

Operational Assistance for Pressurized Water Reactor Plants: Co-sourcing and Outsourcing of Probabilistic Risk Assessment Model Development and Maintenance

Background

The increased focus on probabilistic risk assessment (PRA) and risk-informed applications by the U.S. Nuclear Regulatory Commission (NRC) has led utilities to expand their PRA model update efforts. The utilities' efforts have initially focused on updating the Level 1 and Level 2 PRA models for internally initiated events. Subsequently, the utilities developed PRA models for the external hazards such as fire and seismic events. The nuclear industry has also developed consensus standards to address PRA scope and technical adequacy. Regulatory Guide 1.200 (Revision 2) endorses the American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) consensus standard ASME/ANS RA-Sa-2009 for nuclear power plant PRAs. The standard includes a set of minimal requirements for modeling internal events, internal flooding, fires, seismic events and other external hazards. PRA models are used to evaluate core damage frequency (CDF) and large early-release frequency (LERF) metrics in support of risk-informed applications. When utilities use a PRA model for risk-informed applications, the PRA model is generally required to meet the ASME/ANS standard supporting requirements at Capability Category II level.

As part of these efforts, risk-informed applications have become part of the fabric of nuclear plant operation and licensing. As a result, the time demands on a utility's current PRA staff to support workday scheduling, outage planning and emergent plant configurations are continually increasing. PRA development work necessary for compliance with these industry standards requires significant additional effort in the short term. Furthermore, plant performance improvements using risk-informed approaches that have been generically approved by the U.S. NRC have not been widely implemented at most plants, due in part to a lack of PRA resources (i.e., people, time or money).

In addition, in the long term, the PRA standards call for a commitment to maintain these PRA models and risk-informed applications to be consistent with the as-built, as-operated plant. At the same time, aging of the workforce has started to have an adverse impact on the existing utility PRA staffing levels. As a result of all these factors, major U.S. utilities have found value in outsourcing their PRA activities to an outside organization.

Description

Westinghouse can develop specific co-sourcing and outsourcing arrangements for risk-informed activities to fit utilities' overall goals and objectives for PRA support.

Westinghouse has a cadre of experienced industry experts skilled in pressurized water reactor (PWR) plant PRAs, as well as in a broad range of individual PRA technical elements, who can help the utility carry out risk-informed applications and significant determination process and notice of enforcement discretion evaluations. Westinghouse's team of 60+ PRA engineers has the expertise and capability to fully maintain and implement the baseline PRA and online maintenance models, and perform the upgrades needed for the operating plant PRAs to conform to the requirements of the ASME/ANS PRA standard and the U.S. NRC's positions in Regulatory Guide 1.200, Revision 2. Through our knowledge transfer programs, Westinghouse also is developing a successor PRA staff, both at partner plants and internally, so that long-term capabilities for PRA support are developed and maintained.

Westinghouse also can provide the PRA resources and staff required to implement risk-informed applications to meet the concurrent utility goals and objectives of increasing safety, increasing plant operational flexibility and reducing costs. Westinghouse has developed many of the risk-informed applications and methods for the PWR Owners Group and has first-hand experience in implementing many of these activities.

In addition to our in-house capability in performing PWR plant thermal-hydraulic analyses, Westinghouse has access to the severe accident analysis capability of our subsidiary, Fauske and Associates.

Finally, through on-site experience at operating plants, Westinghouse's PRA engineers understand the impact of PRA on plant operations and can thus support the utility's PRA staff in handling day-to-day risk evaluations as well as tackle emergent issues.

Westinghouse can tailor an arrangement to provide PRA activities to meet a utility's needs. Through a committed supplier arrangement, Westinghouse has the bench strength to support changing month-to-month staffing requirements, using PRA personnel familiar with the plant.

Benefits

The major advantage of outsourcing and co-sourcing arrangements is the flexibility afforded to utilities for expanded PRA resources to meet their goals and objectives, in both the short and long term, with a PRA staff that is familiar with the design and operation of the station. Westinghouse continuously invests in our PRA resources to significantly increase the short- and long-term success of our partner utilities in the PRA area. A tailored co-sourcing or outsourcing arrangement also can shift the financial burden of attracting, hiring, training and retaining PRA resources from the utility to Westinghouse.

Westinghouse's many offices and our PRA work for operating plants and new reactor design (such as the **AP1000**[®] power reactor) allow our customers to take advantage of our PRA experience, which Westinghouse has gained through implementing PRA model improvements and risk-informed applications around the world.

Experience

Westinghouse currently provides PRA services through a co-sourcing arrangement with the Omaha Public Power District (OPPD) for the Fort Calhoun Station that began in 2008. Under this arrangement, Westinghouse is responsible for maintaining the Fort Calhoun PRA model, which permits the OPPD PRA staff to focus on day-to-day plant PRA support.

The Westinghouse staff that supports the PRA is located primarily at our office in Windsor, Connecticut (USA), but Westinghouse also provides significant on-site supplemental workers as needed to support project needs/goals.

We also provide PRA services through an outsourcing arrangement with Luminant for the Comanche Peak Station that began in 2006. Under this arrangement, Westinghouse is responsible for all the PRA support for the station. The Westinghouse Comanche Peak PRA staff is located on-site and provides 24/7 support. Other Westinghouse locations have provided timely additional support for emergent issues at the plant.

Further, Westinghouse provides co-sourcing services to the Wolf Creek plant, allowing the Wolf Creek on-site PRA staff to focus on the application and integration of risk information with site operations.

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