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DATE: June 30, 2014

SUBJECT: Report of Foreign Travel to Paris, France

TO: Dr. Jerry N. McKamy, USDOE Nuclear Criticality Safety Program Manager, National Nuclear Security Administration, NA-00-10

FROM: David P. Heinrichs, Nuclear Criticality Safety Division Leader, Lawrence Livermore National Laboratory

MEETING TITLE:

International Criticality Safety Benchmark Evaluation Project (ICSBEP) Technical Review Group (TRG) Meeting

MEETING LOCATION:

Organization for Economic Cooperation and Development (OECD), Nuclear Energy Agency (NEA), Le Seine Saint Germain, 12, Boulevard des Îles, 92130 Issy-les-Moulineaux, Paris, France

MEETING DATES:

May 15-16, 2014

ATTENDEES ON BEHALF OF NCSP:

David Heinrichs, Jesson Hutchinson, Gregory Keefer, Richard Lell, Catherine Percher, Benoit Richard

MEETING BENEFITS TO NCSP:

Three NCSP evaluations prepared and reviewed by the attendees on behalf of NCSP were submitted to the ICSBEP Technical Review Group (TRG) for review for publication in the International Handbook of Evaluated Criticality Safety Benchmark Experiments. Publication in the Handbook completes NCSP

CED-4b milestones as defined in the NCSP Critical & Subcritical Experiment Design Team (C_EdT) Process Manual and specified in the NCSP Five-Year Execution Plan tasks for ANL, LANL and LLNL for FY-2014.

MEETING PURPOSE:

The USDOE Office of Defense Programs founded the Criticality Safety Evaluation Project (CSBEP) in 1992 to document and preserve criticality safety benchmark experiments. In 1994, the CSBEP welcomed international participants from France, Hungary, Japan, Russia and the United Kingdom; and in 1995, the DOE allowed the CSBEP to become an official activity of the OECD NEA to further enhance international participation and changed the name to the ICSBEP. As described in the USDOE NCSP Mission and Vision and Five-Year Execution Plan, the ICSBEP remains an important element of information preservation and dissemination.

During this, the 2014 annual meeting, three NCSP evaluations were submitted to the Technical Review Group for pre-publication review and approval:

- PU-MET-FAST-043, ZPR-3 Assembly 58: A Cylindrical Assembly of Plutonium Metal and Graphite with a Thick Depleted Uranium Reflector
- PU-MET-INTER-004, ZPR-3 Assembly 59: A Cylindrical Assembly of Plutonium Metal and Graphite with a Thick Lead Uranium Reflector
- SUB-PU-MET-FAST-003, Nickel-Reflected Plutonium Metal Sphere Subcritical Noise Measurements

As members of the Technical Review Group, the NCSP attendees also participated in review of two additional evaluations submitted by the Institut de Radioprotection et de Sûreté Nucléaire (IRSN, France) and the Instituto de Pesquisas Energeticas e Nucléares (IPEN, Brazil):

- MIX-MISC-THERM-007, Arrays of UO₂-PuO₂ PHENIX Pins Containing 26 wt.-% of Plutonium (²⁴⁰Pu/Pu=16 wt.-%) in a Plutonium (²⁴⁰Pu/Pu=19 wt.-%) Nitrate Solution
- SUB-LEU-COMP-THERM-002, Subcritical Configurations of the IPEN/MB-01 Reactor

All five new evaluations were approved for publication subject to satisfactory completion of the review comments. Note that during the meeting there was considerable discussion and consensus that SUB-PU-MET-FAST-003 should be re-categorized as a fundamental physics benchmark.

As listed in the attached Final Agenda, the status of unpublished evaluations and minor revisions to several approved ICSBEP and International Reactor Physics Experiment Evaluation Project (IRPhEP) evaluations were also discussed.

Ian Hill (NEA) described recent additions to the Database for ICSBEP (DICE) describing a new capability to search based on sensitivity data provided by IPPE (304 cases), ORNL (520 cases) and NEA (2850 cases) covering approximately 75% of the Handbook.

MEETING GOVERNANCE:

Jim Gulliford (NEA) announced the retirement of Mr. J. Blair Briggs and Dr. John Bess was selected to succeed him as ICSBEP Chairman. Note that Bess also succeeds Briggs as IRPhEP Chairman. The next ICSBEP TRG meeting is tentatively scheduled to take place on May 13-15, 2015, at OECD/NEA Headquarters in Paris, France.

OTHER MEETINGS:

Prior to and following the ICSBEP meeting, NCSP attendees from Los Alamos National Laboratory and Lawrence Livermore National Laboratory attended meetings at the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) at 31, Avenue de la Division Leclerc, 92260 Fontenay-aux-Roses, Paris, France.

LLNL discussed opportunities for collaboration with IRSN in support of on-going NCSP approved Integral Experiment activities including IER-147, 148, 184, 252, 253 and 268 and explored other areas of mutual interest for possible future collaborations.

ITINERARIES:

FTS 49871-01, 49887-01 and 49866-01 for the LLNL travelers.

ATTACHMENTS:

- Final Agenda, International Criticality Safety Benchmark Evaluation Project Technical Review Group Meeting (3 pages)
- ICSBEP Meeting NEA List of Participants (3 pages)
- Summary of the 2014 International Criticality Safety Benchmark Evaluation Project Meeting, 16-17 May 2014, Paris, France (1 page)

DISTRIBUTION:

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INTERNATIONAL CRITICALITY SAFETY BENCHMARK EVALUATION PROJECT TECHNICAL REVIEW GROUP MEETING

FINAL AGENDA 15 – 16 MAY 2014

**Le Seine Saint Germain, 12, bd des Iles, 92130 Issy-les-Moulineaux, Paris France
Ground Floor, Room D**

Upon arrival Please report to the Reception Desk on the ground floor with a photo ID. A badge will be issued that will allow you to enter the premises at all times during the meeting.

Local information about hotels and transport, as well as an area map, can be found on the Web page:

<http://www.oecd-nea.org/general/practical/>

Thursday, 15 May 2014

09:30 - 10:00

SESSION 1:

WELCOME AND INTRODUCTION

Welcome and Introduction

Jim Gulliford
Blair Briggs

Administrative Items: Sign-In, Future Evaluation,
Format Issues

Lori Scott

10:00 - 10:30

SESSION 2:

**DISCUSSION OF MINOR REVISIONS,
STATUS OF UNPUBLISHED
EVALUATIONS, AND APPROVED IRPhEP
EVALUATIONS**

HEU-MET-FAST-100

ORSphere: Critical, Bare, HEU(93.2)-Metal
Sphere ([Increased Uncertainty of \$\beta_{crit}\$](#))

Margaret Marshall

HEU-COMP-FAST-001
IRPhEP ID: (SCCA-SPACE-EXP-001)
HEU-COMP-FAST-002
IRPhEP ID: (SCCA-SPACE-EXP-002)
HEU-COMP-FAST-004
IRPhEP ID: (SCCA-SPACE-EXP-003)

Critical Configuration and Physics Measurements
for Graphite or Beryllium Reflected Assemblies of
U(93.15)O₂ Fuel Rods ([Revision to Fuel Rod End
Caps and the Addition of Reactor Physics
Measurements](#))

Margaret Marshall

HEU-MET-FAST-051
HEU-MET-FAST-071

Unreflected Uranium (93.2) Metal Cylinders,
Interacting Uranium (93.2) Metal Cylinders, and
Graphite Reflected Uranium Metal Annuli
([Revised Room Return Correction](#))

John Bess

HEU-MET-THERM-033

2 X 2 Polyethylene Reflected and Moderated
Highly Enriched Uranium System with Rhenium
([Small Correction to Rhenium Atomic Densities
and Minor Editorial Corrections](#))

John Bess
For
Nichole Ellis

MIX-MISC-THERM-006

Arrays of UO₂-PuO₂ PHENIX Pins Containing
26% of Plutonium (²⁴⁰Pu/Pu_i=16%) in a Mixed
Uranium-Plutonium (Pu/(U+Pu)_i =29.6%,
²⁴⁰Pu/Pu_i=19%) Nitrate Solution ([Revised
Treatment of Uncertainty in Plutonium Isotopic
Data and Temperature](#))

Nicolas Leclaire
For
Gilles Poullot

INTERNATIONAL CRITICALITY SAFETY BENCHMARK EVALUATION PROJECT TECHNICAL REVIEW GROUP MEETING

Thursday, 15 May 2014 (Continued)

Time	Session	Topic	Presenters
10:00 - 10:30	SESSION 2 (Continued):	DISCUSSION OF MINOR REVISIONS, STATUS OF UNPUBLISHED EVALUATIONS, AND APPROVED IRPhEP EVALUATIONS (Continued)	
	MIX-COMP-FAST-001	ZPR-6 ASSEMBLY 7: A Cylindrical Assembly with Mixed (PU,U)-Oxide Fuel and Sodium with A Thick Depleted-Uranium Reflector (Typing Error to Figure of Model)	Rich Lell
	IEU-COMP-INTER-003	Unreflected UF ₄ -CF ₂ Blocks with 37.5% ²³⁵ U (Minor Editorial Corrections)	Evgeni Rozhikhin
	IEU-COMP-INTER-004	Unreflected UF ₄ -CF ₂ Blocks with Uranium of 30, 25, 18.8, and 12.5% ²³⁵ U (Propagate Previous Revisions to ICT-002, where appropriate)	Evgeni Rozhikhin
	U233-COMP-THERM-004	D ₂ O Moderated Lattice of ²³³ UO ₂ - ²³² ThO ₂ (Revision To Uncertainty Analysis to Correct Error in Driver Fuel Rod Pitch Uncertainty Component.)	Michael Zerkle For Emily Flora
	PU-COMP-FAST-004	PURNIMA-I: A Plutonium Oxide Fast Reactor with Axial Molybdenum and Radial Copper and Mild Steel Reflectors (Add Plutonium Isotopic Data for the Pu-Be Source)	Blair Briggs For The Authors
	HEU-MET-FAST-086	GODIVA-IV Delayed-Critical and Static Prompt Supercritical Experiments (Possible Error – Update Status)	Dave Heinrichs
	HEU-MET-THERM-035 HEU-MET-FAST-077	Highly Enriched Uranium Metal Foils Moderated By Graphite: ‘SNOOPY 134’ and Unmoderated Spherical Shells of Highly Enriched Uranium Metal Reflected by Beryllium (Update Status)	Dave Heinrichs
10:30 - 10:45	BREAK		
10:45 - 12:30	SESSION 3:	APPROVAL OF EVALUATIONS	
	MIX-MISC-THERM-007	Arrays of UO ₂ -PuO ₂ PHENIX Pins Containing 26 wt% of Plutonium (²⁴⁰ Pu/Pu=16 wt%) in a Plutonium (²⁴⁰ Pu/Pu=19 wt%) Nitrate Solution	Nicolas Leclaire Gilles Poullot
12:30 - 13:45	LUNCH		
13:45 - 15:30	SESSION 4:	APPROVAL OF EVALUATIONS (Continued)	
	PU-MET-FAST-046	ZPR-3 Assembly 58: A Cylindrical Assembly of Plutonium Metal and Graphite with a Thick Depleted Uranium Reflector	Rich Lell
15:30 - 15:45	BREAK		
15:45 - 17:45	SESSION 5:	APPROVAL OF EVALUATIONS (Continued)	
	PU-MET-INTER-003	ZPR-3 Assembly 59: A Cylindrical Assembly of Plutonium Metal and Graphite with a Thick Lead Reflector	Rich Lell

INTERNATIONAL CRITICALITY SAFETY BENCHMARK EVALUATION PROJECT TECHNICAL REVIEW GROUP MEETING

Friday, 16 May 2013

09:30 - 11:00	SESSION 6:	APPROVAL OF EVALUATIONS	
	SUB-LEU-COMP-THERM-002	Subcritical configurations of the IPEN/MB-01 Reactor	Adimir dos Santos
11:00 - 11:15	BREAK		
11:15 - 12:30	SESSION 7:	APPROVAL OF EVALUATIONS	
	SUB-PU-MET-FAST-003	Nickel-Reflected Plutonium Metal Sphere Subcritical Noise Measurements	Jesson Hutchinson
12:30 - 13:45	LUNCH		
13:45 - 15:30	SESSION 8:	DISCUSSION	
		Future Benchmarks	All
		ICSBEP Database (DICE)	Ian Hill Manuel Bossant Nicolas Soppera
		Comparing DICE SDF Sensitivity Data to Section 2 Data, for Older ICSBEP Evaluations	Ian Hill
		Next ICSBEP Meeting (13– 15 May 2015)	All
		Chairman of the ICSBEP	Jim Gulliford
		Adjourn	

ICSBEP MEETING NEA
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**SUMMARY OF THE 2014
INTERNATIONAL CRITICALITY SAFETY
BENCHMARK EVALUATION PROJECT MEETING**

**16-17 May, 2014
Paris, France**

The annual International Criticality Safety Benchmark Evaluation Project (ICSBEP) Meeting was held in Paris, France May 16 - 17, 2014. Representatives from 7 of the 20 participating countries attended, including the United States (BAPL, INL, ANL, DOE-ID, LANL, LLNL), Japan (JAEA), Russian Federation (IPPE), France (IRSN, CEA), Slovenia (JSI), Brazil (IPEN) Switzerland. A total of 25 individuals participated in the meeting, including Jim Gulliford and Ian Hill of the OECD NEA.

The following individuals participated in the meeting:

J. Bess	INL	R. Lell	ANL
J. B. Briggs	INL	M. Marshall	INL
A. Brynov	IPPE	M. Murphy	OECD/NEA Subcontractor
A. Garcia	DOE-ID	C. Percher	LLNL
H. Gougar	INL	B. Richard	LANL
P. Grivot	CEA	Y. Rozhikhin	IPPE
J. Gulliford	OECD NEA	A. dos Santos	IPEN
D. Heinrichs	LLNL	L. Scott	OECD/NEA Subcontractor
I. Hill	OECD NEA	L. Snoj	J. Stefan Inst.
J. Hutchinson	LANL	K. Tonoike	JAEA
T. Ivanova	IRSN	A. Tsiboulia	IPPE
G. Keefer	LLNL	M. Zerkle	BAPL
N. Leclaire	IRNS		

Five new evaluations and fourteen revisions of previously published ICSBEP evaluations were reviewed and discussed. All of the new evaluations were approved for publication, subject to satisfactory resolution of all assigned actions. If all of the approved evaluations are completed in time for publication of the 2014 Edition of the *International Handbook of Evaluated Criticality Safety Benchmark Experiments*, the Handbook will contain approximately 4839 critical or subcritical configurations, 24 criticality-alarm/shielding configurations, and 207 configurations categorized as fundamental-physics measurements that are relevant to criticality-safety applications.