

## SAFETY SYSTEM FUNCTIONAL FAILURES

### Purpose

This indicator monitors events or conditions that ~~alone~~ prevented, or could have prevented, the fulfillment of the safety function of structures or systems, or the total loss of the RCIC decay heat removal function that are needed to:

- (a) Shut down the reactor and maintain it in a safe shutdown condition;
- (b) Remove residual heat;
- (c) Control the release of radioactive material; or
- (d) Mitigate the consequences of an accident.

### Indicator Definition

The number of events or conditions that ~~alone~~ prevented, or could have prevented, the fulfillment of the safety function of structures or systems, or the total loss of the RCIC decay heat removal function in the previous four quarters.

### Data Reporting Elements

The following data is reported for each reactor unit:

- the number of safety system functional failures during the previous quarter
- the number of reactor core isolation cooling (RCIC) functional failures during the previous quarter

### Calculation

unit value = number of safety system functional failures and RCIC functional failures in the previous four quarters

### Definition of Terms

*Safety System Function Failure (SSFF)* is any event or condition that prevented, or ~~alone~~ could have prevented the fulfillment of the safety function of structures or systems that are needed to:

- (A) Shut down the reactor and maintain it in a safe shutdown condition;
- (B) Remove residual heat;
- (C) Control the release of radioactive material; or
- (D) Mitigate the consequences of an accident.

*RCIC functional failure* is any event or condition that prevented, or could have prevented the fulfillment of its decay heat removal function independent of RCIC reporting requirements specified in 10 CFR 50.72 and 73 and guidance provided in

Attachment 7

NUREG-1022 Revision 2. The RCIC function monitored for this performance indicator is the ability of the RCIC system to cool the reactor vessel core and provide makeup water into the reactor vessel.

The indicator includes a wide variety of events or conditions, ranging from actual failures on demand to potential failures attributable to various causes, including environmental qualification, seismic qualification, human error, design or installation errors, etc. Many SSFFs and RCIC functional failures ~~do~~ may not involve actual failures of equipment.

Because the contribution to risk of the structures and systems included in the SSFF ~~this~~ performance indicator varies considerably, and because potential as well as actual failures are included, it is not possible to assign a risk-significance to this indicator. It is intended to be used as a possible precursor to more important equipment problems, until an indicator of safety system performance more directly related to risk can be developed.

### Clarifying Notes

#### Reporting of Safety System Functional Failures

The definition of SSFFs is identical to the wording of the current revision to 10 CFR 50.73(a)(2)(v). Because of overlap among various reporting requirements in 10 CFR 50.73, some events or conditions that result in safety system functional failures may be properly reported in accordance with other paragraphs of 10 CFR 50.73, particularly paragraphs (a)(2)(i), (a)(2)(ii), and (a)(2)(vii). An event or condition that meets the requirements for reporting under another paragraph of 10 CFR 50.73 should be evaluated to determine if it also prevented the fulfillment of a safety function. Should this be the case, the requirements of paragraph (a)(2)(v) are also met and the event or condition should be included in the quarterly performance indicator report as an SSFF. The level of judgement for reporting an event or condition under paragraph (a)(2)(v) as an SSFF is a reasonable expectation of preventing the fulfillment of a safety function.

In the past, LERs may not have explicitly identified whether an event or condition was reportable under 10 CFR 50.73(a)(2)(v) (i.e., all pertinent boxes may not have been checked). It is important to ensure that the applicability of 10 CFR 50.73(a)(2)(v) has been explicitly considered for each LER considered for this performance indicator.

NUREG-1022: Unless otherwise specified in this guideline, guidance contained in the latest revision to NUREG-1022, "Event Reporting Guidelines, 10CFR 50.72 and 50.73," that is applicable to reporting under 10 CFR 50.73(a)(2)(v), should be used to assess the reportability of safety system functional failures for this performance indicator.

Planned Evolution for maintenance or surveillance testing: NUREG-1022, Revision 2, page 56 states, "The following types of events or conditions generally are not reportable under these criteria:...Removal of a system or part of a system from service as part of a planned evolution for maintenance or surveillance testing..."

The word "planned" is defined as follows:

“Planned” means the activity is undertaken voluntarily, at the licensee’s discretion, and is not required to restore operability or for continued plant operation.

A single event or condition that affects several systems: counts as only one failure.

Multiple occurrences of a system failure: the number of failures to be counted depends upon whether the system was declared operable between occurrences. If the licensee knew that the problem existed, tried to correct it, and considered the system to be operable, but the system was subsequently found to have been inoperable the entire time, multiple failures will be counted whether or not they are reported in the same LER. But if the licensee knew that a potential problem existed and declared the system inoperable, subsequent failures of the system for the same problem would not be counted as long as the system was not declared operable in the interim. Similarly, in situations where the licensee did not realize that a problem existed (and thus could not have intentionally declared the system inoperable or corrected the problem), only one failure is counted.

Additional failures: a failure leading to an evaluation in which additional failures are found is only counted as one failure; new problems found during the evaluation are not counted, even if the causes or failure modes are different. The intent is to not count additional events when problems are discovered while resolving the original problem.

Engineering analyses: events in which the licensee declared a system inoperable but an engineering analysis later determined that the system was capable of performing its safety function are not counted, even if the system was removed from service to perform the analysis.

Reporting date of SSFF: the date of the SSFF is the Report Date of the LER.

### **Reporting of RCIC Functional Failures For Plants That Do Not Report RCIC SSFFs**

In addition to the general guidance provided above, the following guidance is provided for plants that do not report RCIC function failures as SSFFs.

While safety systems are generally thought of as those that are designed to mitigate design basis accidents, both safety and non-safety related equipment and systems have been considered for this performance indicator due to their risk importance. Therefore, although RCIC may be considered as a non-safety related, non-mitigation system in some license and design bases, RCIC functional failures are included in the reporting of this performance indicator due to their risk importance.

The definition of a RCIC functional failure is any event or condition that prevented, or could have prevented the total loss of its decay heat removal function. For purposes of

this performance indicator, in determining the need to report an event or condition, the following criteria apply:

- The RCIC system must operate long enough to complete its decay heat removal function.
- Engineering Analyses: events in which the licensee declared RCIC unable to perform its decay heat removal function but an engineering analysis later determined that RCIC was capable of performing the specified function are not counted, even if the system was removed from service to perform the analysis. Reasonable engineering judgement should be applied in determining whether a condition or event prevented, or could have prevented the fulfillment of its decay heat removal function.
- In determining the need to report an event or condition that affects the RCIC decay heat removal function, it is not necessary to assume an additional random single failure in the RCIC system, however, it is necessary to consider other existing plant conditions.
- Events may include one or more personnel errors, including procedure violations; equipment failures; inadequate maintenance; or design, analysis, fabrication, equipment qualification, construction, or procedural deficiencies.
- Individual component failures need not be reported if redundant equipment in the RCIC system was available to perform the RCIC decay heat removal function.
- This decay heat removal function can be achieved through either automatic or manual means.

Reporting date of RCIC functional failure: No later than 60 days from date of event or discovery to be consistent with SSFF reporting. The performance indicator reporting date for plants that use the reporting regulation, the date of the RCIC functional failure is the report date of the LER.