

# High-Energy Line Break Reconstitution Project Profile



**Project Name:** High-Energy Line Break Reconstitution

**Description:**

In support of nuclear power plants across the United States, Sargent & Lundy technical experts have stayed abreast of changing and evolving regulatory guidance associated with high-energy line break (HELB) issues over the past 50 years. For nuclear plants built in the 1960s and early 1970s, the original licensing basis for HELB was per the 1972 Atomic Energy Commission (AEC) HELB criteria (prior to the formation of the Nuclear Regulatory Commission [NRC]), which required the licensee to postulate arbitrary intermediate pipe ruptures. The AEC HELB criteria were later superseded when the NRC issued Generic Letter (GL) 87-11, "Relaxation in Arbitrary Intermediate Pipe Rupture Requirements," which eliminated the requirement to postulate arbitrary intermediate pipe ruptures. Application of GL 87-11 and the identified sections of Branch Technical Position (BTP) Mechanical Engineering Branch (MEB) 3-1, "Postulated Rupture Locations in Fluid System Piping Inside and Outside Containment," continues as the overriding guidance for plants to be safely shut down and maintained in a safe shutdown condition during a postulated rupture of a high-energy piping system outside of containment. Prior to adopting the new methodology put forth by MEB 3-1, older nuclear plants are required to submit a License Amendment Request to the NRC for approval.

Due to the complex and evolving regulatory guidance on HELB, plants have identified instances of unevaluated break locations existing in the plant, requiring corrective actions. This often leads to the need for further comprehensive research to identify other extant HELB issues by reviewing the plant's complete history, representing decades of calculations and modifications, against NRC requirements and plant licensing commitments.



**Scope of Services:**

Sargent & Lundy's scope in this area of nuclear technology often involves thorough active and historical documentation reviews; environmental analysis of HELBs and cracks for various piping systems in several

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vital areas of the plant using the thermal-hydraulics computer program GOTHIC (Generation of Thermal Hydraulic Information for Containments); mass and energy release calculations using RELAP5; component thermal lag analysis; equipment qualification; internal flooding analysis; pipe stress analysis considering HELB dynamic effects; pipe whip impact and jet impingement loads; structural design and analysis to restrain piping due to HELB effects; structural evaluations of HELB building loads; writing operability evaluations used to substantiate any unanalyzed conditions; providing substantial input to License Amendment Requests submitted to the NRC; and responding to NRC requests for additional information. Sargent & Lundy often provides these services in conjunction with active participation of plant staff to meet aggressive schedules, with further support from our office staff. Analysis, licensing, and reactor operations specialists are utilized to provide the consulting services and specific expertise needed to support these projects.

### Highlights:

- License Amendment Request acceptance from the NRC.
- Successful completion of the HELB reconstitution with subsequent plant restart.
- Successful completion and approval of calculations and modifications to support the plant licensing and design basis.
- Modifications to eliminate required rupture locations or protect vital equipment.

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