

# FRIEDMAN FAMILY VISITING PROFESIONALS PROGRAM

## Visit to NC State University: April 20, 2018



This report summarizes the visit of **Dr. Annie Kammerer** from Annie Kammerer Consulting that took place at North Carolina State University on April 20<sup>th</sup>, 2018.

### ITINERARY OR AGENDA

Provide the itinerary of the visit. For example:

TIME:	ACTIVITY:
9:00AM	Arrive at Constructed Facilities Laboratory (CFL) on Centennial Campus
9:00AM – 9:45AM	Tour of CFL (Zach Krish, Christopher Price, and Emrah Tasdemir)
9:45AM – 10:30AM	Student research presentations (EERI Officers)
10:30AM – 11:30AM	Discussion with graduate students at CFL
11:45AM – 1:00PM	Lunch at Neomonde (EERI Officers)
1:15PM – 1:45PM	Meeting with Dr. Gupta
1:45PM – 2:45PM	Discussion with graduate students (Mann Hall 412A)
3:00PM – 4:00PM	Dr. Kammerer's presentation (Mann Hall 304)
4:00PM – 4:30PM	Post lecture discussion and departure

### STUDENT CHAPTER VISIT PLANNING COMMITTEE

#### LEAD ORGANIZER(S):

- Zachary Krish, President, zfkris@ncsu.edu
- Christopher Price, Secretary, cwprice@ncsu.edu
- Ariadne Palma, Secretary, apalmap@ncsu.edu
- Dr. Mervyn Kowalsky, Chapter Faculty Advisor, kowalsky@ncsu.edu

### VISITING PROFESSIONAL LECTURE OVERVIEW

Dr. Kammerer presented to a group of approximately 20 students, faculty, and local professionals on the topic of seismic design in the US nuclear power industry. The lecture specifically focused on risk evaluation of the fleet of nuclear power plants within the country and the assessment of possible hazards following the Fukushima Daiichi incident in Japan. The lecture was well received by the audience, with quite a bit of discussion and questions following the presentation.

#### Lecture Abstract

Since the beginning of the nuclear power industry, the framework and methods used in the seismic design and risk evaluation of the fleet of nuclear power plants in the US has gone through significant change and advancement. This presentation—targeted to the technically-inclined layperson—will cover a wide variety of topics including:

- Basic nuclear plant design concepts (how they work and what can go wrong)
- Why the engineering of nuclear plants is unique and challenging
- Brief history of seismic regulations, design approaches, and reevaluation efforts
- The performance-based and risk-informed methods used in the industry today,
- The impact of the Fukushima Daiichi accident, including current and future NRC efforts
- The NRC, IAEA, and the new global nuclear picture

## Professional Bio

Dr. Annie Kammerer is owner of Annie Kammerer Consulting, a firm specializing in seismic hazard and risk consulting for the nuclear energy sector. She is also the executive director of the Consortium of Organizations of Strong Motion Observation Systems (COSMOS), an applied research organization out of at UC Berkeley.

Her work is principally focused on analysis and regulatory processes associated with probabilistic seismic and tsunami hazard and risk assessments for nuclear plants and other critical facilities.

Prior to starting her own firm, she was Principal Seismologist for the Bechtel Corporation in San Francisco. Prior to that, she spent 7 years at the US Nuclear Regulatory Commission, where she coordinated the NRC Seismic Research Program. At the NRC, she developed the current US guidance on performing seismic hazard assessments and seismic margin analysis for nuclear facilities. Starting in 2011, Dr. Kammerer was a member of the NRC's seismic technical team developing post-Fukushima response and re-evaluation guidance. From 2012 to 2013, she was also the NRC's technical lead for a special program conducting Seismic Walkdowns of all 104 operating US nuclear plants in response to the Fukushima Daiichi accident. Dr. Kammerer is active internationally and has chaired IAEA Working Groups on seismic re-evaluation of operating reactors, tsunami, and seismic isolation.

She holds three degrees from UC Berkeley, including a PhD in geotechnical engineering with minors in strong motion seismology and structural engineering.

## SUPPLEMENTAL ACTIVITIES

### Tour of the Constructed Facilities Laboratory (CFL)

Dr. Kammerer first arrived on Centennial Campus at NC State, which is where the structures lab, also known as the CFL, is located. Three of the chapter officers (Zach Krish, Chris Price, and Emrah Tasdemir) escorted Dr. Kammerer through the lab and showed the current research that is ongoing. The goals of this activity were to showcase the largescale experimental work that is taking place at NC State and to receive any feedback that Dr. Kammerer may have. The photo below shows Dr. Kammerer with Chris Price and Emrah Tasdemir in front of a test specimen to investigate the behavior of longitudinal keyway joints in precast bulb-tee girders under lateral loading.



### Student research presentations

Following the tour of the CFL, the graduate student officers of the chapter gave short presentations on their current research. This was meant to follow up on the tour of the lab and to provide more insight into the full scope of the work being done by the students at NC State University. Presentations were given by Zach Krish, Ariadne Palma, Emrah Tasdemir, Chris Price, and Leo Barclay. Dr. Kammerer was able to provide a lot of great feedback and commentary on each of the projects and give her perspective on how our research will impact the industry.

### Informal discussion with graduate students

Dr. Kammerer met with groups of students twice throughout the day for informal discussion regarding current research and career advice. These sessions were attended by approximately 15 students who were eager to ask questions and get advice from Dr. Kammerer who has had such a remarkable career in the earthquake engineering industry. The picture below was taken from the afternoon discussion session.



## RESULTS, FEEDBACK AND LESSONS LEARNED

Overall the event went very smoothly, from the planning process through the day of Dr. Kammerer's visit. This lecture has become an event that our student chapter looks forward to each year, as we have hosted several Friedman Family Visiting Professionals in recent years. The reception of the lecture was tremendously positive with many students, faculty, and local professionals in attendance.

With regards to feedback and lessons learned, the visit was held very late in the semester which probably impacted the overall attendance. It is recommended that future visits be held earlier in the semester; however, this can be challenging when working with the schedule of a busy professional. For lessons learned, we would recommend that the chapters reach out to the professional to schedule the visit as early as possible.

Our Student Chapter considers the following topics important for future visits:

- Displacement-based design
- Earthquake engineering policy
- Seismic repair and retrofit

## ACKNOWLEDGEMENTS

The NC State University EERI Student Chapter gratefully acknowledges the support of the Friedman Family for sponsoring the travel of Dr. Annie Kammerer through their Friedman Family Visiting Professional Program endowment.

## LIST OF ATTACHMENTS

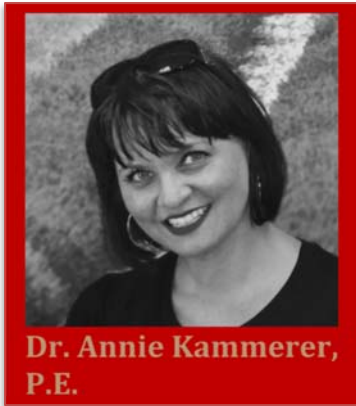
Included at the end of this report is an attachment of the flyer used to promote and advertise the lecture given by Dr. Kammerer.



# SEISMIC DESIGN AND RISK EVALUATION OF NUCLEAR POWER PLANTS

## PAST, PRESENT, AND FUTURE

Friday, April 20<sup>th</sup>, 2018  
3:00pm – 4:00pm, Mann Hall 304



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