

# 4<sup>th</sup> Annual Probabilistic Flood Hazard Assessment Workshop

January 29-31, 2019

U.S. NRC Headquarters, Rockville, Maryland

On January 29-31, 2019, the Nuclear Regulatory Commission's Office of Nuclear Regulatory Research (NRC/RES) will host the 4th Annual NRC Probabilistic Flood Hazard Assessment (PFHA) Research Workshop at NRC headquarters in Rockville, Maryland. Staff and contractors from NRC, Electric Power Research Institute (EPRI), federal agencies, industry, and other organizations involved in flood hazard assessment, flood risk assessment, and flood protection/mitigation research will provide information on recent results, current activities, and perspectives on future research directions. This three-day workshop is open to the public at no charge.

## AGENDA: TUESDAY, JANUARY 29, 2019

09:00 – 09:10 Welcome & Logistics

### Session 1A: Introduction

Session Chair: TBD

09:10 – 09:25	Introduction	1A-1
	<i>Raymond Furstenau*, Director, Office of Nuclear Regulatory Research</i>	
09:25 – 09:45	NRC Flooding Research Program Overview	1A-2
	<i>Joseph Kanney*, Meredith Carr, Tom Aird, Elena Yegorova, Mark Fuhrmann &amp; Jacob Philip, NRC/RES</i>	
09:45 – 10:05	EPRI Flooding Research Program Overview	1A-3
	<i>Marko Randelovic*, Electric Power Research Institute (EPRI)</i>	
10:05 – 10:20	WGEV Flooding Overview	1A-4
	<i>John Nakoski*, NRC/RES</i>	
10:20 – 10:35	<b>BREAK</b>	

\* denotes presenter, ^ denotes remote presenter

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## Session 1B: Coastal Flooding

Session Chair: *TBD*

10:35 – 11:05	KEYNOTE: NWS Storm Surge Ensemble Guidance <i>Arthur Taylor*, NWS</i>	1B-1
11:05 – 11:30	Quantification of Uncertainty in Probabilistic Storm Surge Models <i>Norberto C. Nadal-Caraballo*, &amp; Victor Gonzalez, U.S. Army Corps of Engineers (USACE) R&amp;D Center, Coastal and Hydraulics Laboratory</i>	1B-2
11:30 – 11:55	Probabilistic Flood Hazard Assessment Using the Joint Probability Method for Hurricane Storm Surge <i>Michael B. Salisbury^ (EPRI Contractor)</i>	1B-3
11:55 – 12:20	Assessment of Epistemic Uncertainty for Probabilistic Storm Surge Hazard Assessment using a Logic Tree Approach <i>Bin Wang*, GZA</i>	1B-4
12:20 – 13:00	Coastal Flooding Panel	1B-5
13:00 – 14:00	<b>LUNCH</b>	

## Session 1C: Precipitation

Session Chair: *TBD*

14:00 – 14:30	KEYNOTE: Satellite Precipitation Estimates, GPM, and Extremes <i>George J. Huffman*, NASA/GSFC</i>	1C-1
14:30 – 14:55	Planned Improvements for NOAA Atlas 14 Process and Products <i>Sanja Perica*, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite, NOAA/NWS</i>	1C-2
14:55 – 15:20	Factors Affecting the Development of Precipitation Areal Reduction Factors <i>Shih-Chieh Kao*, Scott DeNeale, ORNL</i>	1C-3
15:20 – 15:35	<b>BREAK</b>	
15:35 – 16:00	Current Capabilities for Developing Watershed Precipitation-Frequency Relationships and Storm-Related Inputs for Stochastic Flood Modeling for Use in Risk-Informed Decision-Making <i>M.G. Schaefer*, MGS Engineering Consultants, Inc.</i>	1C-4
16:00 – 16:25	Current Use of Reanalysis in Flood Hazard Assessments <i>Jason Caldwell *, Weather &amp; Water, Inc.</i>	1C-5
16:25 – 17:05	Precipitation Panel Discussion	1C-6
17:05 – 17:20	<b>Daily Wrap-up</b>	

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**AGENDA: WEDNESDAY, JANUARY 30, 2019**

08:20 – 08:30 Day 2 Welcome

## **Session 2A: Riverine Flooding**

Session Chair: *TBD*

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|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 08:30 – 9:00  | KEYNOTE: An Overview NOAA's National Water Model<br><i>Brian Cosgrove*<sup>1</sup>, David Gochis<sup>2</sup>, Thomas Graziano<sup>1</sup>, Ed Clark<sup>1</sup>, Trey Flowers<sup>1</sup>, Fred Ogden<sup>1</sup>; <sup>1</sup>Office of Water Prediction, National Weather Service, NOAA; <sup>2</sup>Research Applications Laboratory, NCAR</i> | 2A-1 |
| 09:00 – 09:25 | Global Sensitivity Analyses Applied to Riverine Flood Modeling<br><i>Vincent Rebour and Claire-Marie Duluc, Institut de radioprotection et de sûreté nucléaire (IRSN) Radioprotection and Nuclear Safety Institute</i>                                                                                                                            | 2A-2 |
| 09:25 – 09:50 | Practical Approaches to Probabilistic Flood Estimates: an Australian perspective<br><i>Rory Nathan*, University of Melbourne</i>                                                                                                                                                                                                                  | 2A-3 |
| 09:50 – 10:15 | Bulletin 17C Flood Frequency and Extrapolations for Dams and Nuclear Facilities<br><i>J. England*, USACE, Risk Management Center</i>                                                                                                                                                                                                              | 2A-4 |
| 10:15 – 10:35 | <b>BREAK</b>                                                                                                                                                                                                                                                                                                                                      |      |
| 10:35 – 11:00 | Riverine Paleoflood Analyses in Risk-Informed Decision Making: Improving Hydrologic Loading Input for USACE Dam Safety Evaluations<br><i>Justin Pearce*, USACE, Risk Management Center; Keith Kelson, USACE, Sacramento Dam Safety Production Center; Brian Hall, USACE, Dam Safety Modification Mandatory Center of Expertise</i>                | 2A-5 |
| 11:00 – 11:25 | Improving Flood Frequency Analysis with a Multi-Millennial Record of Extreme Floods on the Tennessee River near Chattanooga, TN<br><i>Tess Harden*, Jim O'Connor &amp; Mackenzie Keith, U.S. Geological Survey</i>                                                                                                                                | 2A-6 |
| 11:25 – 12:05 | Riverine Flooding Panel Discussion                                                                                                                                                                                                                                                                                                                |      |
| 12:05 – 13:25 | <b>LUNCH</b>                                                                                                                                                                                                                                                                                                                                      |      |

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## Session 2B: Modeling Frameworks

Session Chair: *TBD*

13:25 – 13:50	Structured Hazard Assessment Committee Process for Flooding (SHAC-F) for Probabilistic Flood Hazard Assessment <i>Rajiv Prasad* &amp; Phillip Meyer, Pacific Northwest National Laboratory; Kevin Coppersmith, Coppersmith Consulting</i>	2B-1
13:50– 14:15	Overview of the TVA PFHA Calculation System <i>Shaun Carney*, RTI</i>	2B-2
14:15 – 14:40	Update on ANS-2.8: Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities <i>Tentative: Ray Schneider, Westinghouse</i>	2B-3
14:40 – 15:20	Modeling Frameworks Panel Discussion	2B-4
15:20 – 15:35	Daily Wrap-up	

15:35 – 16:50

## Session 2C: Poster Session

18:00

## Group Dinner: TBD

## **AGENDA: THURSDAY, JANUARY 31, 2019**

08:20 – 08:30 Day 3 Welcome

## Session 3A: Climate and Non-stationarity

Session Chair: *TBD*

08:30 – 09:00	KEYNOTE: Hydroclimatic Extremes Trends and Projections: A View from the Fourth National Climate Assessment <i>Kenneth Kunkel*, North Carolina State University</i>	3A-1
09:00 – 09:25	Regional Climate Change Projections: Potential Impacts to Nuclear Facilities <i>L. Ruby Leung* &amp; Rajiv Prasad, Pacific Northwest National Laboratory</i>	3A-2
09:25 – 09:50	Role of Climate Change/Variability in the 2017 Atlantic Hurricane Season <i>Young-Kwon Lim*, GSFC/NASA</i>	3A-3
9:50 – 10:30	Climate Panel Discussion	3A-5
10:30 – 10:50	<b>BREAK</b>	

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## Session 3B: Flood Protection and Plant Response

Session Chair: *TBD*

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|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 10:50 – 11:15 | Qualitative Risk Ranking Process of External Flood Penetration Seals<br><i>Marko Randelovic*, EPRI</i>                                                           | 3B-1 |
| 11:15– 11:40  | Results of Performance of Flood-Rated Penetration Seals Tests<br><i>William (Mark) Cummings^, Fisher Engineering, Inc. (formerly Fire Risk Management, Inc.)</i> | 3B-2 |
| 11:40– 12:05  | Modeling Overtopping Erosion Tests of Zoned Rockfill Embankments<br><i>Tony Wahl^, U.S. Bureau of Reclamation</i>                                                | 3B-3 |
| 12:05– 12:45  | Flood Protection and Plant Response Panel Discussion                                                                                                             | 3B-4 |
| 12:45 – 13:45 | <b>LUNCH</b>                                                                                                                                                     |      |

## Session 3C: Towards External Flooding PRA

Session Chair: *TBD*

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|---------------|---------------------------------------------------------------------------------------------------------------------------------------|------|
| 13:45 – 14:10 | External Flooding PRA Walkdown Guidance<br><i>Marko Randelovic*, EPRI</i>                                                             | 3C-1 |
| 14:10 – 14:35 | Updates on the Revision and Expansion of the External Flooding PRA Standard<br><i>Michelle(Shelby) Bensi*, University of Maryland</i> | 3C-2 |
| 14:35 – 15:00 | <i>Tentative:</i> External Flooding PRA Presentation<br><i>Invited Speaker</i>                                                        | 3C-3 |
| 15:00 – 15:40 | Towards External Flooding PRA Discussion Panel                                                                                        | 3C-4 |
| 15:40 – 16:00 | Wrap-up Discussion                                                                                                                    |      |