

Non-LOCA Safety Analysis Services

Background

Westinghouse maintains responsibility for the final safety analysis report (FSAR), and nonloss- of-coolant accident (LOCA) analyses for numerous Westinghouse-, Combustion Engineering- (CE-) and non Westinghousedesigned plants worldwide, including the System-80+ and the Westinghouse AP1000™ plant designs.

Westinghouse personnel are proficient with the LOFTRAN, RETRAN, CESEC and CENTS computer codes used to model system transient analysis response, the TWINKLE code used to model the core kinetics in response to reactivity transients, the FACTRAN and STRIKIN computer codes used to model the fuel rod for “hot-spot” calculations, and the OPTOAX code used to determine the overpower T (OP T) and overtemperature T (OT T) reactor trip set points. Westinghouse also maintains expertise in the COLSS and CPC simulator codes used to model trip set points for the CE COLSS and CPC digital protective system.

Description

Among products supported by Westinghouse are fuel reloads, plant upratings, That reductions and replacement steam generator programs, including those for non-Westinghouse plants. Westinghouse conducts evaluations/ analyses to support plant changes and/or nonconforming conditions. Design basis information pertaining to each of the FSAR, Chapter 15 accidents is available via the accident

analysis basis document (AABD). These modules summarize the important information used in the development of the safety analysis portion of the licensing basis for the plant as well as for the codes listed above, including pre- and post-processors, and for the licensed methods and training. Training includes overview training, detailed training and on-the-job training.

Westinghouse is continually working to improve the codes and methods used to analyze the non-LOCA safety analyses. Recently completed improvements include a detailed RETRAN model, a pre-processor that uses existing databases and minimal user input to create a RETRAN input deck; and a detailed postprocessor CENTS, which is used for both safety analysis and plant simulators, providing increased plant margins through improved (realistic) modeling of plant transients. Westinghouse maintains a fully automated process for set point analysis of the CE plants with analog protection systems and a set points program, which has provided plants with additional operating margin.

Benefits

Currently, Westinghouse is developing a 3-D rod ejection methodology that will enable nuclear plants to address potential regulatory changes to rod ejection acceptance criteria. This effort uses the Westinghouse codes ANC-K and VIPRE. A topical report on the 3-D rod ejection methodology was submitted at the end of 2000. Additionally, the development effort includes the combination of RETRAN with ANC-K and VIPRE to produce the RAVE code. This code will enable more accurate modeling of complex reactivity transients and is expected to generate significant margin increases.

Benefits

Westinghouse has more than 30 employees actively involved in transient analysis and maintains an extensive experience base in the non-LOCA area, including a core group with more than 15 years of experience in this area. Most of the group has experience working on-site in various capacities at nuclear power plants. Westinghouse maintains responsibility for the FSAR,

Chapter 15 non-LOCA analyses, including:

- Primary cooldown events
 - Feedwater malfunction
 - Excessive load increase
 - Steam line rupture
- Primary heat-up events
 - Loss-of-load/turbine trip
 - Loss-of-normal feedwater
 - Feed line rupture
- Decrease in reactor coolant system (RCS) flow events
 - Partial loss-of-flow
 - Complete loss-of-flow
 - Locked reactor coolant pump rotor/shaft break
- Increase in RCS inventory events
 - Inadvertent chemical, volume and control system (CVCS) actuation
 - Inadvertent emergency core cooling system (ECCS) actuation
 - RCS depressurization

- Reactivity anomaly
 - Rod withdrawal from subcritical
 - Rod withdrawal at power
 - Dropped rod
 - Boron dilution
 - Rod control cluster assembly ejection
- Miscellaneous
 - Anticipated transient without scram
 - OT T and OP T reactor trip set points
 - Steam generator level reactor trip set points
 - Engineering plant performance improvement

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