TECHNICAL ANNEX NUMBER 1.

COOPERATION AGREEMENT NUMBER 1 BETWEEN THE CDTN/CNEN AND THE CIEMAT, MINISTRY OF ECONOMY AND COMPETITIVENESS

The CIEMAT during the course 2015 / 2016, will host the researcher down recorded, under the terms of the Collaboration Agreement on Studies Degree / Post graduated dated 01/07/2015 to which this document is an annex inseparable.

NAME OF THE RESEARCHER: **MARCO AURÉLIO DE SOUSA LACERDA**
Researcher of the CDTN/CNEN.
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CDTN TUTOR: TEÓGENES AUGUSTO DA SILVA
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LENGTH OF STAY: From November 01, 2015 to October 31, 2016.

TECHNICAL AND SCIENTIFIC OBJECTIVES OF THE PROJECT:

Neutron spectrometry is important for complete characterization of the radiation field. From the neutron fluence spectrum, it is possible to determine the radiation protection quantities (absorbed dose in the body, DT, and effective dose, E) or operational quantities (dose equivalent personal Hp(d) and ambient dose equivalent H*(10)). Bonner multisphere spectrometry system, more commonly known as Bonner spectrometer (EB), is normally used for neutron spectrometry studies. Monte carlo methods have also been used to characterize the neutron radiation fields and validate experimental measurements.
The main objective of the project is to characterize radiation fields from isotopic neutron sources of the Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT, Madrid), and Universidade Politécnica de Madrid (UPM), Spain. Characterization will be performed using Bonner spectrometers with different neutron unfolding computer codes, in addition to monte carlo particle transport code MCNPX
The CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico), of the Ministry of Science Technology and Innovation of Brazil, has granted a scholarship for 12 months to the researcher Marco Aurélio de Sousa Lacerda to develop the project (details in the annexed document).

The activities of the researcher will be held at the home of the collaborating institution, located at Avda. Complutense, 40 – 28040 Madrid, will begin in **November 01, 2015 and end in October 31, 2016** covering from Monday to Friday from 08:30 to 16:30 including 1 hour per day for lunch.

The researcher undertakes to respect the rules of the Center and maximize the potential of practical tasks offered. The researcher promises to keep absolute confidentiality on the data, information and documents accessed during his stay at CIEMAT, and use only solely in the course of the duties derived from this Agreement. Also, he promises not to publish or disseminate them by any means without CIEMAT's authorization.
In the case of causing low before completing the training program and practices relating thereto, the researcher agree to notify the supervisor that low within seven days from the date on which it occurs.

At the close of business on the researcher will perform a memory based on which the Tutor Academic and Professional Tutor an assessment.

The parties shall consult immediately to resolve any problems they might suffer in the implementation of this Annex.

Madrid and Belo Horizonte, on July 2nd, 2015

Teógenes Augusto da Silva
Mat.: 5134-2 - CNEN/CDTN

Signed for CDTN
Dr. Teógenes Augusto da Silva
Head, Reactors and Radiations Division (DIRRA/CDTN)

UNIDAD DE FORMACIÓN

Signed for CIEMAT
Marisa Marco Arboli
Chief Knowledge Management Division

Signed for the researcher
Dr. Marco Aurélio de Sousa Lacerda