

Peach Bottom Atomic Power Station Structural Response Analysis

OWNER

Constellation - Delta, PA

CONTRIBUTORS

Structural Integrity Associates, Inc. (SI*)

*Project performed by SC Solutions Structural Division, now part of Structural Integrity Associates, Inc.

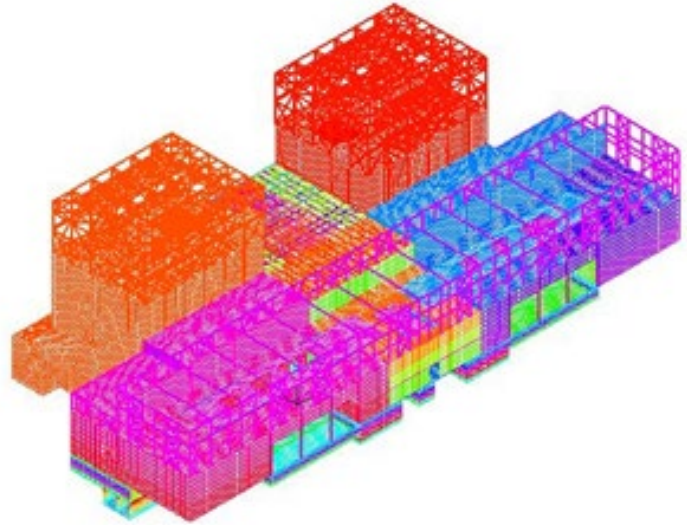
BACKGROUND

Constellation reached out to perform a proactive Seismic Probabilistic Risk Assessment (SPRA) at its Peach Bottom Atomic Power Station, a dual-unit plant in Delta, PA. This assessment enabled Constellation to better understand the impact an updated site's seismic hazard would have on the plant's earthquake safety.

SI's primary tasks in the project were: 1. building detailed finite element models of the critical plant structures and 2. performing soil-structure interaction (SSI) analyses using SASSI software to generate in-structure response spectra (ISRS) to be used as demands during component fragility evaluations. SI analyzed a wide range of structures, including both reactor buildings (RB), radwaste/main control room (RW/MCR), turbine building (TB), diesel generator building (DGB), intake pumping structure (PS), and the emergency cooling tower (ECT).

SUMMARY OF SI SUPPORT

Due to the nature of the updated seismic hazard for the site, estimating a realistic (versus conservative or bounding) structural response was paramount to support the SPRA objectives. Therefore, the SSI analyses included consideration for ground motion incoherency, variability in both soil and structure properties, randomness in ground motion records, and location-specific response quantities. Additionally, several buildings sharing a common foundation (2xRB, 2xTB, and RW/MCR) were combined to form a single Reactor Building Complex to address structure-soil-structure interaction (SSSI) as well as to capture the full beneficial effects of ground motion incoherency. The dual-unit Reactor Building Complex SSSI model, Figure 1., is one of SI's largest SASSI models to date, made possible through the use of the High-Performance Computing (HPC) capabilities of the SC-SASSI software version developed by SI's Critical Infrastructure Solutions team.



PROJECT EXAMPLE

VALUE TO THE OWNER

Structural Integrity's unique expertise in advanced seismic computational techniques applied to frequency-domain SSI analysis, coupled with innovative approaches to efficiently address variability in modeling and seismic analysis of the soil-structure system, provided Constellation with detailed demand information suitable for subsequent fragility evaluations while effectively minimizing unwarranted conservatism. The approach and techniques applied by Structural Integrity ensured the level of detail and realism described herein could be successfully provided in a cost-effective and expedient manner while operating within project constraints and a challenging regulatory environment.

