Attachment 5

SCRAMS WITH COMPLICATIONS

Purpose

This indicator monitors that subset of unplanned automatic and manual scrams that require additional operator actions beyond that of the "normal" scram. Such events or conditions present more challenges to the operations staff and therefore are more risk-significant than uncomplicated scrams.

Indicator Definition

The number of unplanned scrams while critical, both manual and automatic, during the previous 4 quarters that require additional operator actions as determined by the flowchart for this indicator.

Data Reporting Elements

The following data are reported for each reactor unit:

- the number of unplanned automatic and manual scrams while critical in the previous quarter that required additional operator response as determined by the flowchart criteria.

Calculation

The indicator is determined using the values reported for the previous 4 quarters as follows:

value = total unplanned scrams while critical in the previous 4 quarters that required additional operator response as determined by the flowchart criteria.

Definition of Terms

Scram: means the shutdown of the reactor by the rapid addition of negative reactivity by any means, e.g., insertion of control rods, boron, use of diverse scram switch, or opening reactor trip breakers. This does NOT include a reactor scram signal that inserts the shutdown banks in Mode 3 or a preplanned opening of the reactor trip breakers in Mode 1 or 2 as directed by an approved procedure.

Criticality, for the purposes of this indicator, typically exists when a licensed reactor operator declares the reactor critical. There may be instances where a transient initiates from a subcritical condition and is terminated by a scram after the reactor is critical—this condition would count as a scram.

Flowchart Question Definitions

PWR

Did two or more control rods fail to fully insert?

Did control rods that are required to move on a reactor scram fully insert into the core as evidenced by the Emergency Operating Procedure/Instruction (EOP) evaluation criteria? As an example for some Westinghouse PWR evaluation schemes using rod bottom light indications, if more than one-rod bottom light is NOT illuminated, this question must be answered "Yes". The basis of this step is to determine if additional actions are required by the operators as a result of the failure of all rods to insert. Additional actions, such as emergency boration, pose a complication beyond the normal scram response that this metric is attempting the measure. It is allowable to have one control rod not fully inserted since core protection design accounts for one control rod remaining fully withdrawn from the core on a reactor

scram. This question MUST be evaluated using the criteria contained in the plant EOP used to verify that control rods inserted. During performance of this step of the EOP the licensee staff would not need to apply the "Response Not Obtained" actions. Other means not specified in the EOPs are not allowed to satisfy this step of this metric.

Did the turbine trip?

Did the turbine trip automatically/manually as required on the reactor trip signal? To be successful steam flow to the main turbine must have been isolated by the turbine trip logic actuated by the reactor trip signal, or operator action from a single switch or pushbutton. The allowance of operator action to trip the turbine is based on the operation of the turbine trip logic from the operator action if directed by the Emergency Operating Procedure. Operator action to close valves or secure pumps to trip the turbine beyond use of a single turbine trip switch would count in this indicator as a complication beyond the normal reactor scram response.

Was power lost to any ESF bus?

During the reactor scram or during the period operators are responding to the reactor scram using reactor scram response procedures, was power lost to any ESF bus that was not restored automatically by the emergency AC (EAC) power system? Operator action to close the EAC output/feeder breaker from a single switch on the main control board is allowed as an acceptable action to satisfy this metric. Any other actions beyond closing the output/feeder breaker are considered as complications beyond the normal scram response. This question is looking for a loss of power at any time for any duration where the bus was not energized/re-energized. The bus must have:

- remained energized until the scram response procedure was exited, or
- been re-energized automatically by the plant EAC power system (i.e., EDG), or
- been re-energized by an operator by closing a single output/feeder breaker from a single switch on the main control board

The question applies to all ESF busses (switchgear, load centers, motor control centers and DC busses) that are designed to re-energize automatically. This does NOT apply to 120-volt power panels. It is expected that operator action to re-energize an ESF bus from a single switch would not take longer than 10 minutes in order to be exempt from this indicator.

Was a Safety Injection signal received?

Was a Safety Injection signal generated either manually or automatically during or prior to the reactor scram response? The consideration here is wether the operator had to respond to abnormal conditions that required a safety injection or respond to the actuation of additional equipment that would not normally actuate on an uncomplicated scram. This would include any condition that challenged RCS inventory, pressure, or temperature severely enough to require a safety injection. A manual reactor scram in response to a severe steam generator tube leak beyond the capacity of the normal at power running charging system should be counted even if a safety injection was not used since additional charging pumps were started. Taking actions to control RCS inventory due to a large SG tube leak while responding to a reactor scram is beyond the response for a normal scram.

Was Main Feedwater available or recoverable using approved plant procedures?

If operating prior to the scram, was Main Feedwater operating and/or available during the reactor scram response? The consideration for this question is whether Main Feedwater could be used to feed the steam generators if necessary. The qualifier of "recoverable using approved plant procedures" will allow a licensee to answer yes to this question if there is no physical equipment restraint to prevent the operations

staff from starting the necessary equipment, aligning the required systems, or satisfying required logic using plant procedures approved for use and in place prior to the reactor scram occurring.

The operations staff must be able to start and operate the required equipment using normal alignments and approved normal and off-normal operating procedures. Manual operation of controllers/equipment, even if normally automatic, is allowed if addressed by procedure. Situations that require maintenance activities or non- proceduralized operating alignments will not satisfy this question. Additionally the restoration of Feedwater must be capable of feeding the Steam Generators in a reasonable period of time. Operations should be able to start a Main Feedwater pump and start feeding Steam Generators with the Main Feedwater System within 30 minutes. During startup conditions where Main Feedwater was not placed in service prior to the scram, this question would not be considered, and should be skipped.

Was the scram response procedure completed without re-entering another EOP?

The response to the scram must be completed without transitioning to another EOP. This step is used to determine if the scram was a simple scram that did not require using other procedures beyond the normal scram response. Exiting the normal scram response procedure to the plants normal operating procedures without using another EOP satisfies this step. The discretionary use of the lowest level Function Restoration Guideline (Yellow Path) by the operations staff is an approved exception to this requirement.

BWR

Did Control Rods fail to Shut Down the Reactor?

Withdrawn control rods are required to be inserted to or beyond position 02 or it has been determined that the reactor will remain shutdown under all conditions without boron ensure the reactor will have required shutdown margin in a cold, xenon free state.

The basis of this step is to determine if additional actions are required by the operators to ensure the plant remains shutdown as a result of the failure of all rods to insert. Additional actions, such as boron injection, or other actions to insert control rods to maintain shutdown, pose a complication beyond the normal scram response that this metric is attempting the measure. This question MUST be evaluated using the criteria contained in the plant emergency procedure (EP) used to verify that control rods inserted.

Was automatic pressure control established following the initial transient?

To be successful, Reactor pressure must be controlled following the initial transient without the automatic use of SRV(s). In other words, automatic opening of SRV(s) may have initially occurred as a result of the transient, but automatic cycling of the SRV(s) is not occurring subsequently. Additionally the SRV(s) cannot fail open. Failure of the pressure control system (i.e. turbine valves / turbine bypass valves / manual reactor pressure control using SRV(s) / HPCI / RCIC) to maintain reactor pressure or failed open SRV(s) count in this indicator as a complication beyond the normal reactor trip response.

Was power lost to any ESF bus?

During the reactor scram or during the period operators are responding to the reactor scram using reactor scram response procedures, was power lost to any ESF bus that was not restored automatically by the emergency AC (EAC) power system. Operator action to close the EAC output/feeder breaker from a single switch on the main control board is allowed as an acceptable action to satisfy this metric. Any other actions beyond closing the output/feeder breaker are considered as complications beyond the normal scram response. This question is looking for a loss of power at any time for any duration where the bus was not energized/re-energized. The bus must have:

- remained energized until the scram response procedure was exited, or
- been re-energized automatically by the plant EAC power system (i.e., EDG), or
- been re-energized by an operator by closing a single output breaker from a single switch on the main control board

The question applies to all ESF busses (switchgear, load centers, motor control centers and DC busses) that are designed to re-energize automatically. This does NOT apply to 120-volt power panels. It is expected that operator action to re-energize an ESF bus from a single switch would not take longer than 10 minutes in order to be exempt from this indicator.

Was a Level 1 Injection signal received?

Was a Level 1Injection signal generated either manually or automatically during the reactor scram response? The consideration here is if the operator had to respond to abnormal conditions that required a low pressure safety injection or respond to the actuation of additional equipment that would not normally actuate on an uncomplicated scram. This question would include any condition that challenged RCS inventory, or Drywell pressure severely enough to require a safety injection.

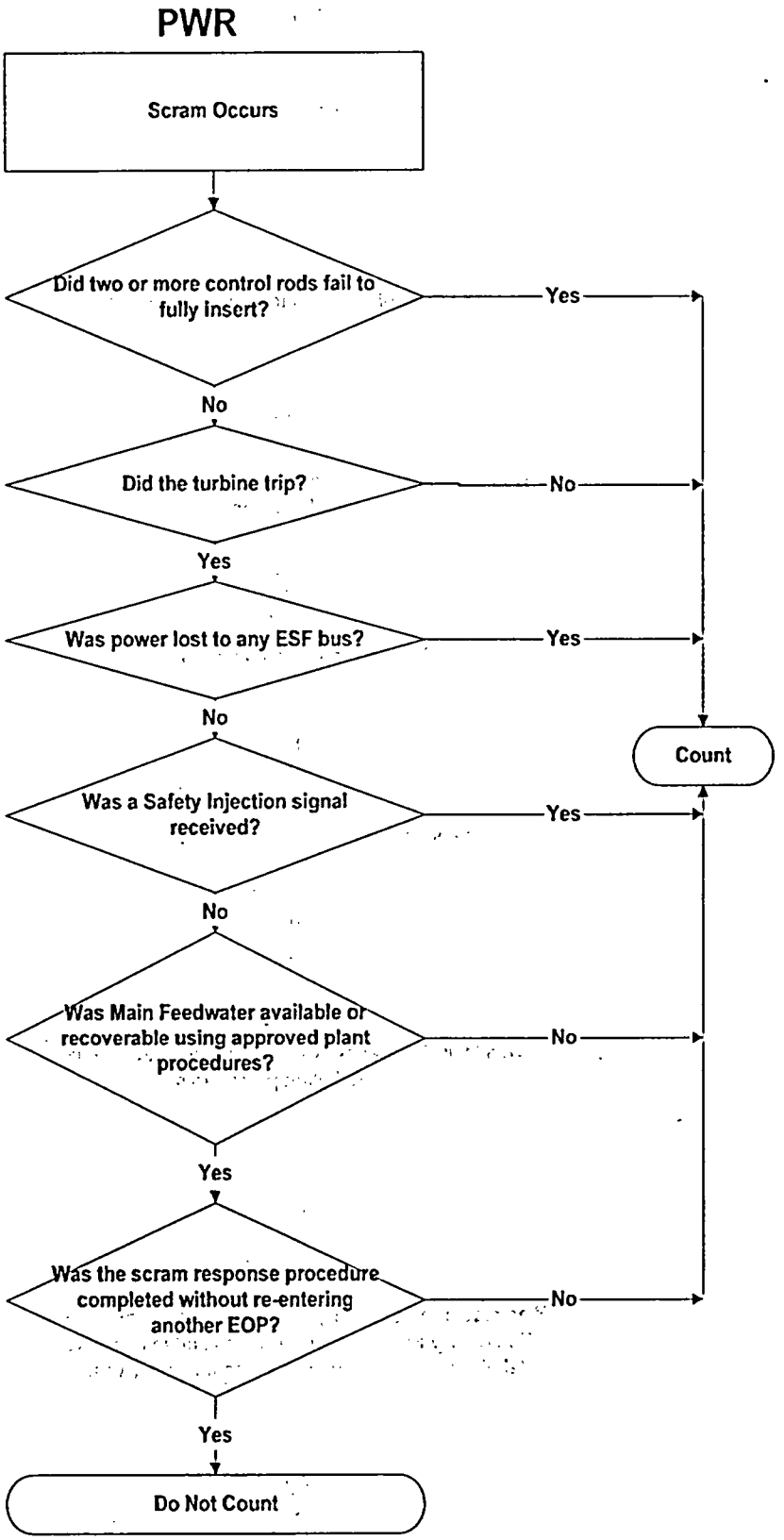
Was Main Feedwater available or recoverable using approved plant procedures?

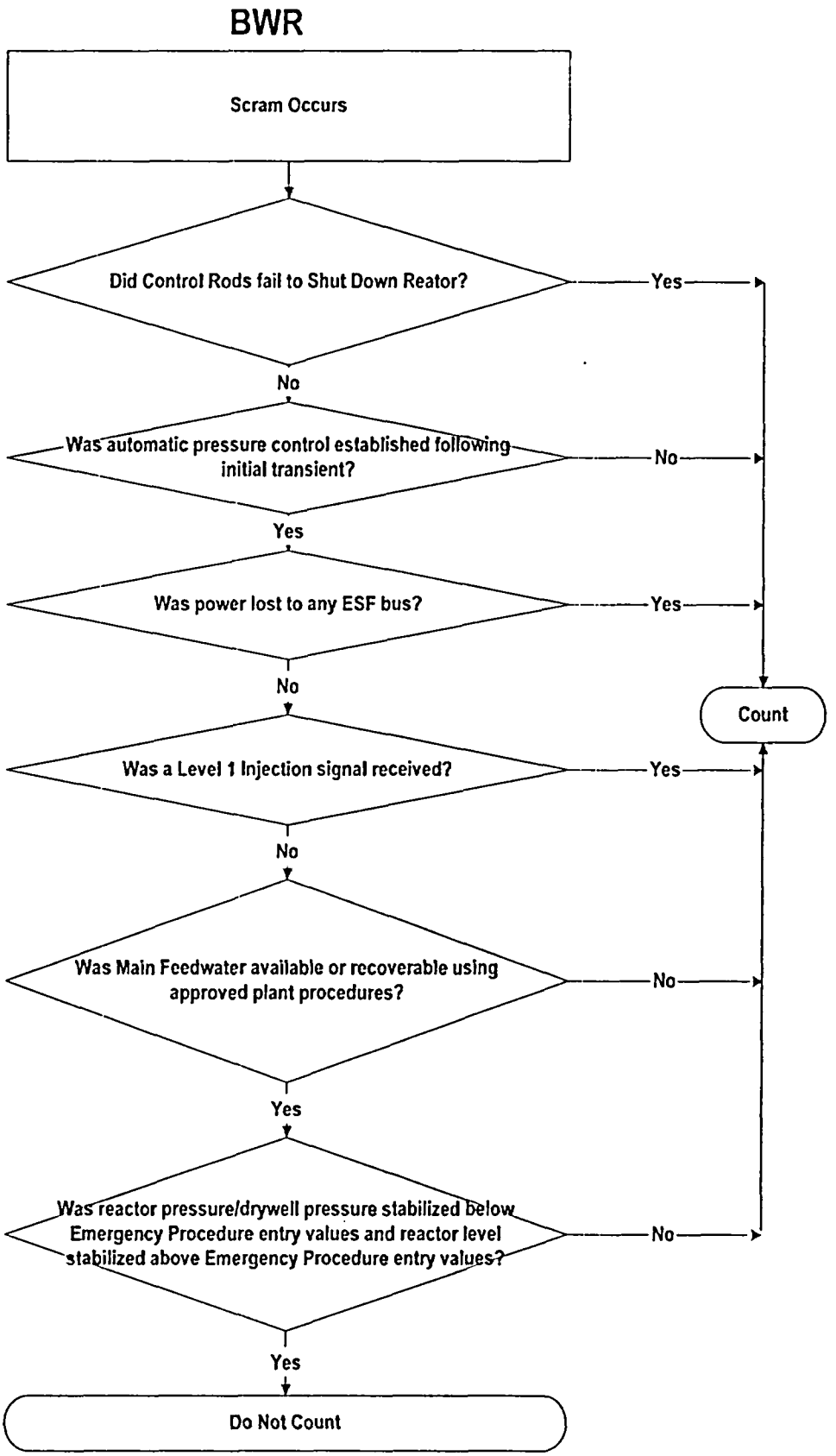
If operating prior to the scram, was Main Feedwater operating and/or available during the reactor scram response? The consideration for this question is whether Main Feedwater could be used to feed the Reactor Vessel if necessary. The qualifier of "recoverable using approved plant procedures" will allow a licensee to answer yes to this question if there is no physical equipment restraint to prevent the operations staff from starting the necessary equipment, aligning the required systems, or satisfying required logic using plant procedures approved for use and in place prior to the reactor scram occurring.

The operations staff must be able to start and operate the required equipment using normal alignments and approved normal or off-normal operating procedures. Manual operation of controllers/equipment, even if normally automatic, is allowed if addressed by procedure. Situations that require maintenance activities or non- proceduralized operating alignments will not satisfy this question. Additionally the restoration of Feedwater must be capable of feeding the Reactor Vessel in a reasonable period of time. Operations should be able to start a Main Feedwater pump and start feeding the Reactor Vessel with the Main Feedwater System within 30 minutes. During startup conditions where Main Feedwater was not placed in service prior to the scram, this question would not be considered, and should be skipped.

Was reactor pressure/drywell pressure stabilized below Emergency Procedure entry values and reactor level stabilized above Emergency Procedure entry values?

This step is used to determine if the scram was a normal "simple" scram that did not require using other procedures beyond the "typical" scram response. Following the initial transient maintaining the reactor and drywell pressure below Emergency Procedure entry values while ensuring level is above Emergency Procedure entry values satisfies this step.


PWR
Scram Occurs
Did two or more control rods fail to fully insert?
Yes
No
Did the turbine trip?
No
Yes
Was power lost to any ESF bus?
Yes
No
Was a Safety Injection signal received?
Yes
No
Was Main Feedwater available or recoverable using approved plant procedures?
No
Yes
Was the scram response procedure completed without re-entering another EOP?
No
Yes
Count
Do Not Count


BWR
Scram Occurs
Did Control Rods fail to Shut Down Reator?
Yes
No
Was automatic pressure control established following initial transient?
No
Yes
Was power lost to any ESF bus?
Yes
No
Was a Level 1 Injection signal received?
Yes
No
Was Main Feedwater available or recoverable using approved plant procedures?
No
Yes
Was reactor pressure/drywell pressure stabilized below Emergency Procedure entry values and reactor level stabilized above Emergency Procedure entry values?
No
Yes
Count
Do Not Count

Clarifying Notes

Scrams from a condition where the Reactor is not critical do not count in this indicator.

This indicator includes unplanned scrams. Unplanned scrams counted for this indicator are also counted for the *Unplanned Scrams per 7000 Critical Hours* indicator.