




United States Nuclear Regulatory Commission Official Hearing Exhibit		
In the Matter of:	DOMINION VIRGINIA POWER (North Anna Power Station, Unit 3)	
	Commission Mandatory Hearing	
Docket #:	05200017	Identified: 03/23/2017
Exhibit #:	DVP-011-MA-CM01	Withdrawn:
Admitted:	03/23/2017	Stricken:
Rejected:		
Other:		

Exhibit DVP-011

# James E. Marrone

## Senior Seismologist/Geophysicist

### Technical Qualifications

- Member of Seismological Society of America (SSA)
- Member of American Geophysical Union (AGU)

### Education

- M.A., Geophysics (Seismology), University of California at Berkeley
- B.A., Physics, Occidental College

James Marrone has 35 years of experience in seismology and geophysics and is knowledgeable in numerous U.S. and international seismic design codes, including ASCE 7, NEHRP, IBC, etc. He has supported Bechtel projects around the world by providing subject matter expertise in the field of seismology and its application to engineering design, progressing to ever increasing levels of responsibility. In particular, Mr. Marrone has been deeply involved in developing seismic design vibratory ground motions for several proposed nuclear power plant sites in the central and eastern U.S.

### Seismology and Geophysics, Geotechnical & Hydraulic Engineering Services, Bechtel Nuclear, Security & Environmental

**1981–Present:** Mr. Marrone’s work has centered on the application of seismological and geophysical data to design analysis of various engineering sites. Emphasis has been on the seismicity, tectonic setting, seismic risk, and designing earthquake parameterization for project sites with the appropriate regulations and codes. His work in recent years has included extensive work on earthquake ground motion vibratory design for utilities of nuclear power plants seeking Early Site Permits and/or Combined Operating Licenses in the central and eastern U.S.—e.g., North Anna, Vogtle, STP, Turkey Point, and others. This work required direct efforts as well as coordinated input from contracted expertise and included development of the characterization of regional seismicity, seismic sources, and implementation of state-of-the-practice evaluation of seismic design ground motions. Interaction with the clients, subject matter experts, and the NRC was routine in this work.

For North Anna 3, Mr. Marrone has worked on the evaluations of earthquake vibratory ground motions for both the ESP and COL phases, including the consideration of the evolution of seismic source models and ground motion prediction equations during the project. Most recently, Mr. Marrone was the primary investigator of the update of the earthquake catalog from what had been published by EPRI, DOE, and NRC in 2012. The 2011 Mineral, Virginia earthquake, not included in the EPRI et al. (2012) catalog, was included in the North Anna 3 catalog update, and explicitly considered in current PSHA for North Anna 3.

Mr. Marrone’s work in seismic design has also been in application to various projects around the world, including LNG storage facilities (e.g., Trinidad, Port Said, Yemen, Mare Island, Bioko Island, Angola, multiple sites in Australia) fossil-fuel power plants (several sites in California), nuclear power plants (e.g., North Anna ESP), petroleum/gas pipelines (e.g., Camisea, PGT-PG&E), and conventional industrial facilities (e.g., L.A. DWP, Nile Plaza). This work required familiarity not only with ASCE 7, NEHRP, and IBC, but also several international codes, such as Eurocode 8, National Building Code of Canada, Australian Standard AS1170.4, as well as the LNG seismic design codes of NFPA 59A and the British Standard EN-1473. Mr. Marrone was a member of the Bechtel team investigating the seismotectonics of the eastern United States as part of the EPRI project. Mr. Marrone was also a member of the Bechtel team that investigated the seismic design criteria for the East Bay, San Francisco Airport, San Jose BART extensions, as well as the development of seismic design criteria for the seismic retrofit of the entire BART system. Mr. Marrone was one of the principle investigators in the 2004 EPRI-sponsored study of the development of an updated model of earthquake ground motion attenuation in the central and eastern U.S. During the past several years he has been intensely involved in developing the seismic design vibratory ground motions for several proposed nuclear power plant sites in the central and eastern U.S., requiring state-of-the knowledge evaluations and technical coordination with those in the fields of geology, geotechnical engineering, and earthquake and structural engineering.

In addition to preparing specifications and reviewing results for a number of seismic evaluations and safety analysis reports, Mr. Marrone has supervised and performed various geophysical field exploration programs, including vibration monitoring (Richmond Chevron Oil Refinery, California; Quartz Hill Molybdenum Mine project, Alaska; Maanshan and Kuosheng N.P.P., Taiwan; SSC, Nevada; FMC Dublin Road, N.Y.), DC resistivity and SP surveying (EPIA, Saudi Arabia; Sheldon Springs Hydroelectric project, Vermont; Dinkey

Creek Hydroelectric project, Mt. Poso Cogeneration project, Hunter's Point Cogeneration, California; SSC, Nevada; Savannah River Site, South Carolina), seismic refraction surveying (Sheldon Springs Hydroelectric project, Vermont; Friant Kern Powerhouse project, California; Ankara Motorway, Turkey; SSC, Nevada; Noranda project, Montana; CIC-LLRW, Nebraska; Kensington Gold project, Alaska), and EM and magnetic surveying (various FUSRAP sites, Ohio and New York; Navy CLEAN, southern California).