

**OAK RIDGE NATIONAL LABORATORY
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**ORNL
FOREIGN TRIP REPORT
TA 372186**

DATE: January 15, 2016

SUBJECT: Report of Foreign Travel Paris, France – Luiz C. Leal, Reactor and Nuclear Systems Division

TO: Jerry N. McKamy, Nuclear Criticality Safety Program Manager, National Nuclear Security Administration / NA-511/GTN, 1000 Independence Ave., SW, Washington, DC 20585-1290

FROM: Luiz C. Leal

**MEETING:
TITLE** Collaboration meeting with the Institut de Radioprotection et de Sûreté (IRSN)

**MEETING:
LOCATION** IRSN Headquarters Paris, France

**MEETING:
DATES** IRSN: March 2 to March 20, 2015

**ATTENDEES:
ON BEHALF
OF NCSP** Luiz Leal

**MEETING:
BENEFIT TO
NCSP** Luiz Leal visited IRSN to work on nuclear data evaluations of common interest to ORNL under development in support of the NCSP. The visit to IRSN provided the opportunity to interact with IRSN criticality safety experts to help expedite the progress on completing new nuclear data evaluations for the NCSP. The IRSN work focused on improving the evaluation of ²³⁵U. During the visit, Luiz Leal also had the opportunity to visit the Bruyères-le-Châtel (BRC) laboratory that is part of the French Energy Commission (CEA). The meeting with BRC provided the opportunity to obtain additional differential and integral data that will improve the NCSP nuclear data evaluations.

PURPOSE: The purpose of the travel to France is to perform nuclear cross-section evaluation work in accordance with the NCSP Five Year Plan. The travel provided the opportunity for Leal to work with IRSN and BRC staff to test and improve the ²³⁵U nuclear data evaluations, respectively.

**SITES:
VISITED** IRSN Headquarters and BRC

ABSTRACT: Leal worked at IRSN on the resonance evaluations of ²³⁵U and generated cross-section libraries with the new resonance evaluations in order to test the evaluations with benchmark experiments. The processed ²³⁵U library was used in benchmark calculations with the MCNP and MORET codes. MORET is a continuous energy Monte Carlo based computer tool used at IRSN for criticality safety calculations. In addition to the work with IRSN, Leal visited to BRC for a day meeting to discuss the procedure to merge the ORNL resonance evaluation with the high-energy evaluation generated by the BRC researchers. A new cross-section library was assembled including ORNL and the BRC evaluation. Leal generated data libraries for testing at ORNL and IRSN. The ORNL-IRSN-BRC data library was made available for further testing in the OECD/NEA Collaborative International Evaluated Library Organization (CIELO) Project.

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REPORT OF FOREIGN TRAVEL

**Luiz C. Leal
Paris, France**

March 2 to March 20, 2015

PURPOSE OF TRAVEL

The purpose of the travel to France is to perform nuclear cross-section evaluation work in accordance to the NCSP Five Year Plan. The travel provided the opportunity for Leal to work with IRSN and BRC staff to test and improve ^{235}U evaluations.

Report

Selected critical benchmark experiments for ^{235}U were used to test the performance of the ORNL-IRSN-BRC nuclear data evaluations that have been developed under the NCSP Nuclear Data element. IRSN staff members selected a series of benchmark problems sensitive ^{235}U . In addition, the performance of the covariance data in the description of the benchmark uncertainties was also investigated. A cross-section library was obtained combining the new ORNL resolved resonance evaluation combined with a high-energy evaluation performed at BRC. Selected sets of benchmark sensitive to the resonance region and high-energy region were calculated. APPENDIX A provides the IRSN summary report on the meeting including participants from IRSN, ORNL and BRC. The meeting focused on issues pertinent to the ^{235}U evaluation and benchmark experiments in the intermediate and high-energy regions. BRC researchers provided a new high-energy evaluation that appears to improve benchmark results. The ORNL, IRSN, and BRC meeting participants agreed that further benchmark tests are needed and therefore the evaluation was made available for use as part of the WPEC/CIELO project.

Overall, Leal's foreign travel to IRSN has been important to completing nuclear data evaluation work tasks as defined in the NCSP Five Year Plan. Furthermore, the travel has accelerated the cross-section evaluation and testing effort thereby enabling ORNL to perform work toward completing the NCSP Five Year Plan tasks for these key evaluations.

Itinerary

2/28/15 - 3/01/15	Travel from Knoxville, TN, USA to Paris, France
3/02/15 - 3/20/15	Work at IRSN
03/21/15	Travel from Paris, France to Knoxville, TN, USA

DISTRIBUTION

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