

**OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE, LLC
POST OFFICE BOX 2008, OAK RIDGE, TENNESSEE 37831-6170**

**ORNL
FOREIGN TRIP REPORT
TA 446626**

DATE: October 19, 2019 – October 23, 2019

SUBJECT: Attend ICSBEP Technical Review Group meeting as NCSP execution manager

TO: Angela Chambers, Nuclear Criticality Safety Program Manager, National Nuclear Security Administration / NA-511/GTN, Pantex Plant, PO Box 30020, Amarillo, TX 79120-0020

FROM: Douglas G. Bowen

**MEETING:
TITLE** ICSBEP, IRPhEP, and SINBAD Technical Review Groups

**MEETING:
LOCATION** Nuclear Energy Agency Headquarters; Paris France

**MEETING:
DATES** Monday, October 21, 2018 – Wednesday, October 23, 2019

**ATTENDEES:
ON BEHALF
OF NCSP** William Marshall, Doug Bowen; others from SNL, LANL, and LLNL (from the NCSP)

**MEETING:
BENEFIT TO
NCSP** ORNL's participation in the ICSBEP, SINBAD, and IRPhEP Technical Review Group (TRG) meetings is identified as a planned foreign trip in the NCSP 2020-2024 Five Year Plan. Dr. Bowen is criticality safety expert and program execution manager of the DOE/NNSA Nuclear Criticality Safety Program (NCSP), and his participation in the ICSBEP meetings is intended to observe and participate in these meetings to determine how they are organized and executed to understand better how NCSP integral experiments are documented in the ICSBEP handbook as high quality integral benchmarks. These high-quality benchmarks can then be used by DOE, NNSA, and commercial facilities throughout the country to perform validations supporting nuclear criticality safety analyses. Specifically, Bowen oversaw and participated in the review discussions for the NCSP ICSBEP benchmarks that were submitted: KRUSTY (part 1 of 2) and TEX/Pu (part 1 of 2). Sandia submitted their benchmark for the SPR/CX experiment for IER 209. Dr. Bowen also had one-on-one meetings with NEA/OECD staff to discuss the future of the ICSBEP, IRPhEP, and SINBAD handbooks/databases and future collaboration with the NCSP and the possibility of a formal collaboration with them.

**MEETING
PURPOSE:** The purpose of the trip is to participate in Technical Review Group (TRG) meetings related to proposed benchmarks for criticality safety, shielding, and reactor physics experiments and to meet with NEA/OECD staff to discuss future NCSP collaborations on similar topics. As the NCSP execution manager, it is important for NCSP management to understand the process of how completed NCSP-funded

experiments end up in the ICSBEP handbook as high quality benchmarks. This process is the highlight of sharing these expensive, high-quality, experiments with the NCSP community.

SITES

Nuclear Energy Agency Headquarters, Paris, France

VISITED:

ABSTRACT:

The ICSBEP Technical Review Group (TRG) meetings ensure a rigorous review of proposed benchmarks. These high-quality benchmarks can then be used by DOE, NNSA, and commercial facilities throughout the country to perform validations supporting nuclear criticality safety analyses. Similarly, applying the expertise gained through research and applications on criticality safety validation to the shielding (SINBAD) and reactor physics (IRPhEP) benchmark collections will maintain or improve the standards supporting validation in these other areas.

Access to the information in this report is limited to those indicated on the distribution list and to U.S. Government Agencies and their Contractors.

REPORT OF FOREIGN TRAVEL

**Douglas G. Bowen
Paris, France**

October 19, 2019 – October 23, 2019

PURPOSE OF TRAVEL

The purpose of the trip is to participate in Technical Review Group (TRG) meetings related to proposed benchmarks for criticality safety, shielding, and reactor physics experiments and to meet with NEA/OECD staff to discuss future NCSP collaborations on similar topics. As the NCSP execution manager, it is important for NCSP management to understand the process of how completed NCSP-funded experiments end up in the ICSBEP handbook as high quality benchmarks. This process is the highlight of sharing these expensive, high-quality, experiments with the NCSP community.

Persons Contacted at NEA Headquarters

The chair of the ICSBEP and IRPhEP Technical Review Groups is John Bess of INL. NEA participation for these meetings included Ian Hill and Tatiana Ivanova. A range of individuals from different institutions at different countries make up the Technical Review Groups and participated in the associated meetings. In the appendix, attendance sheets and meeting details are provided to document those in attendance at the meetings, in addition to details about the NCSP-relevant information for the meeting.

Itinerary

10/19/19 – 10/20/19	Travel from Knoxville, USA to Paris, France
10/21/19	Paris, France (ICSBEP TRG)
10/22/19	Paris, France (ICSBEP TRG)
10/23/19	Travel from Paris, France to Knoxville, TN

DISTRIBUTION

1. Douglas G. Bowen (bowendg@ornl.gov)
2. Angela Chambers (angela.chambers@mnsa.doe.gov)
3. Lori Scott (Lorisc0tt@aol.com)

Appendix – Information from Lori Scott

The Criticality Safety Benchmark Evaluation Project (CSBEP) was initiated in 1992 by the United States Department of Energy (DOE). The project quickly became an international effort as scientists from other interested countries became involved. The International Criticality Safety Benchmark Evaluation Project (ICSBEP) became an official activity of the OECD Nuclear Energy Agency (NEA) in 1995.

This handbook contains criticality safety benchmark specifications that have been derived from experiments performed at nuclear critical facilities around the world. The benchmark specifications are intended for use by criticality safety engineers to validate calculation techniques used to establish minimum subcritical margins for operations with fissile material and to determine criticality alarm requirement and placement. Many of the specifications are also useful for nuclear data testing.

A group of technical experts from around the world meet annually to review, discussed and approve new evaluations, which are published in the ICSBEP Handbook, also, annually on an interactive DVD and on the OECD/NEA website: <https://www.oecd-nea.org/science/wpncs/icsbep/handbook.html>.

NCSP attendees at the 2019 ICSBEP: (12)

K. ADMUNDSON	LANL
D. BOWEN	ORNL
G. HARMS	SNL
D. HEINRICHS	LLNL
J. HUTCHINSON	LANL
S. KIM	LLNL
B.J. MARSHALL	ORNL
G. MCKENZIE	LANL
A. MCSPADEN	LANL
C. PERCHER	LLNL
L. SCOTT	ORNL
N. THOMPSON	LANL
M. ZERKLE	NNL

NCSP Benchmarks reviewed and submitted to ICSBEP:

EVALUATION ID NO.	TITLE	LAB/STAFF	APPROVED OR DELAYED
LEU-COMP-THERM-101	PARTICALLY-REFLECTED WATER-MODERATED SQUARE-PITCHED U(6.90)02 FUEL ROD LATTICES WITH 0.52 FUEL TO	SNL-HARMS, AMES	APPROVED

PU-MET- MIXED-002	WATER VOLUME RATIO (0.855 CM PITCH) TEX PLUTONIUM BASELINE ASSEMBLIES: PLUTONIUM/ALUMINUM METAL ALLOY PATES WITH VARYING THICKNESSES OF POLYETHYLENE MODERATOR AND A THIN POLYETHYLENME REFLECTOR	LLNL-PERCHER	APPROVED
HEU-MET- FAST-101	KRUSTY: BERYLLIUM-OXIDE AND STAINLESS-STEEL REFLECTED CYLINDER OF HEU METAL	LANL-SMITH, CUTLER	DELAYED
FUND-LLNL- ALPHAN-HE3- MULTI-001	SUBCRITICAL MEASUREMENTS OF WATER- MODERATED HIGHLY ENRICHED URANIUM OXIDE MTR TYPE FUEL	LLNL-NELSON	MINOR REVISION

Total Benchmarks reviewed and submitted to ICSBEP:

8 total, 5 of which are funded by NCSP.

1 presentation for future benchmark – JAEA/LANL – Pb Collaborative Experiments

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**ORNL
FOREIGN TRIP REPORT
TA 446671**

DATE: October 19, 2019 – October 25, 2019
SUBJECT: Attend ICSBEP, SINBAD, and IRPhEP Technical Review Group meetings
TO: Angela Chambers, Nuclear Criticality Safety Program Manager, National Nuclear Security Administration / NA-511/GTN, Pantex Plant, PO Box 30020, Amarillo, TX 79120-0020

FROM: William Jay Marshall

MEETING: ICSBEP, IRPhEP, and SINBAD Technical Review Groups
TITLE
MEETING: Nuclear Energy Agency Headquarters; Paris France
LOCATION
MEETING: Monday, October 21, 2019 – Thursday, October 24, 2019
DATES
ATTENDEES: William Marshall, Doug Bowen; others from SNL, LANL, and LLNL
ON BEHALF
OF NCSP
MEETING: ORNL's participation in the ICSBEP, SINBAD, and IRPhEP Technical Review Group (TRG) meetings is identified as a planned foreign trip in the NCSP 2020-2024 Five Year Plan. Dr. Marshall is an expert on benchmarks and validation, and his participation in the ICSBEP meetings ensures a rigorous review of proposed benchmarks. These high-quality benchmarks can then be used by DOE, NNSA, and commercial facilities throughout the country to perform validations supporting nuclear criticality safety analyses. Similarly, applying the expertise gained through research and applications on criticality safety validation to the shielding (SINBAD) and reactor physics (IRPhEP) benchmark collections will maintain or improve the standards supporting validation in these other areas.
BENEFIT TO
NCSP
MEETING The purpose of the trip is to participate in Technical Review Group (TRG) meetings
PURPOSE: related to proposed benchmarks for criticality safety, shielding, and reactor physics experiments.

SITES Nuclear Energy Agency Headquarters, Paris, France
VISITED:

ABSTRACT: The ICSBEP, SINBAD, and IRPhEP Technical Review Group (TRG) meetings ensure a rigorous review of proposed benchmarks. These high-quality benchmarks can then be used by DOE, NNSA, and commercial facilities throughout the country to perform validations supporting nuclear criticality safety analyses. Similarly, applying the expertise gained through research and applications on criticality safety validation to the shielding (SINBAD) and reactor physics (IRPhEP) benchmark collections will maintain or improve the standards supporting validation in these other areas.

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REPORT OF FOREIGN TRAVEL

**William Jay Marshall
Paris, France
October 19 – 25, 2019**

PURPOSE OF TRAVEL

The purpose of the trip was to attend the Technical Review Group meetings for the International Criticality Safety Benchmark Evaluation Project and the International Reactor Physics Experiment Evaluation Project. The Shielding Integral Benchmark Archive and Database project also had a review meeting, in an effort to establish the path forward for this project.

Persons Contacted at NEA Headquarters

The chair of the ICSBEP and IRPhEP Technical Review Groups is John Bess of INL. NEA participation for these meetings included Ian Hill, Tatiana Ivanova, and Shuichi Tsuda. The chair for the SINBAD meeting was Pedro Ortego from SEA in Spain. A range of individuals from different institutions at different countries make up the Technical Review Groups and participated in the associated meetings.

Itinerary

10/19/19 – 10/20/19	Travel from Knoxville, USA to Paris, France
10/21/19 – 10/22/19	Paris, France (ICSBEP TRG)
10/23/19	Paris, France (SINBAD TRG)
10/24/19	Paris, France (IRPhEP TRG) [Did not attend the second day of IRPhEP TRG]
10/25/19	Travel from Paris, France to Knoxville, TN

DISTRIBUTION

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