual Design of Tritium Plant Automatic Control System

SUMMARY

Purpose

The purpose of this Contract is to develop a conceptual design of the ITER Tritium Plant control system. The work has to comprise the safety requirements specification (SRS), the functional and the integrity specifications, selection of a technology, architecture, definition of necessary redundancy and diversity of system components, definition of system communication protocols, hardware and software specifications, etc. This work is necessary as it will provide input information for detailed design and manufacturing of the system providing reliable and safe operation of the Tritium Plant. This work is necessary as it has to provide information for Tritium Plant building design as well.

Background

ITER is the first fusion machine initially designed to operate with Deuterium / Tritium plasma of high density and temperature. Safety and economical reasons require the confinement of fuel components (mostly tritium) inside ITER complex. To recycle hydrogen isotopes (tritium and deuterium) ITER will have Tritium Plant (TP) comprising Storage & Delivery System (SDS), Tokamak Exhaust Processing system (TEP), Isotope Separation System (ISS), Water Detritiation System (WDS), Analytical System (ANS) and Vent Detritiation System (DS). All systems of Tritium Plant have to operate as single ITER Plant System (PS) providing safe and reliable handling of hydrogen isotopes including: tritium confinement, hydrogen isotopes purification, storage and delivery of hydrogen isotopes and other technological gases serving different ITER Plant Systems.

The integration of TP into comprehensive whole shall be provided by Automatic Control System (TPACS) which is intended to synchronize the operation of TP systems, collect, store and visualize the data from TP systems, provide investment protection or trip the TP into safe state in case of off-normal operation. TPACS is the distributed control system and will comprise of three separated tires: TP Control & Data Acquisition system (TPCDA), TP Interlock System (TPIS) and TP Safety System (TPSS). TPACS shall be a part of ITER control system and therefore shall communicate with central systems: CODAC, CIS and CSS.

General requirements to ITER PS Instrumentation and Control are formulated in ITER Plant Control Design Handbook (PCDH v. 5.0). The technical requirements to TPACS are given in SRD 32J (Individual System Requirements Document for Tritium Plant Automatic Control System**,** ITER_D_2VUGMQ).

Scope of work

This contract is foreseen to perform:

1) Analysis of TPACS functions and interfaces to TP systems I&C. Integrity specification of TPACS. Definition of necessary redundancy and diversity of TPACS components.
2) Development of TPACS architecture; subsystems functional specification.

3) Development of database concept; definition of its structure.
4) Development of the concept of TPACS communication system; definition of communication protocols.
5) Development of the concept of TPACS Control Room.
6) Development of the concept of TPIS.
7) Development of the concept of TPSS
8) Software specification for TPCDA, TPIS and TPSS.
9) Concept design report preparation.
10) Concept Design Review of the TPACS

As the foreseen work relates to tritium, there may be possible Export Control considerations.

Estimated Duration and Timetable

The duration of the Contract will be 10.5 months from the date of the signature, additionally the Contractor shall participate in the Conceptual Deign Review according to ITER procedure.

The tentative timetable of the applicable Call for Tender procedure is as follows:

Call for Pre-qualification	June 2010
Call for Tender	August 2010
Tender submission	October 2010
Contract placement	November 2010
Completion of contract	October 2011

Experience

The potential tenderers should have proven experience in the following areas:

- Recognized competence in design of distributed plant control systems.
- Design and use of databases for data storage.
- Design of human-machine interfaces.
- Design of I&C important for safety for nuclear equipment.
- Design of control systems software.

Candidature

Participation is open to all legal persons participating either individually or in a grouping (consortium) which is established in an ITER Member State. A consortium may be a permanent, legally-established group or a grouping, which has been constituted informally for a specific tender procedure. All members of a consortium (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization.

Any consortium groupings shall be presented at the pre-qualification stage. The consortium cannot be modified later without a written approval of the ITER Organization.