Career Development Plan-Year 1

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BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED :

ITER, as a nuclear facility installed in France ("INB" which means "Installation Nucléaire de Base" or Basic Nuclear Facility) will be submitted to stringent rules imposed by the French nuclear regulation (the ASN or "Autorité de Sûreté Nucléaire"). So, safety has to be a concern for everyone during the whole life-cycle of ITER (design, manufacturing, integration, installation, operation, decommissioning), in order to protect people and the environment from harmful effects of ionizing radiation and other threats related to an INB.
The main objective of this research project is to give to a young engineer the knowledge necessary to efficiently apply all nuclear regulatory rules affecting ITER projects. The knowledge acquired during the training period will be applied to one of the ITER projects in which CEA Cadarache is involved, the "Procurement Package 11" or PP11 project (with 2 main components, the equatorial port plug 1 and the visible/infrared diagnostic). The trainee will be integrated in the CEA team participating in this project, and will also be in close contact with other European Associations working on this project (ENEA, CIEMAT, IST, HAS), and also with Fusion for Energy and ITER Organisation.
The academic training will be based on general courses about fusion and ITER, and on specific courses relative to nuclear engineering (nuclear codes, neutronic analysis...). These courses will be mostly concentrated during the 2 first years of the training. The last year will be dedicated to applied studies and analyses, with some general trainings aiming at preparing the fellow to the transition between his training period and his future work.
The major accomplishments expected at the end of the 3 years are :

- a preliminary nuclear safety analysis of the PP11 project in which the fellow will be implied during the 3 years of his training ;
- several neutronic analyses mandatory for the development of the PP11 project (for instance determination of necessary neutron and gamma shieldings) ;
- several reports summarizing the nuclear safety guidelines and common practices necessary to achieve the safety objectives during the development of the main components of PP11 project. For instance these guidelines could concern the design of weldings, cooling circuits with pressurised water, neutron labyrinths, confinement barriers etc ;
- the establishment of a work methodology to follow and evaluate the nuclear safety commitment at each stage of PP11 project development and deployment ;
- and finally production of preliminary nuclear safety specifications for the PP11 project.

LONG-TERM CAREER OBJECTIVES (over 3 years) :

1. Goals :

At the end of the training period, the fellow will have a sufficient knowledge regarding the ITER nuclear safety concepts and applicable regulatory framework to be able to evaluate and manage all safety aspects concerning any ITER component.

2. What further research activity or other training is needed to attain these goals ?

These goals seem to be reachable without additional research or training activities.

SHORT-TERM OBJECTIVES (1st year):

1. **Research results**

   - Anticipated publications :

Maybe in the conferences quoted below, depending on the achieved results at the date of the abstract submission.

   - Anticipated conference, workshop attendance, courses, and/or seminar presentations :

Courses :
- Courses about fusion technology given at the French Master "Sciences de la Fusion" (http://www.sciences-fusion.fr/master.php?m=btn_mas), regarding safety, heating systems, diagnostics, CAD methodology, plasma facing components... (February 2009)

- Training courses (1 week) on "Specificities of ITER INB", organized at CEA and given by AREVA (French company specialized in nuclear engineering) - Foreseen in spring or summer 2009

Conferences/Schools :
In 2009, the following conferences are planned.

Date	Title	Organizer	Place
07-10/06/09	Animma (Advancements in Nuclear Instrumentation, Measurement Methods and their Applications)	CEA, Univ. of Provence, INSTN, SCK-CEN	Marseille (France)
12-16/07/09	17th International Conference on nuclear Engineering	ASME	Brussels (Belgium)
31/08-11/09/09	3rd Karlsruhe International School on Fusion Technologies	FZK	Karlsruhe (Germany)
11-16/10/09	9th International Fusion Symposium on Fusion Technology	Dalian Univ. of Technology	Dalian (China)

Seminars :
The fellow will present the work he has already performed so far (and which he intends to perform) during the internal seminar "Journée des post-docs et trainees" organised by CEA Institute for Magnetic Fusion Research (April 2009).

2. **Research Skills and techniques:**
   - Training in specific new areas, or technical expertise etc:

Trainings relative to neutronics codes :
- TRIPOLI code (developed by CEA Saclay, France) : basic courses to be followed in spring or summer 2009
- MCNP 5 code : the basic knowledge already acquired during fellow's education will be applied to a real study that will be performed with the collaboration of ENEA Frascati (in discussion). Another possibility would be to work in collaboration with the neutronics team of ITER Organisation (contacts to be established soon).

Trainings relative to useful engineering tools :
- CATIA V5 (CAD software) : basic training to foresee (in 2009 or 2010)
- ANSYS (FEA code) : basic training to foresee (in 2009 or 2010)

Trainings relative to nuclear safety :
- A collaboration with the safety team as well as with the diagnostics team of ITER Organisation is envisaged (contacts to be established soon). Its objective would be to perform a safety analysis of one or several components of PP11 project (for instance vacuum windows).

3. **Research management:**

These skills will be developed during day-to-day work, and will be completed if necessary by courses in Project Management, Quality Management and Procurement Management.

4. **Communication skills:**

The fellow will regularly do a presentation of his work to CEA PP11 project team (each 3 months approximately).
He will also participate in PP11 project meetings (at different levels : consortium, F4E, ITER Organisation) during which he will present his work.

5. **Other professional training (course work, teaching activity):**

The fellow will regularly give some general courses to the CEA PP11 project team on nuclear safety topics (safety principles, defense-in-depth, safety culture, safety analysis, specificities of design in nuclear environment, etc.).

6. **Anticipated networking opportunities:**

Several stays are foreseen in Associations belonging to the training programme (FZK, FZJ) or in other entities (ITER Organisation, ENEA, industrial company…).

7. **Other activities (community, etc) with professional relevance:**

This will be done during the second half of the training period (2010-2011).

Date & Signature of fellow:

06/02/2009

Date & Signature of supervisor

06/02/2009