Baseline Risk Index for Initiating Events (BRIIE)

The NRC has developed the Baseline Risk Index for Initiating Events (BRIIE), a new performance indicator that tracks risk-significant changes in performance for the overall fleet of U.S. nuclear power plants as part of the Industry Trends Program (ITP).

The BRIIE concept provides a two-level approach to industry performance monitoring by tracking several types of events that could potentially start ("initiate") a challenge to a plant's safety systems, assigning a value to each initiating event according to its relative importance to the plant's overall risk of damage to the reactor core, and calculating an overall indicator of industry safety performance.

ln the first level (referred to as Tier 1 performance monitoring), the NRC tracks and counts the number of times the initiating events that have an impact on plant safety occur in nuclear power plants during the year. Nine initiating event categories are monitored for Boiling Water Reactors; ten for Pressurized Water Reactors. The number of times that each event occurs is compared with a predetermined industry number of occurrences for that event that, if exceeded, indicates possible degradation of industry safety performance. This annual trending allows the NRC to intervene and engage the nuclear industry before any long-term adverse trends in performance emerge.

The second level (referred to as Tier 2 performance monitoring) addresses the risk to plant safety and core damage that each of the initiating events contributes in addition to tracking the number of times the event occurs. Each of the events is assigned an importance value, a ranking according to its relative contribution to overall risk to plant safety. The greater the contribution of the event to overall risk, the higher the importance value that is assigned to the event. Using statistical methods, the importance values are combined with the number of times the events occur during the year to calculate a number that indicates how much the overall industry risk of damage to the reactor core has changed from a baseline value. This indicator of industry safety performance is the Baseline Risk Index for Initiating Events (BRIIE). A report is made as part of the NRC performance and accountability reports if the BRIIE indicator reaches a pre-established threshold.

The following summarizes the key features and advantages of the new BRIIE indicator:

Tier 1 Performance Monitoring: Monitoring individual initiating events.

- Provides short-term trending of individual risk-significant initiating events
- Compares individual initiating event occurrences against a pre-determined, safety significant upper limit for the number of expected events
- Helps identify degrading industry safety performance before long-term adverse trends emerge

Tier 2 Performance Monitoring: Integrated, risk-informed monitoring of industry safety performance at the initiating event cornerstone of safety level.

- Provides a risk perspective of industry safety performance as a change from a baseline value
- Reported to Congress if threshold is reached

Advantages of BRIIE:

- Combines individual initiating events information into a risk-informed indicator at the industry level

- Addresses the risk of events in addition to counting and monitoring the number or increase in the number of events

The BRIIE is not intended as a replacement for the ITP but to enhance and complement the ITP by providing additional insights related to annual ITP results. The staff intends to use the results of the BRIIE in the ITP, along with the other qualified indicators, when reporting to Congress the number of statistically significant adverse trends in nuclear industry safety performance.

A more detailed description of BRIIE is provided in NRC Inspection Manual Chapter 0313.

Current BRIIE Tier 1 and Tier 2 results are provided in the ITP web page.