RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.:	**295-8263**
SRP Section:	**16 – Technical Specifications**
Application Section:	**16.3.3**
Date of RAI Issue:	**11/05/2015**

Question No. 16-115

The applicant is requested to consider the following suggested clarifications and corrections to the Bases for generic TS 3.3.6; please explain and correct any errors in the suggested changes:

1. Generic TS SR 3.3.6.2 verifies that each subgroup can actuate ESFAS equipment when actuational output of each subgroup is generated; surveillance column Note 2 says “Subgroup of Actuation Logic channel A, C and B, D shall be tested on a staggered basis.” The “Background” section of the Bases for generic TS 3.3.6 does not describe in any detail the ESFAS Actuation Logic subgroups and trip legs so that the Required Actions and Surveillance Requirements may be understood. Suggest inserting into the SR 3.3.6.2 Bases discussion consistent with the following information describing the ESF-CCS actuation logic from TeR APR1400-Z-J-NR-14001-P, Rev.0:

    For each ESF actuation function, each group of outputs is divided into subgroups. Outputs within a subgroup are tested concurrently and are selectively arranged so that concurrent actuation does not adversely affect plant operations. (Page 60, Section 4.4.3, last paragraph, **TS**)

    The ESFAS initiation signals from the PPS are sent to separate ESF-CCS cabinets. Each cabinet contains the actuation logic for only one division; therefore, a failure in one cabinet cannot affect the circuitry and actuated equipment of the other divisions. (Page A9)

    Single failures of the actuation (or control) logic will cause, at worst, only a failure of a component, group of components, or one entire redundant train; actuation of the remaining redundant division is sufficient for the protective action. (Page A10)

In the above TeR quotations, when the word “division” means either electrical power Division I or Division II, or Actuation Logic division (A, B, C, or D), staff requests applicant to so indicate to improve the clarity of the discussion in the TeR, and in the Bases for generic TS 3.3.6.

2. In order for NRC staff to verify the TeR quotations in item 1 above, for each ESFAS subgroup (“subgroup for Actuation signal of each Actuation Logic channel”), the applicant is requested to provide, in response to this question, a list of components (motor, air, and solenoid operated valves, pumps, dampers, and fans) by equipment designator and name, for all six NSSS ESFAS Functions, and all three BOP ESFAS Functions. For each component indicate (a) the supporting electrical power division (also indicate whether dc or ac power), (b) the associated safety train (A, B, C, or D), and the associated ESFAS Actuation Logic division. For each containment penetration flow path, indicate which isolation valve is inside and which isolation valve is outside containment. Also indicate the same information, where applicable, for the pressurizer power operated safety relief valves, the steam generator atmospheric steam dump valves and block valves, the CVCS isolation valves, the SCS valves, the steam generator blowdown system isolation valves, and the RCS leak detection system instrumentation, and the post accident monitoring instrumentation (AMI) for Type A, B, and C parameters.

3. The “Actions” section of the Bases for generic TS 3.3.6 uses the term ‘trip leg’ in the discussion of Required Actions B.1 and B.2. The CE System 80+ DCD Chapter 16, Section 1.1 defines “trip leg” as follows:

> A TRIP LEG is defined as the "logical or" combination of channel states which represent half of a Selective two-out-of-four Logic function. When both TRIP LEGS of a Selective two-out-of-four Logic function assume a true state, the output of the Selective two-out-of-four Logic function assumes a true state (e.g., in a Selective two-out-of-four Logic [(A "or" C) "and" (B "or" D) = N]; the term (A "or" C) is a TRIP LEG, the term (B "or" D) is a TRIP LEG, and N is the output).

In the CE System 80+ DCD, the generic TS use the term TRIP LEG in the “Background” and “Actions” sections of the Bases for TS 3.3.4, RPS Logic and Trip Initiation, and in the “Actions” section of the Bases for TS 3.3.6, ESFAS Logic and Manual Initiation. The applicant is requested to discuss what is meant by an ESFAS “trip leg” in the “Background” section of the Bases on page B 3.3.5-4 and page B 3.3.6-3.

4. In the “Background” section of the Bases for TS 3.3.5 and TS 3.3.6,

   a. First paragraph, replace reactor coolant system with Reactor Coolant System.

   b. On pages B 3.3.5-1 and B 3.3.6-1, apply STS ordered list format convention to list of ESFAS functions; that is, end each item with a comma except end last item with a period, and append “and” to the next to last item. Note that this may be considered a global comment for all ordered lists in the “Background” section of each generic TS Subsection Bases.

c. Fourth paragraph on pages B 3.3.5-1 and B 3.3.6-1, the applicant is requested to revise for clarity and for acronym definition and usage consistency, as indicated in the following markup; please explain and correct any errors in the suggested changes:

> The ~~engineered safety features (ESF)~~ ~~system~~ **Engineered Safety Features (ESF) Actuation System (ESFAS)** consists of four channels of sensors, **auxiliary process cabinets – safety** (APC-S)~~ cabinets~~, the ESF**AS signal** ~~initiation~~ **generation** portion of the **Plant Protection System (**PPS) cabinets and **the ESF Component Control System** **(**ESF-CCS**)**.

d. On pages B 3.3.5-1 & 2, and page B 3.3.6-2, the applicant is requested to revise the following three paragraphs for clarity as indicated by the following markup; please explain and correct any errors in the suggested changes::

> **The devices and circuitry that generate the above ESFAS signals are grouped into the following interconnected parts. These parts are:** ~~The ESFAS function is performed through the below portions in the ESF system.~~
>
> ~~a.~~• Measurement channels**,**
>
> ~~b.~~• Bistable logic **processor channels,**
>
> ~~c.~~• ESFAS logic **channels**:
>
> – Coincidence Logic**,**
>
> – Initiation Logic **(trip paths), and**
>
> – Actuation Logic**.**
>
> [For B 3.3.6] This LCO addresses **the** ESFAS logic **channels**. Bistable logic **processor channels** and measurement channel**s** are addressed in . . .
>
> [For B 3.3.5] This LCO addresses measurement channels and bistable logic **processor channels**. **ESFAS logic** ~~Logic is~~ **channels**~~. and~~ are addressed in . . .
>
> [For B 3.3.6] The role**s** of the measurement channel**s** and bistable logic **processor channels** ~~is~~ **are** described in LCO 3.3.5. The role of the ESFAS logic is described below.
>
> [For B 3.3.5] The role of each of these ~~functions~~ **interconnected parts of** ~~in~~ the ESFAS, including the **ESFAS** logic**, which is also described in** ~~of~~ LCO 3.3.6, is discussed below.

e. On pages B 3.3.5-2 & 3, for consistency in terminology, the applicant is requested to revise the heading “Bistable Logics” to “Bistable Logic Processors.”

f. On page B 3.3.6-2, for clarity the applicant is requested to revise the paragraph under the heading “ESFAS Logic” as indicated; please explain and correct any errors in the suggested changes:

> The ESFAS logic, consisting of coincidence, initiation and actuation logic, employs a scheme that provides an ESF**AS** actuation **signal from all** ~~of~~ four **PPS** divisions **to the component control logic of all trains of the associated ESF systems** when ~~bistables in~~ any two of the four **bistable logic processor** channels sense **that** the same input parameter **has satisfied the ESFAS Function’s** trip **setpoint on the input parameter**. This **logic scheme** is called a two-out-of-four trip logic.

On page B 3.3.5-4, for clarity the applicant is requested to revise the paragraph under the heading “ESFAS Logic” as indicated:

> The ESFAS logic, consisting of **coincidence,** initiation ~~logic channel~~ and actuation logic, employs a scheme that provides an ESF**AS** actuation **signal from all four PPS divisions to the component control logic** of all trains **of the associated ESF systems** when ~~bistables in~~ any two of the four **bistable logic processor** channels **sense that** ~~sensing~~ the same input parameter **has satisfied the ESFAS Function’s** trip **setpoint on the input parameter**. This **logic scheme** is called a two-out-of-four trip logic.

The applicant is requested to compare corresponding paragraphs in the “Background” sections of the Bases for all generic TS Section 3.3 Subsections, and make repeated information consistent in both phrasing and terminology.

g. On pages B 3.3.6-2 and -3, for clarity the applicant is requested to revise the paragraph under the heading “Coincidence Logic” as indicated; please explain and correct any errors in the suggested changes:

> There is one local coincidence logic (LCL) associated with each trip bistable logic of each channel **of a given ESFAS instrument Function**. Each LCL receives four trip signals, one **from the trip** ~~for its associated~~ bistable logic in the **associated** channel and one from each **trip** ~~of the equivalent~~ bistable logic located in the other three channels **of the affected ESFAS instrument Function**. The LCL **also** receives the trip channel bypass status **signal** associated with each of the ~~above mentioned bistables~~**bistable signals**. The function of the LCL is to generate a coincidence logic trip **signal** whenever two or more like bistables are in a tripped condition. ~~The LCL takes into consideration the trip bypass input state when determining the coincidence logics state.~~ **Each LCL automatically changes the state of each of the four coincidence logic channels based on the state of the trip channel bypass Function in**

each channel. For example, a 2-out-of-4 trip logic goes to 2-out-of-3 if one trip bistable logic channel is bypassed.

Designating the protection channels as A, B, C, D, with no trip **channel** bypass **signal** present, the LCL will produce a coincidence logic trip signal for any of the following trip inputs: AB, AC, AD, BC, BD, CD, ABC, ABD, ACD, BCD, ABCD. These represent all possible two- or more out- of-four trip combinations of the four protection channels. Should a trip **channel** bypass be present, the logic will provide a coincidence logic trip signal when two or more of the three un-bypassed **trip bistable logic channels** ~~bistables~~ are in a tripped condition.

h. On pages B 3.3.6-3, for clarity the applicant is requested to revise the paragraph under the headings "Initiation Logic," "Actuation Logic," and "Manual Trip," as indicated; please explain and correct any errors in the suggested changes:

Initiation Logic

The initiation logic is designed to **be** fail-safe. ~~This~~ **Failure of one initiation logic channel** will result in a partial trip (1 of 4) in the two-out- of-four (**one-out-of-two-taken-twice** ESFAS **selective** actuation logic. The partial trip will be alarmed the same as a full ESF**AS** trip and will be indicated by the **Qualified Indication and Alarm System - Safety** **(**QIAS**-P)** and **the Information Processing System (**IPS**)**; the partial trip cannot be bypassed.

Actuation Logic

The four initiation logic ~~in~~ **signals from** the PPS ~~actuate~~ **are used to generate** a two-out-of-four **selective** logic ~~in~~ **actuation signal in each division of** the ESF-CCS. In the actuation logic, each signal also sets a latch when the two-out-of-four **selective** logic actuates to assure that the **ESF actuation** signal is not automatically reset once it has been ~~initiated~~ **generated**.

Receipt of two ~~engineered safety system~~ **ESFAS** initiation **logic** channel signals will generate the actuation ~~channel~~ **logic division** signals. This is done independently in each ESF-CCS cabinet, generating division A and division B **actuation signals**, and where required **for ESF systems with four trains**, division C and division D **actuation** signals.

Manual Trip

ESFAS Manual ~~ESFAS~~ Trip capability is provided to permit the operator to manually actuate an ESF system when necessary.

Two sets of two push buttons (in the MCR) for each ESF function are provided, and each set actuates **all trains provided for that ESF Function, either two or four.** ~~the ESF of four trains (or two trains).~~ Each manual trip push button signal is **sent** ~~inputted~~ to the actuation logic ~~of~~ **in the** ESF-CCS **cabinets** via **the** control panel multiplexer (CPM). By arranging the push buttons in two sets of two, such that both push buttons in a set must be depressed, it is possible to ensure that manual trip will not be prevented in the event of a single random failure **in the signal path associated with one set of push buttons**.

5. Regarding Diverse Manual ESF Actuation, the applicant is requested to add in the APR1400 generic TS Bases equivalent discussions with the same level of detail as provided in CE System 80+ DCD Chapter 16, since no such discussion are included:

   a. The “Background’ section of the Bases for generic TS 3.3.6, “ESFAS Logic and Manual Initiation,” of the CE System 80+ DCD Chapter 16 includes a discussion of Diverse Manual ESF Actuation. The APR1400 generic TS 3.3.6 Bases “Background” section contains no discussion of ESFAS Function 7, “Diverse Manual ESF Actuation Signal.” The appliocant is requested to add discussion of this function in “Background” section of Bases for generic TS 3.3.6.

   b. The “Applicable Safety Analyses” section of the Bases for generic TS 3.3.6, “ESFAS Logic and Manual Initiation,” of the CE System 80+ DCD Chapter 16 includes a discussion of “Diverse Manual ESF Actuation Interface to ESF Components.” The applicant is requested to add an equivalent discussion of this function in the “Applicable Safety Analyses” section of Bases for generic TS 3.3.6.

   c. The “LCO” section of the Bases for generic TS 3.3.6, “ESFAS Logic and Manual Initiation,” of the CE System 80+ DCD Chapter 16 includes a discussion of “Diverse Manual ESF Actuation Interface to ESF Components.” The applicant is requested to add an equivalent discussion of this function in the “LCO” section of Bases for generic TS 3.3.6.

   d. The “Applicability” section of the Bases for generic TS 3.3.6, “ESFAS Logic and Manual Initiation,” of the CE System 80+ DCD Chapter 16 includes a discussion of “Diverse Manual ESF Actuation Interface to ESF Components.” The applicant is requested to add an equivalent discussion of this function in the “Applicability” section of Bases for generic TS 3.3.6.

6. The applicant is requested to explain why automatic Diverse ESF Actuation Functions are not included in an LCO based on LCO Selection Criterion 4, and why the manual Diverse ESF Actuation Functions are included in LCO 3.3.6 (as in System 80+) instead of in a separate LCO in generic TS Section 3.3.

Response

1. The following sentences will be inserted into the SR 3.3.6.2 Bases to be consistent with TeR APR1400-Z-J-NR-14001-P, Rev. 0.

Each ESFAS Function has an associated group of outputs. Each group of outputs is divided into subgroups. Outputs within a subgroup are tested concurrently and are selectively arranged so that concurrent actuation does not adversely affect plant operations.

The ESFAS initiation signals from the PPS are sent to separate ESF-CCS cabinets. Each cabinet contains the actuation logic for only one division. Therefore, a failure in one cabinet cannot affect the circuitry and actuated equipment of the other divisions.

Single failures of the actuation logic will cause, at worst, only a failure of a component, group of components, or one entire redundant train. The actuation of the remaining redundant division is sufficient for the protective action.

In accordance with the IEEE Std. 603-1991, the channel loses its identity where single protective action signals are combined. Therefore, TeR APR1400-Z-J-NR-14001-P, Rev. 0 uses the word “division” for the portion of the circuit from the local coincidence logic to the actuation logic. This approach is consistent with DCD Tier 2 Chapter 7. However, generic TS LCOs 3.3.4 and 3.3.6 use the word “channel” instead of “division” for the same portion of the circuit; from the local coincidence logic to the actuation logic, in accordance with the definitions of channel check, channel functional test, and channel calibration stated in Section 1.1 of NUREG 1432. As a result, the words “channel” and “division” are interchangeable regarding the portion from the local coincidence logic to the actuation logic.

2. A list of all BOP and NSSS components in the ESF-CCS ESFAS Actuation Logic Division Functions for the groups and subgroups is included as Attachment 2.

3. Since the reactor trip switchgear system (RTSS) is composed of full two-out-of-four logic, the term “trip leg” is not necessary to be used for the ACTIONS of LCO 3.3.4. Therefore, Condition C of LCO 3.3.4 will be deleted along with the corresponding TS Bases.

The Actuation Logic in the ESF-CCS Group Controller is composed of selective two-out-of-four logic. The ESFAS “trip leg” which represents half of a selective two-out-of-four logic function pertains to one portion of the “logical OR” combination of PPS channel A or C and PPS channel B or D. Therefore, the following paragraph will be added under the heading “Actuation Logic” in the “Background” section of the Bases on page B 3.3.6-3.

> A trip leg is defined as the "logical or" combination of channel states which represent half of a selective two-out-of-four logic function. When both trip leg of a selective two-out-of-four logic function assume a true state, the output of the selective two-out-of-four logic function assumes a true state (e.g., in a selective two-out-of-four logic [(A "or" C) "and" (B "or" D) = N]; the term (A "or" C) is a trip leg, the term (B "or" D) is a trip leg, and N is the output).

4. The following responses are provided pertaining to the “Background” section of the Bases for TS 3.3.5 and TS 3.3.6.

   a. The phrase “reactor coolant system” stated in the first paragraph will be replaced with

"Reactor Coolant System."

b. Each item in the ESFAS Function list will be ended with a comma except the last item which will be ended with a period and the word "and" will be appended to the next to the last item with a comma.

c. The fourth paragraph on pages B 3.3.5-1 and B 3.3.6-1 will be revised for clarity as follows:

> The Engineered Safety Features (ESF) Actuation System (ESFAS) consists of four channels of sensors, auxiliary process cabinets – safety (APC-S), the ESFAS signal generation portion of the Plant Protection System (PPS) cabinets and the ESF Component Control System (ESF-CCS).

d. The following paragraphs in the Background sections of the Bases on pages B 3.3.5-1 & 2, and page B 3.3.6-2 will be revised as follows:

> The devices and circuitry that generate the above ESFAS signals are grouped into the following interconnected parts. These parts are:
>
> • Measurement channels,
>
> • Bistable logic processor channels,
>
> • ESFAS logic channels:
>
> — Coincidence Logic,
>
> — Initiation Logic (trip paths), and
>
> — Actuation Logic.
>
> [For B 3.3.5] This LCO addresses measurement channels and bistable logic processor channels. ESFAS logic channels are addressed in . . .
>
> [For B 3.3.6] This LCO addresses the ESFAS logic channels. Bistable logic processor channels and measurement channels are addressed in . . .
>
> [For B 3.3.5] The role of each of these interconnected parts of the ESFAS, including the ESFAS logic, which is also described in LCO 3.3.6, is discussed below.
>
> [For B 3.3.6] The roles of the measurement channels and bistable logic processor channels are described in LCO 3.3.5. The role of the ESFAS logic is described below.

e. The heading “Bistable Logics” stated on page B 3.3.5-3 will be changed to “Bistable Logic Processors” for consistency in terminology.

f. The paragraph under the heading “ESFAS Logic” stated on page B 3.3.6-2 will be revised for clarity as follows:

> The ESFAS logic, consisting of coincidence, initiation and actuation logic, employs a scheme that provides an ESFAS actuation signal from all four PPS divisions to the component control logic of all trains of the associated ESF systems when any two of the four bistable logic processor channels sense that the same input parameter has satisfied the ESFAS Function’s trip setpoint on the input parameter. This logic scheme is called a two-out-of-four trip logic.

The paragraph under the heading “ESFAS Logic” stated on page B 3.3.5-4 will be revised for clarity as follows:

> The ESFAS logic, consisting of coincidence, initiation and actuation logic, employs a scheme that provides an ESFAS actuation signal from all four PPS divisions to the component control logic of all trains of the associated ESF systems when any two of the four bistable logic processor channels sense that the same input parameter has satisfied the ESFAS Function’s trip setpoint on the input parameter. This logic scheme is called a two-out-of-four trip logic.

Other generic TS Subsections in 3.3 do not have a corresponding paragraph in their “Background” sections of the Bases.

g. The paragraph under the heading “Coincidence Logic” stated on pages B 3.3.6-2 and -3 will be revised as follows:

> There is one local coincidence logic (LCL) associated with each trip bistable logic of each channel of a given ESFAS instrument Function. Each LCL receives four trip signals, one from the trip bistable logic in the associated channel and one from each trip bistable logic located in the other three channels of the affected ESFAS instrument Function. The LCL also receives the trip channel bypass status signal associated with each of the bistable signals. The function of the LCL is to generate a coincidence logic trip signal whenever two or more like bistables are in a tripped condition. Each LCL automatically changes the state of each of the four coincidence logic channels based on the state of the trip channel bypass Function in each channel. For example, a 2-out-of-4 trip logic goes to 2-out-of-3 if one trip bistable logic channel is bypassed.
>
> Designating the protection channels as A, B, C, D, with no trip channel bypass signal present, the LCL will produce a coincidence logic trip signal for any of the following trip inputs: AB, AC, AD, BC, BD, CD, ABC, ABD, ACD, BCD, ABCD. These represent all possible two- or more out-

of-four trip combinations of the four protection channels. Should a trip channel bypass be present, the logic will provide a coincidence logic trip signal when two or more of the three un-bypassed trip bistable logic channels are in a tripped condition.

h. The paragraph under the headings “Initiation Logic,” “Actuation Logic,” and “Manual Trip” stated on pages B 3.3.6-3 will be revised for clarity as follows:

<u>Initiation Logic</u>

The initiation logic is designed to be fail-safe. Failure of one initiation logic channel will result in a partial trip (1 of 4) in the two-out- of-four (one-out-of-two-taken-twice ESFAS selective actuation logic. The partial trip will be alarmed the same as a full ESFAS trip and will be indicated by the Qualified Indication and Alarm System – Safety (QIAS-P) and the Information Processing System (IPS); the partial trip cannot be bypassed.

<u>Actuation Logic</u>

The four initiation logic signals from the PPS are used to generate a selective two-out-of-four logic actuation signal in each division of the ESF-CCS. In the actuation logic, each signal also sets a latch when the selective two-out-of-four logic actuates to assure that the ESF actuation signal is not automatically reset once it has been generated.

A trip leg is defined as the "logical or" combination of channel states which represent half of a selective two-out-of-four logic function. When both trip leg of a selective two-out-of-four logic function assume a true state, the output of the selective two-out-of-four logic function assumes a true state (e.g., in a selective two-out-of-four logic [(A "or" C) "and" (B "or" D) = N]; the term (A "or" C) is a trip leg, the term (B "or" D) is a trip leg, and N is the output).

Receipt of two ESFAS initiation logic channel signals will generate the actuation logic division signals. This is done independently in each ESF-CCS cabinet, generating division A and division B actuation signals, and where required for ESF systems with four trains, division C and division D actuation signals.

<u>Manual Trip</u>

ESFAS Manual Trip capability is provided to permit the operator to manually actuate an ESF system when necessary.

Two sets of two push buttons (in the MCR) for each ESF function are provided, and each set actuates all trains provided for that ESF Function,

either two or four. Each manual trip push button signal is sent to the actuation logic in the ESF-CCS cabinets via the control panel multiplexer (CPM). By arranging the push buttons in two sets of two, such that both push buttons in a set must be depressed, it is possible to ensure that manual trip will not be prevented in the event of a single random failure in the signal path associated with one set of push buttons.

5. The discussions regarding Diverse Manual ESF Actuation will be incorporated into the APR1400 generic TS Bases as follows:

a. The following discussion will be added in the "Background" section of Bases for generic TS 3.3.6.

Diverse Manual ESF Actuation

Independent of the above design features, APR1400 implements a means for manual actuation of engineered safety feature Functions using a single channel which uses hardwired communication that bypasses all data links, network communications, and all computers with large software applications. Switches located in the main control room provide for system level actuation of safety injection, containment spray, auxiliary feedwater for each steam generator, main steam isolation per MSIV, and containment isolation.

The hardwired manual input signal from the control room switches will override input data received from the network communication interface to actuate the plant components. This feature of APR1400 design provides an additional level of protection against a postulated common mode failure of protection system software.

Provisions are made to permit periodic testing of the complete ESFAS. These tests cover the trip actions from sensor input through the protection system and actuation devices. The system test does not interfere with the protection function of the system. Overlap between individual tests exists so that the entire ESFAS can be tested. DCD Tier 2, Section 7.3 (Ref. 1) describes ESFAS testing in detail.

b. The following discussion will be added in the "Applicable Safety Analyses" section of Bases for generic TS 3.3.6.

7. Diverse Manual ESF Actuation Interface to ESF Components

The diverse manual ESF actuation interface to ESF components is a single channel which uses hardwired communication that bypasses all data links, network communications, and all computers with large software applications. Switches located in the control room provide system level actuation of safety injection, containment spray, auxiliary feedwater for each steam generator, main steam isolation per MSIV, and containment isolation.

The hardwired manual input signal from the control room switches will override input data received from the network communication interface to actuate the plant

components. The two position control room switches for safety injection, containment spray, auxiliary feedwater, main steam isolation, and containment isolation also have the ability to deactivate the associated plant components. These features of the design provide an additional level of protection against a postulated common mode failure of protection system software.

The diverse manual ESF actuation channel satisfies Criterion 4 of the NRC Policy Statement.

c. The following discussion is already described in the “LCO” section of Bases for generic TS 3.3.6.

7. Diverse Manual ESF Actuation Signal

The diverse manual ESF actuation interface to ESF components is initiated manually from switches in the MCR. The switches for safety injection, containment spray, auxiliary feedwater, main steam isolation, and containment isolation have two positions as follows: normal and actuate. When in actuate, input received from the network communication interface to actuate the components will be overridden.

This LCO requires two channels of safety injection, containment spray, auxiliary feedwater, and one channel for each main steam isolation valve and one channel for containment isolation to be OPERABLE in MODES 1, 2, 3, and 4.

d. The following discussion will be added between the second and third paragraphs in the “Applicability” section of Bases for generic TS 3.3.6.

The diverse manual ESFAS trip capability is required to be OPERABLE in the same MODES 1, 2, 3, and 4 as the manual ESFAS trip.

6. In the event of a postulated common cause failure (CCF) of the digital computer logic within the ESF-CCS, both manual and automatic logic functions are expected to be inoperable since the manual trip signal is transmitted to the digital ESF-CCS computer logic. Therefore, the diverse manual ESF actuation function that is independent of the manual and automatic ESF-CCS logic functions is required to respond to the event.

Regarding automatic Diverse ESF Actuation Functions, the Diverse Protection System (DPS), which is a non-safety and backup system, performs auxiliary feedwater actuation and safety injection actuation functions to assist the mitigation of the effects of a postulated software CCF of the digital computer logic within the PPS and ESF-CCS. Therefore, it is not necessary to include the automatic Diverse ESF Actuation Functions in an LCO. This is the same approach taken in NUREG-1432, Rev. 4 even though the alternate protection system instrumentation was included in Section 3.3.8 of the CE System 80+ DCD Chapter 16.

In addition, operating experience or probabilistic risk assessment has shown the diverse reactor trip not to be significant to public health and safety since the function is not required for safe operation of the APR1400. Therefore, the automatic Diverse ESF Actuation

Functions do not meet the LCO Selection Criterion 4.

The manual Diverse ESF Actuation Functions that address all ESFAS functions containing SIAS, MSIS, CIAS, CSAS, AFAS-1, and AFAS-2 are included in LCO 3.3.6 because the manual Diverse ESF Actuation switches in the MCR are connected to the associated component interface modules installed in the EFS-CCS.

In conclusion, the APR1400 inclusion of the manual Diverse ESF Actuation Function in TS and not the automatic Diverse ESF Actuation Functions is consistent with NUREG-1432, Rev. 4.

Impact on DCD

Same as changes described in the impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS 3.3.4 and 3.3.12 and the Bases for TS 3.3.1, 3.3.4, 3.3.5, and TS 3.3.6 will be revised as indicated in the Attachment 1.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical or Environmental Report.

Delete

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~C. Two channels of Manual Trip, RTSG, or RPS logic affecting the same trip leg inoperable.~~	~~C.1 Open affected RTSGs.~~	~~Immediately~~
C. ~~D.~~ Required Action and associated Completion Time of Condition A ~~or C~~ not met. OR One or more Functions with more than two channels of Manual Trip, RTSG, or RPS logic inoperable ~~for reasons other than Condition C~~.	C. ~~D.~~1 Be in MODE 3. AND C. ~~D.~~2 Open all RTSGs.	6 hours 6 hours

Delete

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.4.1	Perform CHANNEL FUNCTIONAL TEST on each RPS logic channel and RTSG channel.	31 days
SR 3.3.4.2	Perform CHANNEL FUNCTIONAL TEST, including separate verification of undervoltage and shunt trips, on each RTSG.	18 months
SR 3.3.4.3	Perform CHANNEL FUNCTIONAL TEST on each RPS manual trip channel.	31 days
SR 3.3.4.4	Perform CHANNEL FUNCTIONAL TEST on each RPS logic channel and RTSG channel.	31 days

Table 3.3.12-1 (Page 3 of 3)
Remote Shutdown Display and Control Functions

FUNCTION (DISPLAY or CONTROL)	REQUIRED NUMBER of CHANNELS[(a)]
44. SI Pump/SC Pump Suction Cross Connect Valve Control	1
45. SI Pump Control	1
46. SC Pump Control	1
47. Manual Reactor Trip Switch	2[(d)]
48. MSIS Actuation Switch	2
49. AFW Pump Controls (SG #1, #2)	4[(b)]
50. AFW Isolation Valves (SG #1, #2)	4[(b)]
51. AFW Flow Control Valves (SG #1, #2)	4[(b), (g)]
52. AFW Steam Motive Power Controls (SG #1, #2)	2[(b), (e)]
53. Charging Pump Controls	2
54. AF Turbine Trip and Throttle Valve 1&2 Trip and Reset	2
55. EDG Power Circuit Breaker (PCB) Controls	2
56. Reactor Containment Building Fan Cooler Controls	1
57. Area Cooling Fan Controls	1
58. Digital Control Transfer Switch	2[(f)]
59. CCW Pump and ESW Pump Controls	1

(a) A division can have one or more channels (per IEEE 603).

(b) Turbine Driven Pump Display and Control for Division I, Motor Driven Pump Display and Control for Division II.

Delete

(d) A division consists of two Manual Reactor Trip Switches ~~in opposite trip legs to meet the selective two-out-of-four logic for a reactor trip~~.

(e) AFW Pump Turbine Steam Supply Valves, AFW Pump Turbine Steam Isolation and Isolation Bypass Valves, AFW Turbine, and AFW Turbine Speed Control for Division I, No Steam Motive Power Controls for Division II.

(f) Includes non-safety Channel N1 and N2.

(g) Includes ON/OFF switch and M/A station.

BASES

ACTIONS (continued)

Therefore, a Note has been added, specifying that the RTSGs associated with one inoperable channel may be closed for up to 1 hour for the performance of an RPS CHANNEL FUNCTIONAL TEST.

Required Action A.1 provides for opening the RTSGs associated with the inoperable channel within a Completion Time of 1 hour. This Required Action is conservative, since depressing the manual trip switch associated with either set of breakers in the other ~~trip leg~~ channels will cause a reactor trip. With this configuration, a single channel failure will not prevent a reactor trip. The allotted Completion Time is adequate for opening the affected RTSGs while maintaining the risk of having them closed at an acceptable level.

B.1

Delete

Condition B applies to the failure of one initiation logic channel, RTSG channel, or manual trip channel ~~affecting the same trip leg~~ in MODE 3, 4, or 5 with the RTSGs closed. The channel must be restored to OPERABLE status within 48 hours. If the inoperable channel cannot be restored to OPERABLE status within 48 hours, the affected RTSGs must be opened so the affected functions are one-out-of-two logic which meets redundancy requirements.

The Completion Time of 48 hours is adequate to repair most failures.

Testing on the OPERABLE channels cannot be performed without causing a reactor trip, unless the RTSGs in the inoperable channels are closed to permit testing. Therefore, a Note has been added specifying that the RTSGs associated with one inoperable channel may be closed for up to 1 hour for the performance of an RPS CHANNEL FUNCTIONAL TEST.

~~C.1~~

~~Condition C applies to the failure of both initiation logic channels affecting the same trip leg. Since this will open two channels of RTSGs, this Condition is also applicable to channels in the same trip leg. This will open both RTSGs in the affected trip leg, satisfying the Required Action of opening the affected RTSGs.~~

Delete

Delete

BASES

ACTIONS (continued)

~~Of greater concern is the failure of the initiation circuit in a non-trip condition. With only one RPS logic channel failed in a non-trip condition, there is still the redundant set of RTSGs in the trip leg.~~

~~With both failed in a non-trip condition, the reactor will not trip automatically when required. In either case, the affected RTSGs must be opened immediately by using the appropriate manual trip push switches, since each of the four push buttons opens one RTSG. Caution is required since reactor will be shut down by pushing unrelated switches.~~

~~If the affected RTSG cannot be opened, Required Action D is entered. This would only occur if there is a failure in the manual trip circuitry or the RTSGs.~~

~~D.1 and D.2~~ C.1 and C.2

Delete

Delete

Condition D is entered if Required Actions associated with Condition A ~~or C~~ are not met within the required Completion Time or if for one or more functions, more than one logic (coincidence logic, initiation logic), manual trip channel, or RTSG channel is inoperable ~~for reasons other than Condition C~~.

Delete

If the RTSGs associated with the inoperable channel cannot be opened, the reactor must be shut down within 6 hours and all the RTSGs opened. A Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required plant conditions from full power conditions in an orderly manner and without challenging plant systems and for opening RTSGs. All RTSGs should then be opened, placing the plant in a MODE where the LCO does not apply and ensuring no CEA withdrawal occurs.

SURVEILLANCE REQUIREMENTS

The OPERABILITY of the ITP is not limited per LCO 3.3.4 because ITP does not perform the safety function of RPS. However, the ITP shall maintain the functional integrity to perform CHANNEL FUNCTIONAL TEST of SR 3.3.4.1 and 3.3.4.2.

SR 3.3.4.1

A CHANNEL FUNCTIONAL TEST on each channel is performed every 31 days to ensure the entire channel will perform its intended function when needed.

B 3.3 INSTRUMENTATION

B 3.3.5 Engineered Safety Features Actuation System (ESFAS) Instrumentation

Reactor Coolant System

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based upon the values of selected unit parameters, to protect against violating core design limits and ~~reactor coolant system~~ (RCS) pressure boundary during anticipated operational occurrences (AOOs) and ensures acceptable consequences during accidents.

The Engineered Safety Features (ESF) Actuation System (ESFAS) consists of four channels of sensors, auxiliary process cabinets - safety (APC−S), the ESFAS signal generation portion of the Plant Protection System (PPS) cabinets and the ESF Component Control System (ESF−CCS).

The ESFAS contains devices and circuitry that generate the following signals when monitored variables reach levels that are indicative of conditions requiring protection action:

1. Safety Injection Actuation Signal (SIAS) ,
2. Containment Spray Actuation Signal (CSAS) ,
3. Containment Isolation Actuation Signal (CIAS) ,
4. Main Steam Isolation Signal (MSIS) , and
5, 6. Auxiliary Feedwater Actuation Signal (AFAS) .

The equipment actuated by each of the above signals is identified in the DCD Tier 2, Section 7.3 (Reference 1).

~~The engineered safety features (ESF) system consists of four channels of sensors, APC-S cabinets, the ESF signal initiation portion of the PPS cabinets and ESF-CCS.~~

The devices and circuitry that generate the above ESFAS signals are grouped into the following interconnected parts. These parts are:

~~The ESFAS function is performed through the below portions in the ESF system.~~

- Measurement channels ,
- ~~Bistable logic~~
- ~~ESFAS logic:~~
  - ~~Coincidence logic~~
  - ~~Initiation logic channel~~
  - ~~Actuation logic~~

- Bistable logic processor channels,
- ESFAS logic channels:
  — Coincidence Logic,
  — Initiation Logic (trip paths), and
  — Actuation Logic.

BASES

BACKGROUND (continued)

~~This LCO addresses measurement channels and bistable logic. Logic is addressed in LCO 3.3.6, "Engineered Safety Features Actuation System (ESFAS) Logic and Manual Trip."~~

~~The role of each of these functions in the ESFAS, including the logic of LCO 3.3.6, is discussed below.~~

This LCO addresses measurement channels and bistable logic processor channels. ESFAS logic channels are addressed in LCO 3.3.6, "Engineered Safety Features Actuation System (ESFAS) Logic and Manual Trip."

The role of each of these interconnected parts of the ESFAS, including the ESFAS logic, which is also described in LCO 3.3.6, is discussed below.

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ased upon
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Four identical measurement channels with electrical and physical separation are provided for each parameter used in the generation of trip signals. These channels are designated A through D. Measurement channels provide input to ESFAS bistable processors within the same ESFAS channel. In addition, some measurement channels are used as inputs to reactor protection system (RPS) bistable processors and provide indication in the MCR.

When a channel monitoring a parameter indicates an unsafe condition, the bistable monitoring the parameter in that channel will trip. Tripping two or more channels of NSSS ESFAS bistables monitoring the same parameter will generate initiation signal in local coincidence logic. This causes both channels of actuation logic to respond. Each channel of actuation logic controls one train of the associated engineered safety features (ESF) equipment.

Three of the four measurement channels and bistable processors are necessary to meet the redundancy and testability of 10 CFR Part 50, Appendix A, GDC 21 (Reference 2).

The fourth channel provides additional flexibility, by allowing one channel to be removed from service for maintenance or testing, while still maintaining a minimum two-out-of-three logic.

Since no single failure will prevent a protection system actuation, this arrangement meets the requirements of IEEE 603 (Reference 3).

Bistable Logic Processors

BASES

BACKGROUND (continued)

~~Bistable Logics~~

The bistable trip unit, mounted in the plant protection system (PPS) cabinet, receives an analog input from the measurement channels. The analog signal then converted into digital in the analog input module of bistable processor. The bistable trip algorithm decides the pretrip and trip status. Each output status is derived through comparing the digitalized process values by A/D converter to the setpoints (pretrip and trip). The output status of bistable trip logic is provided to the local coincidence logic. In addition, the status is provided for trip indication and remote alarm.

There are four bistable logic channels for each ESFAS function corresponding to each measurement channel (A, B, C, and D). When two ESFAS functions share the same input and trip setpoints (e.g., containment pressure being inputted to CIAS and SIAS), bistable logic output in one channel can be used for two safety Functions. Similarly, RPS and ESFAS can share bistable logic (e.g., Pressurizer Pressure – Low inputs to RPS and SIAS). When a trip occurs, each bistable logic channel provides a trip output signal to the corresponding coincidence logic. The trip status in one channel is sent to the local coincidence logic in the other channels through fiber-optic links for isolation.

The local coincidence logic (two-out-of-four logic) generates the ESFAS initiation signal when two or more bistable logics are in tripped condition. The trip setpoints and Allowable Values used in the bistables based on the analytical limits stated in Chapter 15 (Reference 4). The selection of these trip setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account.

To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment effects, for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Reference 5), Allowable Values specified in SCP, in the accompanying LCO, are conservatively adjusted with respect to the analytical limits. The actual nominal trip setpoint entered into the bistable is normally still more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a CHANNEL FUNCTIONAL TEST. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value in SCP.

BASES

BACKGROUND (continued)

Setpoints in accordance with the Allowable Value will ensure that Safety Limits (SLs) are not violated during AOOs and the consequences of design basis accidents (DBAs) will be acceptable, providing the plant is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed.

Functional testing of the ESFAS, from the bistable input through the output to the ESFAS actuation logic, can be performed either at power or shut down, and is normally performed on a monthly basis (31 days). DCD Tier 2, Section 7.2 (Reference 6) provides more detail on ESFAS testing. Process transmitter calibration is normally performed on a refueling basis. SRs for the channels are specified in the Surveillance Requirements section.

The ESFAS logic, consisting of coincidence, initiation and actuation logic, employs a scheme that provides an ESFAS actuation signal from all four PPS divisions to the component control logic of all trains of the associated ESF systems when any two of the four bistable logic processor channels sense that the same input parameter has satisfied the ESFAS Function's trip setpoint on the input parameter. This logic scheme is called a two-out-of-four trip logic.

ESFAS Logic

~~The ESFAS logic, consisting of initiation logic channel and actuation logic, employs a scheme that provides an ESF actuation of all trains when bistables in any two of the four channels sensing the same input parameter trip. This is called a two-out-of-four trip logic.~~

Each LCL receives four trip signals, one for its associated bistable logic in the channel and one from each of the equivalent bistable logic located in the other three channels. The LCL receives the trip channel bypass status associated with each of the above mentioned bistables. The function of the LCL is to generate a coincidence signal whenever two or more like bistables are in a tripped condition. The LCL takes into consideration the trip bypass input state when determining the coincidence logics state. Designating the protection channels as A, B, C, D, with no trip bypass present, the LCL will produce a coincidence signal for any of the following trip inputs: AB, AC, AD, BC, BD, CD, ABC, ABD, ACD, BCD, ABCD. These represent all possible two- or more out-of-four trip combinations of the four protection channels. Should a trip bypass be present, the logic will provide a coincidence signal when two or more of the three un-bypassed bistables are in a tripped condition.

On a system basis, a coincidence signal is generated in all four protection channels whenever a coincidence of two or more like bistables of the four channels are in a tripped state. The local coincidence trip output in coincidence logic is used as an input to the initiation logic. This signal is sent to actuation logic in each channel of ESF-CCS.

B 3.3 INSTRUMENTATION

B 3.3.6 Engineered Safety Features Actuation System (ESFAS) Logic and Manual Trip

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based upon the values of selected unit parameters, to protect against violating core design limits and the reactor coolant system (RCS) pressure boundary during anticipated operational occurrences (AOOs) and ensures acceptable consequences during accidents.

The ESFAS contains devices and circuitry that generate the following signals when monitored variables reach levels that are indicative of conditions requiring protective action:

1. Safety Injection Actuation Signal (SIAS)
2. Containment Isolation Actuation Signal (CIAS) ,
3. Containment Spray Actuation Signal (CSAS)
4. Main Steam Isolation Signal (MSIS)
5. Auxiliary Feedwater Actuation Signal SG #1 (AFAS-1) , and
6. Auxiliary Feedwater Actuation Signal SG #2 (AFAS-2) .

Equipment actuated by each of the above signals is identified in the DCD Tier 2 (Reference 1).

~~The engineered safety features (ESF) system consists of four channels of sensors, APC-S cabinets, the ESFAS initiation portion of the PPS cabinets and ESF-CCS.~~

The Engineered Safety Features (ESF) Actuation System (ESFAS) consists of four channels of sensors, auxiliary process cabinets - safety (APC-S), the ESFAS signal generation portion of the Plant Protection System (PPS) cabinets and the ESF Component Control System (ESF-CCS).

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BASES

BACKGROUND (continued)

The ESFAS function is performed through the below portions in the ESF system.

a. Measurement channels

b. Bistable logic

c. ESFAS logic:

- Coincidence Logic
- Initiation Logic (trip paths)
- Actuation Logic

This LCO addresses ESFAS logic. Bistable logic and measurement channel are addressed in LCO 3.3.5, "Engineered Safety Features Actuation System (ESFAS) Instrumentation."

The role of the measurement channel and bistable logic is described in LCO 3.3.5. The role of the ESFAS logic is described below.

ESFAS Logic

The ESFAS logic, consisting of coincidence, initiation and actuation logic, employs a scheme that provides an ESF actuation of four divisions when bistables in any two of the four channels sense the same input parameter trip. This is called a two-out-of-four trip logic.

Coincidence Logic

There is one local coincidence logic (LCL) associated with each trip bistable logic of each channel. Each LCL receives four trip signals, one for its associated bistable logic in the channel and one from each of the equivalent bistable logic located in the other three channels. The LCL receives the trip channel bypass status associated with each of the above mentioned bistables. The function of the LCL is to generate a coincidence logic trip whenever two or more like bistables are in a tripped condition. The LCL takes into consideration the trip bypass input state when determining the coincidence logics state.

The devices and circuitry that generate the above ESFAS signals are grouped into the following interconnected parts. These parts are:

- Measurement channels,
- Bistable logic processor channels,
- ESFAS logic channels:
  - Coincidence Logic,
  - Initiation Logic (trip paths), and
  - Actuation Logic.

This LCO addresses the ESFAS logic channels. Bistable logic processor channels and measurement channels are addressed in LCO 3.3.5, “Engineered Safety Features Actuation System (ESFAS) Instrumentation.”

The roles of the measurement channels and bistable logic processor channels are described in LCO 3.3.5. The role of the ESFAS logic is described below.

<u>ESFAS Logic</u>

The ESFAS logic, consisting of coincidence, initiation and actuation logic, employs a scheme that provides an ESFAS actuation signal from all four PPS divisions to the component control logic of all trains of the associated ESF systems when any two of the four bistable logic processor channels sense that the same input parameter has satisfied the ESFAS Function’s trip setpoint on the input parameter. This logic scheme is called a two-out-of-four trip logic.

<u>Coincidence Logic</u>

There is one local coincidence logic (LCL) associated with each trip bistable logic of each channel of a given ESFAS instrument Function. Each LCL receives four trip signals, one from the trip bistable logic in the associated channel and one from each trip bistable logic located in the other three channels of the affected ESFAS instrument Function. The LCL also receives the trip channel bypass status signal associated with each of the bistable signals. The function of the LCL is to generate a coincidence logic trip signal whenever two or more like bistables are in a tripped condition. Each LCL automatically changes the state of each of the four coincidence logic channels based on the state of the trip channel bypass Function in each channel. For example, a 2-out-of-4 trip logic goes to 2-out-of-3 if one trip bistable logic channel is bypassed.

BASES

BACKGROUND (continued)

~~Designating the protection channels as A, B, C, D, with no trip bypass present, the LCL will produce a coincidence logic trip signal for any of the following trip inputs: AB, AC, AD, BC, BD, CD, ABC, ABD, ACD, BCD, ABCD. These represent all possible two- or more out-of-four trip combinations of the four protection channels. Should a trip bypass be present, the logic will provide a coincidence logic trip signal when two or more of the three un-bypassed bistables are in a tripped condition.~~

Designating the protection channels as A, B, C, D, with no trip channel bypass signal present, the LCL will produce a coincidence logic trip signal for any of the following trip inputs: AB, AC, AD, BC, BD, CD, ABC, ABD, ACD, BCD, ABCD. These represent all possible two− or more out− of−four trip combinations of the four protection channels. Should a trip channel bypass be present, the logic will provide a coincidence logic trip signal when two or more of the three un−bypassed trip bistable logic channels are in a tripped condition.

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Actuation Logic

The four initiation logic in the PPS actuate a two-out-of-four logic in the ESF-CCS. In the actuation logic, each signal also sets a latch when the two-out-of-four logic actuates to assure that the signal is not automatically reset once it has been initiated.

Receipt of two engineered safety system initiation channel signals will generate the actuation channel signals. This is done independently in each ESF-CCS cabinet, generating division A and division B and where required, division C and division D signals.

Manual Trip

Manual ESFAS Trip capability is provided to permit the operator to manually actuate an ESF system when necessary.

Two sets of two push buttons (in the MCR) for each ESF function are provided, and each set actuates the ESF of four trains (or two trains). Each manual trip push button signal is inputted to the actuation logic of ESF-CCS via control panel multiplexer (CPM). By arranging the push buttons in two sets of two, such that both push buttons in a set must be depressed, it is possible to ensure that manual trip will not be prevented in the event of a single random failure.

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Initiation Logic

The initiation logic is designed to be fail-safe. Failure of one initiation logic channel will result in a partial trip (1 of 4) in the two-out- of-four (one-out-of-two-taken-twice ESFAS selective actuation logic. The partial trip will be alarmed the same as a full ESFAS trip and will be indicated by the Qualified Indication and Alarm System – Safety (QIAS-P) and the Information Processing System (IPS); the partial trip cannot be bypassed.

Actuation Logic

The four initiation logic signals from the PPS are used to generate a selective two-out-of-four logic actuation signal in each division of the ESF-CCS. In the actuation logic, each signal also sets a latch when the selective two-out-of-four logic actuates to assure that the ESF actuation signal is not automatically reset once it has been generated.

A trip leg is defined as the "logical or" combination of channel states which represent half of a selective two-out-of-four logic function. When both trip leg of a selective two-out-of-four logic function assume a true state, the output of the selective two-out-of-four logic function assumes a true state (e.g., in a selective two-out-of-four logic [(A "or" C) "and" (B "or" D) = N]; the term (A "or" C) is a trip leg, the term (B "or" D) is a trip leg, and N is the output).

Receipt of two ESFAS initiation logic channel signals will generate the actuation logic division signals. This is done independently in each ESF-CCS cabinet, generating division A and division B actuation signals, and where required for ESF systems with four trains, division C and division D actuation signals.

Manual Trip

ESFAS Manual Trip capability is provided to permit the operator to manually actuate an ESF system when necessary.

Two sets of two push buttons (in the MCR) for each ESF function are provided, and each set actuates all trains provided for that ESF Function, either two or four. Each manual trip push button signal is sent to the actuation logic in the ESF-CCS cabinets via the control panel multiplexer (CPM). By arranging the push buttons in two sets of two, such that both push buttons in a set must be depressed, it is possible to ensure that manual trip will not be prevented in the event of a single random failure in the signal path associated with one set of push buttons.

Diverse Manual ESF Actuation

Independent of the above design features, APR1400 implements a means for manual actuation of engineered safety feature Functions using a single channel which uses hardwired communication that bypasses all data links, network communications, and all computers with large software applications. Switches located in the main control room provide for system level actuation of safety injection, containment spray, auxiliary feedwater for each steam generator, main steam isolation per MSIV, and containment isolation.

The hardwired manual input signal from the control room switches will override input data received from the network communication interface to actuate the plant components. This feature of APR1400 design provides an additional level of protection against a postulated common mode failure of protection system software.

Provisions are made to permit periodic testing of the complete ESFAS. These tests cover the trip actions from sensor input through the protection system and actuation devices. The system test does not interfere with the protection function of the system. Overlap between individual tests exists so that the entire ESFAS can be tested. DCD Tier 2, Section 7.3 (Ref. 1) describes ESFAS testing in detail.

BASES

APPLICABLE SAFETY ANALYSES (continued)

5, 6. Auxiliary Feedwater Actuation Signal

AFAS consists of two steam generator specific signals (AFAS-1 and AFAS-2). AFAS-1 initiates auxiliary feed to SG #1 and AFAS-2 initiates auxiliary feed to SG #2.

AFAS maintains a steam generator heat sink during a small LOCA event, steam generator tube rupture event, MSLB, or FWLB event either inside or outside containment.

Insert contents in the next page

The ESFAS satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The LCO requires all channel components necessary to provide an ESFAS actuation to be OPERABLE.

The requirements for each Function are listed below. The reasons for the applicable MODES for each Function are addressed under APPLICABILITY.

1. Safety Injection Actuation Signal

Automatic SIAS occurs in Pressurizer Pressure – Low or Containment Pressure – High and is explained in Bases 3.3.5.

a. Coincidence Logic

This LCO requires four channels of SIAS coincidence logic to be OPERABLE in MODES 1, 2, 3, and 4.

b. Initiation Logic

This LCO requires four channels of SIAS initiation logic to be OPERABLE in MODES 1, 2, 3, and 4.

c. Actuation Logic

This LCO requires four channels of SIAS actuation logic to be OPERABLE in MODES 1, 2, 3, and 4.

d. Manual Trip

This LCO requires four channels of SIAS manual trip to be OPERABLE in MODES 1, 2, 3, and 4.

7. Diverse Manual ESF Actuation Interface to ESF Components

The diverse manual ESF actuation interface to ESF components is a single channel which uses hardwired communication that bypasses all data links, network communications, and all computers with large software applications. Switches located in the control room provide system level actuation of safety injection, containment spray, auxiliary feedwater for each steam generator, main steam isolation per MSIV, and containment isolation.

The hardwired manual input signal from the control room switches will override input data received from the network communication interface to actuate the plant components. The two position control room switches for safety injection, containment spray, auxiliary feedwater, main steam isolation, and containment isolation also have the ability to deactivate the associated plant components. These features of the design provide an additional level of protection against a postulated common mode failure of protection system software.

The diverse manual ESF actuation channel satisfies Criterion 4 of the NRC Policy Statement.

BASES

APPLICABILITY (continued)

In MODES 5 and 6, automatic actuation of these Functions is not required because adequate time is available to evaluate plant conditions and respond by manually operating the ESF components if required.

The ESFAS manual trip capability is required in MODE 4 for SIAS, CIAS, CSAS, MSIS and AFAS even though automatic actuation is not required. Because of the large number of components actuated by these Functions, ESFAS actuation is simplified by the use of the manual trip push buttons.

The diverse manual ESFAS trip capability is required to be OPERABLE in the same MODES 1, 2, 3, and 4 as the manual ESFAS trip.

The ESFAS logic must be OPERABLE in the same MODES as the automatic and manual trip. In MODE 4, only the portion of the ESFAS logic responsible for the required manual trip must be OPERABLE.

In MODES 5 and 6, the systems initiated by ESFAS are either reconfigured or disabled for shutdown cooling operation. Accidents in these MODES are slow to develop and would be mitigated by manual operation of individual components.

ACTIONS

When the number of inoperable channels in a trip Function exceeds those specified in any related Condition associated with the same trip Function, then the plant is outside the safety analysis. Therefore, LCO 3.0.3 should be entered immediately, if applicable in the current MODE of operation.

A Note has been added to the ACTIONS to clarify the application of the Completion Time rules. The Conditions of this Specification may be entered independently for each Function. The Completion Time for the inoperable channel of a Function will be tracked separately for each Function, starting from the time the Condition was entered for that Function.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Manual ESF Actuation Testing

Manual ESF actuation testing is tested every 31 days to verify that manual pushbutton can actuate the actuation logic as designed.

The 31-day Surveillance period is determined by operating experience and shows that equipment can meet the Surveillance requirement condition when equipment is tested as this Surveillance period.

SR 3.3.6.2

Individual subgroup must also be tested, one at a time, to verify the individual ESFAS components will actuate when required.

The 31-day Frequency on a staggered test basis complies with the operating experience and ensures the problems of individual logic signal can be detected within this time frame.

Some components cannot be tested at power operation since their actuation may lead to plant trip or equipment damage. Actuation logic subgroups not tested at power operation must be tested in accordance with the Note to this SR.

SR 3.3.6.3

A CHANNEL FUNCTIONAL TEST for diverse ESF manual actuation channel performs the diverse manual ESF actuation circuit by manual actuation of each Function. This testing is performed every 18 months to verify that the trip pushbutton can actuate the actuation logic as

Each ESFAS Function has an associated group of outputs. Each group of outputs is divided into subgroups. Outputs within a subgroup are tested concurrently and are selectively arranged so that concurrent actuation does not adversely affect plant operations.

The ESFAS initiation signals from the PPS are sent to separate ESF−CCS cabinets. Each cabinet contains the actuation logic for only one division. Therefore, a failure in one cabinet cannot affect the circuitry and actuated equipment of the other divisions.

Single failures of the actuation logic will cause, at worst, only a failure of a component, group of components, or one entire redundant train. The actuation of the remaining redundant division is sufficient for the protective action.

ESFAS	ESFAS Actuation Logic Division	Component	NSSS No.	Tag No.	Electical Power Division (I or II)	Motive Power (dc or ac)	Safety Train (A,B,C or D)	For containment penetratin flow path, indicate inside or outside	Remarks
SIAS	A	Letdown Isolation Valve	CH-516	1-451-V-0516	I	DC	A	N/A	CVCS Isolation Valve AMI Type B
SIAS	A	CCW Train A Isolation Valve		1-461-V-0143	I	AC	A	N/A	
SIAS	A	Aux. BLDG Controlled Area Supply AHU Outlet Isoation Damper		1-606-Y-0017A	I	DC	A	N/A	
SIAS	A	Aux. BLDG Controlled Area Supply AHU Outlet Isoation Damper		1-606-Y-0018A	II	DC	B	N/A	
SIAS	A	Aux. BLDG Controlled Area Emergency Exhaust ACU Fan		1-606-M-AH01A	I	AC	A	N/A	
SIAS	A	Aux. BLDG Controlled Area Normal Exhaust ACU Inlet Isoation Damper		1-606-Y-0021A	I	DC	A	N/A	
SIAS	A	Aux. BLDG Controlled Area Normal Exhaust ACU Inlet Isoation Damper		1-606-Y-0022A	I	DC	A	N/A	
SIAS	A	Cross Connect Isolation Valve		1-461-V-0937	I	AC	A	N/A	
SIAS	A	Check Valve Leakage Line Isoation Valve	SI-648	1-441-V-0648	I	DC	A	N/A	N/A
SIAS	A	SIT Fill and Drain Line Isolation Valve	SI-641	1-441-V-0641	I	DC	A	N/A	N/A
SIAS	A	CREVAS Train A			I		A	N/A	
SIAS	A	CCW Pump		1-461-M-PP01A	I	AC	A	N/A	
SIAS	A	Shutdown Cooling Heat Exchanger Isolation Valve		1-461-V-0351	I	AC	A	N/A	
SIAS	A	SIP 1 Isolation Valve	SI-646	1-441-V-0646	I	AC	A	OUTSIDE	AMI Type B
SIAS	A	CCW Train A Heat Exchanger Outlet Isolation Valve		1-461-V-0021	I	AC	A	N/A	
SIAS	A	CCW Train A Heat Exchanger Outlet Isolation Valve		1-461-V-0023	I	AC	A	N/A	
SIAS	A	CCW Train A Heat Exchanger Outlet Isolation Valve		1-461-V-0025	I	AC	A	N/A	
SIAS	A	CCW Train A Heat Exchanger Outlet Isolation Valve		1-461-V-0027	I	AC	A	N/A	
SIAS	A	CCW Train A Isolation Valve		1-461-V-0149	I	AC	A	N/A	
SIAS	A	SIT 1 (Dischage) Isolation Valve	SI-644	1-441-V-0644	I	AC	A	N/A	AMI Type D
SIAS	A	EDG HEAT EXCHANGER (HX) ISOLATION VALVE		1-461-V-0191	I	AC	A	N/A	
SIAS	A	EDG LOADING SEQUENCER			I		A	N/A	
SIAS	A	AUXILIARY FEEDWATER PUMP		1-542-M-PP02A	I	AC	A	N/A	
SIAS	A	SI Pump #1	SIP-1	1-441-M-PP02A	I	AC	A	N/A	N/A
SIAS	A	SC Pump #1	SCP-1	1-441-M-PP01A	I	AC	A	N/A	N/A
SIAS	B	Letdown Isolation Valve	CH-515	1-451-V-0515	II	DC	B	N/A	CVCS Isolation Valve AMI Type B
SIAS		CCW Train B Isolation Valve		1-461-V-0144	II	AC	B	N/A	
SIAS	B	Check Valve Leakage Line Isolation Valve	SI-628	1-441-V-0628	II	DC	B	N/A	N/A
SIAS	B	SIT Fill and Drain Line Isolation Valve	SI-621	1-441-V-0621	II	DC	B	N/A	N/A
SIAS	B	CCW Train B Isolation Valve		1-461-V-0150	II	AC	B	N/A	
SIAS	B	Cross Connect Isolation Valve		1-461-V-0938	II	AC	B	N/A	
SIAS	B	CREVAS TRAIN B			II		B	N/A	
SIAS	B	EDG HEAT EXCHANGER (HX) ISOLATION VALVE		1-461-V-0192	II	AC	B	N/A	
SIAS	B	CCW Pump		1-461-PP01B	II	AC	B	N/A	
SIAS	B	Shutdown Cooling Heat Exchanger Isolation Valve		1-461-V-0352	II	AC	B	N/A	
SIAS	B	Aux. BLDG Controlled Area Supply AHU Outlet Isoation Damper		1-606-Y-0019B	II	DC	C	N/A	
SIAS	B	Aux. BLDG Controlled Area Supply AHU Outlet Isoation Damper		1-606-Y-0020B	II	DC	D	N/A	

ESFAS	ESFAS Actuation Logic Division	Component	NSSS No.	Tag No.	Electical Power Division (I or II)	Motive Power (dc or ac)	Safety Train (A,B,C or D)	For containment penetratin flow path, indicate inside or outside	Remarks
SIAS	B	Aux. BLDG Controlled Area Normal Exhaust ACU Inlet Isoation Damper		1-606-Y-0023B	II	DC	C	N/A	
SIAS	B	Aux. BLDG Controlled Area Normal Exhaust ACU Inlet Isoation Damper		1-606-Y-0024B	II	DC	D	N/A	
SIAS	B	CCW Train B Heat Exchanger Outlet Isolation Valve		1-461-V-0022	II	AC	B	N/A	
SIAS	B	CCW Train B Heat Exchanger Outlet Isolation Valve		1-461-V-0024	II	AC	B	N/A	
SIAS	B	CCW Train B Heat Exchanger Outlet Isolation Valve		1-461-V-0026	II	AC	B	N/A	
SIAS	B	CCW Train B Heat Exchanger Bypass Line Isolation Valve		1-461-V-0028	II	AC	B	N/A	
SIAS	B	Aux. BLDG Controlled Area Emergency Exhaust ACU Fan		1-606-AH01B	II	AC	B	N/A	
SIAS	B	SIP 2 Isolation Valve	SI-626	1-441-V-0626	II	AC	B	OUTSIDE	AMI Type B
SIAS	B	SIT 2 (Discharge) Isolation Valve	SI-624	1-441-V-0624	II	AC	B	N/A	N/A
SIAS	B	SIT Fill Line Isolation Valve	SI-682	1-441-V-0682	II	DC	B	INSIDE	AMI Type B
SIAS	B	EDG LOADING SEQUENCER			II		B	N/A	
SIAS	B	AUXILIARY FEEDWATER PUMP		1-542-M-PP02B	II	AC	B	N/A	
SIAS	B	SI Pump #2	SIP-2	1-441-M-PP02B	II	AC	B	N/A	N/A
SIAS	B	SC Pump #2	SCP-2	1-441-M-PP01B	II	AC	B	N/A	N/A
SIAS	C	CCW Train A Isolation Valve		1-461-V-0145	I	AC	C	N/A	
SIAS	C	Check Valve Leakage Line Isoation Valve	SI-638	1-441-V-0638	I	DC	C	N/A	N/A
SIAS	C	SIT Fill and Drain Line Isolation Valve	SI-631	1-441-V-0631	I	DC	C	N/A	N/A
SIAS	C	Cross Connect Isolation Valve		1-461-V-0939	I	AC	C	N/A	
SIAS	C	SIT 3 Isolation(/Discharge) Valve	SI-634	1-441-V-0634	I	AC	C	N/A	AMI Type D
SIAS	C	(Hot Leg) Check Valve Leakage Line Isoation Valve	SI-322	1-441-V-0322	I	DC	C	N/A	N/A
SIAS	C	CCW Pump		1-461-PP02A	I	AC	C	N/A	
SIAS	C	Spray Heat Exchanger Inlet Isolation Valve		1-461-V-0097	I	AC	C	N/A	
SIAS	C	SIP 3 Isolation Valve	SI-636	1-441-V-0636	I	AC	C	OUTSIDE	AMI Type B
SIAS	C	CCW Train A Isolation Valve		1-461-V-0147	I	AC	C	N/A	
SIAS	C	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0013A	I	DC	A	N/A	
SIAS	C	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		1-601-M-AH02A	I	AC	A	N/A	
SIAS	C	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0015A	I	DC	A	N/A	
SIAS	C	Outside Air Intake Isolation Damper		1-601-Y-0011A	I	DC	C	N/A	
SIAS	C	Outside Air Intake Isolation Damper		1-601-Y-0012A	I	DC	C	N/A	
SIAS	C	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		1-601-M-AH02C	I	AC	C	N/A	
SIAS	C	Kitchen and Toilet Exhaust Isolation Damper		1-601-Y-0027	I	DC	C	N/A	
SIAS	C	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0013C	I	DC	C	N/A	
SIAS	C	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0015C	I	DC	C	N/A	
SIAS	C	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0029	I	DC	C	N/A	
SIAS	C	Smoke Removal Isolation Damper		1-601-Y-0014B	II	DC	B	N/A	
SIAS	C	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0016B	II	DC	B	N/A	
SIAS	C	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0014D	II	DC	D	N/A	

ESFAS	ESFAS Actuation Logic Division	Component	NSSS No.	Tag No.	Electical Power Division (I or II)	Motive Power (dc or ac)	Safety Train (A,B,C or D)	For containment penetratin flow path, indicate inside or outside	Remarks
SIAS	C	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0016D	II	DC	D	N/A	
SIAS	C	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE		1-461-V-0031	I	AC	C	N/A	
SIAS	C	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE		1-461-V-0033	I	AC	C	N/A	
SIAS	C	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE		1-461-V-0035	I	AC	C	N/A	
SIAS	C	CCW HEAT EXCHANGERS OUTLET BYPASS VALVE		1-461-V-0037	I	AC	C	N/A	
SIAS	C	Aux. BLDG Controlled Area Emergency Exhaust ACU Fan		1-606-M-AH01C	I	AC	C	N/A	
SIAS	C	EDG LOADING SEQUENCER			I		C	N/A	
SIAS	C	SI Pump #3	SIP-3	1-441-M-PP02C	I	AC	C	N/A	N/A
SIAS	C	CONTAINMENT SPRAY PUMP		1-442-M-PP01A	I	AC	C	N/A	
SIAS	C	EDG A HEAT EXCHANGER (HX) INLET ISOLATION VALVE		1-461-V-0181	I	AC	C	N/A	
SIAS	D	CCW TRAIN "B" NON-SAFETY HEADER INLET ISOLATION VALVE		1-461-V-0146	II	AC	D	N/A	
SIAS	D	CCW TRAIN "B" NON-SAFETY HEADER INLET ISOLATION VALVE		1-461-V-0148	II	AC	D	N/A	
SIAS	D	CROSS TIE RETURN HEADER ISOLATION VALVE		1-461-V-0940	II	AC	D	N/A	
SIAS	D	Check Valve Leakage Line Isoation Valve	SI-618	1-441-V-0618	II	DC	D	N/A	N/A
SIAS	D	SIT Fill and Drain Line Isolation Valve	SI-611	1-441-V-0611	II	DC	D	N/A	N/A
SIAS	D	SIP 3 Isolation Valve	SI-616	1-441-V-0616	II	AC	D	OUTSIDE	AMI Type B
SIAS	D	SIT 4 Isolation Valve	SI-614	1-441-V-0614	II	AC	D	N/A	AMI Type D
SIAS	D	Check Valve Leakage Line Isoation Valve	SI-332	1-441-V-0332	II	DC	D	N/A	N/A
SIAS	D	CCW PUMP 2B		1-461-M-PP02B	II	AC	D	N/A	
SIAS	D	CONTAINMENT SPRAY HX 01B INLET ISOLATION VALVE		1-461-V-0098	II	AC	D	N/A	
SIAS	D	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		1-601-M-AH02B	II	AC	B	N/A	
SIAS	D	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		1-601-M-AH02D	II	AC	D	N/A	
SIAS	D	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0016B	II	DC	B	N/A	
SIAS	D	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0014B	II	DC	B	N/A	
SIAS	D	OUTSIDE AIR INTAKE ISOLATION DAMPER		1-601-Y-0012B	II	DC	D	N/A	
SIAS	D	OUTSIDE AIR INTAKE ISOLATION DAMPER		1-601-Y-0011B	II	DC	D	N/A	
SIAS	D	Kitchen and Toilet Exhaust Isolation Damper		1-601-Y-0028	II	DC	D	N/A	
SIAS	D	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0013A	I	DC	A	N/A	
SIAS	D	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0015A	I	DC	A	N/A	
SIAS	D	SMOKE REMOVAL ISOLATION DAMPER		1-601-Y-0030	II	DC	D	N/A	
SIAS	D	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0013C	I	DC	C	N/A	
SIAS	D	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0015C	I	DC	C	N/A	
SIAS	D	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0014D	II	DC	D	N/A	

ESFAS	ESFAS Actuation Logic Division	Component	NSSS No.	Tag No.	Electical Power Division (I or II)	Motive Power (dc or ac)	Safety Train (A,B,C or D)	For containment penetratin flow path, indicate inside or outside	Remarks
SIAS	D	Control Room Supply AHU Inlet Isolation Damper		1-601-Y-0016D	II	DC	D	N/A	
SIAS	D	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE		1-461-V-0032	II	AC	D	N/A	
SIAS	D	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE		1-461-V-0034	II	AC	D	N/A	
SIAS	D	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE		1-461-V-0036	II	AC	D	N/A	
SIAS	D	CCW HEAT EXCHANGERS OUTLET BYPASS VALVE		1-461-V-0038	II	AC	D	N/A	
SIAS	D	Aux. BLDG Controlled Area Emergency Exhaust ACU Fan		1-606-M-AH01D	II	AC	D	N/A	
SIAS	D	EDG LOADING SEQUENCER			II		D	N/A	
SIAS	D	SI Pump #4	SIP-4	1-441-M-PP02D	II	AC	D	N/A	N/A
SIAS	D	CONTAINMENT SPRAY PUMP 2		1-442-M-PP01B	II	AC	D	N/A	
SIAS	D	EDG B HX INLET ISOLATION VALVE		1-461-V-0182	II	AC	D	N/A	
CIAS	A	RCS HOTLEG LOOP1 SAMPLE CONTAINMENT ISOLATION VALVE		1-491-V-0002	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	PZR SURGE LINE SAMPLE CONTAINMENT ISOLATION VALVE		1-491-V-0003	I	DC	A	INSIDE	AMI TYPE B
CIAS	A	PZR STEAM SPACE SAMPLE CONTAINMENT ISOLATION VALVE		1-491-V-0005	I	DC	A	INSIDE	AMI TYPE B
CIAS	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		1-791-V-0031	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		1-791-V-0033	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	BORIC ACID MAKEUP PUMP ISOLATION VALVE		1-447-V-0005	I	AC	A	OUTSIDE	AMI TYPE B
CIAS	A	CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		1-491-V-0042	I	AC	A	OUTSIDE	AMI TYPE B
CIAS	A	LETDOWN HX SUPPLY CONTAINMENT ISOLATION VALVE		1-461-V-0296	I	AC	A	OUTSIDE	AMI TYPE B
CIAS	A	LETDOWN HX RETURN CONTAINMENT ISOLATION VALVE		1-461-V-0302	I	AC	A	OUTSIDE	AMI TYPE B
CIAS	A	SI TANKS SAMPLE CONTAINMENT ISOLATION VALVE		1-491-V-0020	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	SAMPLE RETURN VALVE TO HOLDUP VOLUME TANK		1-491-V-0053	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		1-791-V-0036	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	S/G 1 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		1-791-V-0257	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	RE/RT-039A MONITORING SAMPLE INSIDE CONTAINMENT ISOLATION VALVE		1-761-V-0431	I	AC	A	INSIDE	AMI TYPE B

ESFAS	ESFAS Actuation Logic Division	Component	NSSS No.	Tag No.	Electical Power Division (I or II)	Motive Power (dc or ac)	Safety Train (A,B,C or D)	For containment penetratin flow path, indicate inside or outside	Remarks
CIAS	A	CVCS REACTOR DRAIN TANK GAS ISOLATION VALVE - INSIDE CONTAINMENT		1-471-V-0001	I	AC	A	INSIDE	AMI TYPE B
CIAS	A	CONTAINMENT SERVICE AIR ISOLATION VALVE - OUTSIDE CONTAINMENT		1-594-V-0001	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	CONTAINMENT SUMP DISCHARGE ISOLATION VALVE - OUTSIDE CONTAINMENT		1-481-V-0006	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		1-763-V-0001	I	DC	A	INSIDE	AMI TYPE B
CIAS	A	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		1-763-V-0003	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		1-763-V-0011	I	DC	A	INSIDE	AMI TYPE B
CIAS	A	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE- OUTSIDE CONTAINMENT		1-763-V-0013	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		1-763-V-0009	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE- INSIDE CONTAINMENT		1-763-V-0023	I	DC	A	INSIDE	AMI TYPE B
CIAS	A	Containment High Volume Purge Supply System Containment Isolation Valve		1-612-V-0012	I	AC	A	INSIDE	AMI TYPE B
CIAS	A	Containment Low Volume Purge Supply System Containment Isolation Valve		1-612-V-0032	I	DC	A	INSIDE	AMI TYPE B
CIAS	A	Containment High Volume Purge Exhaust System Containment Isolation Valve		1-612-V-0013	I	AC	A	INSIDE	AMI TYPE B
CIAS	A	Containment Low Volume Purge Exhaust System Containment Isolation Valve		1-612-V-0033	I	DC	A	INSIDE	AMI TYPE B
CIAS	A	S/G -1 BLOWDOWN ISOLATION VALVE		1-455-V-0005	I	DC	A	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
CIAS	A	S/G -1 BLOWDOWN ISOLATION VALVE		1-455-V-0007	I	AC	C	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
CIAS	A	REACTOR CONTAINMENT BLDG FIRE PROTECTION DISCH VALVE		1-691-V-0030	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	HIGH PRESSURE N_2 SUPPLY CONTROL VALVE		1-669-V-0004	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	PCW Return from Containment Ventilation Units Containment Isolation Valve		1-632-V-0015	I	AC	A	INSIDE	AMI TYPE B
CIAS	A	PCW Return from Containment Ventilation Units Containment Isolation Valve		1-632-V-0012	I	DC	A	OUTSIDE	AMI TYPE B

ESFAS	ESFAS Actuation Logic Division	Component	NSSS No.	Tag No.	Electical Power Division (I or II)	Motive Power (dc or ac)	Safety Train (A,B,C or D)	For containment penetratin flow path, indicate inside or outside	Remarks
CIAS	A	PCW Return from Containment Ventilation Units Containment Isolation Valve		1-632-V-0013	I	DC	A	OUTSIDE	AMI TYPE B
CIAS	A	Letdown Containment Isolation Shut Valve	CH-522	1-451-V-0522	I	DC	A	INSIDE	CVCS Isolation Valve AMI Type B
CIAS	A	REACTOR DRAIN TANK EFFLUENT CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT	CH-560	1-451-V-0560	I	DC	A	INSIDE	CVCS Isolation Valve AMI Type B
CIAS	A	Resin Sluicing Supply Header to Reactor Drain Header Isolation Valve	CH-580	1-451-V-0580	I	DC	A	OUTSIDE	CVCS Isolation Valve AMI Type B
CIAS	A	IRWST MAKEUP LINE CONTAINMENT ISOLATION VALVE	CH-509	1-451-V-0509	I	AC	A	OUTSIDE	CVCS Isolation Valve AMI Type B
CIAS	B	RCS HOTLEG LOOP1 SAMPLE CONTAINMENT ISOLATION VALVE		1-491-V-0001	II	DC	B	INSIDE	AMI TYPE B
CIAS	B	PZR SURGE LINE SAMPLE CONTAINMENT ISOLATION VALVE		1-491-V-0004	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	PZR STEAM SPACE SAMPLE CONTAINMENT ISOLATION VALVE		1-491-V-0006	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	SI TANKS SAMPLE CONTAINMENT ISOLATION VALVE		1-491-V-0021	II	DC	B	INSIDE	AMI TYPE B
CIAS	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE- BLOWDOWN HOTLEG		1-791-V-0032	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE- DOWNCOMER		1-791-V-0034	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	BORIC ACID MAKEUP PUMP ISOLATION VALVE		1-447-V-0006	II	AC	B	OUTSIDE	AMI TYPE B
CIAS	B	LETDOWN HX SUPPLY CONTAINMENT ISOLATION VALVE		1-461-V-0297	II	AC	B	INSIDE	AMI TYPE B
CIAS	B	LETDOWN HX RETURN CONTAINMENT ISOLATION VALVE		1-461-V-0301	II	AC	B	INSIDE	AMI TYPE B
CIAS	B	CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		1-491-V-0041	II	AC	B	INSIDE	AMI TYPE B
CIAS	B	CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		1-491-V-0043	II	AC	B	OUTSIDE	AMI TYPE B
CIAS	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE- BLOWDOWN COLDLEG		1-791-V-0036	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	S/G 2 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		1-791-V-0258	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	RE/RT-039A MONITORING SAMPLE OUTSIDE CONTAINMENT ISOLATION VALVE		1-761-V-0432	II	AC	B	OUTSIDE	AMI TYPE B
CIAS	B	RE/RT-039A MONITORING SAMPLE OUTSIDE CONTAINMENT ISOLATION VALVE		1-761-V-0434	II	AC	B	OUTSIDE	AMI TYPE B

ESFAS	ESFAS Actuation Logic Division	Component	NSSS No.	Tag No.	Electical Power Division (I or II)	Motive Power (dc or ac)	Safety Train (A,B,C or D)	For containment penetratin flow path, indicate inside or outside	Remarks
CIAS	B	CVCS REACTOR DRAIN TANK GAS ISOLATION VALVE - OUTSIDE CONTAINMENT		1-471-V-0002	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	CONTAINMENT SUMP DISCHARGE ISOLATION VALVE - INSIDE CONTAINMENT		1-481-V-0005	II	AC	B	INSIDE	AMI TYPE B
CIAS	B	CONTAINMENT ISOLATION VALVE		1-535-V-0013	II	AC	B	OUTSIDE	AMI TYPE B
CIAS	B	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		1-763-V-0002	II	DC	B	INSIDE	AMI TYPE B
CIAS	B	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		1-763-V-0004	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT - IRWST		1-763-V-0012	II	DC	B	INSIDE	AMI TYPE B
CIAS	B	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE- OUTSIDE CONTAINMENT		1-763-V-0014	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		1-763-V-0010	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE- INSIDE CONTAINMENT		1-763-V-0024	II	DC	B	INSIDE	AMI TYPE B
CIAS	B	Containment High Volume Purge Exhaust System Containment Isolation Valve		1-612-V-0014	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	Containment Low Volume Purge Exhaust System Containment Isolation Valve		1-612-V-0034	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	Containment High Volume Purge Supply System Containment Isolation Valve		1-612-V-0011	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	Containment Low Volume Purge Supply System Containment Isolation Valve		1-612-V-0031	II	DC	B	OUTSIDE	AMI TYPE B
CIAS	B	S/G -2 BLOWDOWN ISOLATION VALVE		1-455-V-0006	II	DC	B	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
CIAS	B	S/G -2 BLOWDOWN ISOLATION VALVE		1-455-V-0008	II	AC	D	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
CIAS	B	Letdown Containment Isolation Shut Valve	CH-523	1-451-V-0523	II	DC	B	OUTSIDE	CVCS Isolation Valve AMI Type B
CIAS	B	Reactor Drain Tank Effluent Containment Isolation Valve	CH-561	1-451-V-0561	II	DC	B	OUTSIDE	CVCS Isolation Valve AMI Type B
CSAS	A	CONTAINMENT INSTRUMENT AIR ISOLATION VALVE - OUTSIDE CONTAINMENT		1-596-V-0020	I	DC	A	OUTSIDE	AMI TYPE B
CSAS	A	SC Pump #1	SCP-1	1-441-M-PP01A	I	AC	A	N/A	N/A
CSAS	A	RCP CBO Containment Isolation Valve	CH-506	1-451-V-0506	I	DC	A	INSIDE	CVCS Isolation Valve AMI Type B
CSAS	A	EDG LOADING SEQUENCER			I		A	N/A	
CSAS	B	SC Pump #2	SCP-2	1-441-M-PP01B	II	AC	B	N/A	N/A
CSAS	B	RCP CBO Containment Isolation Valve	CH-505	1-451-V-0505	II	DC	B	OUTSIDE	CVCS Isolation Valve AMI Type B
CSAS	B	EDG LOADING SEQUENCER			II		B	N/A	

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CSAS	C	CONTAINMENT SPRAY PUMP 1		1-442-M-PP01A	I	AC	C	N/A	
CSAS	C	PP01A - CONTAINMENT SPRAY HEADER ISOLATION VALVE		1-442-V-0003	I	AC	C	OUTSIDE	AMI TYPE B
CSAS	C	CONTAINMENT SPRAY HX 01A INLET ISOLATION VALVE		1-461-V-0097	I	AC	C	N/A	
CSAS	C	EDG LOADING SEQUENCER			I		C	N/A	
CSAS	D	CONTAINMENT SPRAY PUMP 2		1-442-M-PP01B	II	AC	D	N/A	
CSAS	D	PP01B - CONTAINMENT SPRAY HEADER ISOLATION VALVE		1-442-V-0004	II	AC	D	OUTSIDE	AMI TYPE B
CSAS	D	CONTAINMENT SPRAY HX 01B INLET ISOLATION VALVE		1-461-V-0098	II	AC	D	N/A	
CSAS	D	EDG LOADING SEQUENCER			II		D	N/A	
MSIS	A	MAIN STEAM DRAIN VALVE ISOLATION VALVE		1-521-V-0090	I	DC	A	N/A	
MSIS	A	MAIN STEAM DRAIN VALVE ISOLATION VALVE		1-521-V-0091	I	DC	A	N/A	
MSIS	A	MAIN STEAM DRAIN VALVE ISOLATION VALVE		1-521-V-0092	I	DC	A	N/A	
MSIS	A	MAIN STEAM DRAIN VALVE ISOLATION VALVE		1-521-V-0093	I	DC	A	N/A	
MSIS	A	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	SG-161X	1-521-V-0015	I	DC	A	N/A	AMI Type B
MSIS	A	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	SG-162X	1-521-V-0016	I	DC	A	N/A	AMI Type B
MSIS	A	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	SG-163X	1-521-V-0017	I	DC	A	N/A	AMI Type B
MSIS	A	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	SG-164X	1-521-V-0018	I	DC	A	N/A	AMI Type B
MSIS	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		1-791-V-0031	I	DC	A	OUTSIDE	AMI TYPE B
MSIS	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		1-791-V-0033	I	DC	A	OUTSIDE	AMI TYPE B
MSIS	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		1-791-V-0035	I	DC	A	OUTSIDE	AMI TYPE B
MSIS	A	S/G 1 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		1-791-V-0257	I	DC	A	OUTSIDE	AMI TYPE B
MSIS	A	FEEDWATER CHEMICAL INJECTION VALVE		1-541-V-0138	I	DC	A	N/A	
MSIS	A	Main Steam Isolation Valve Electro Hydraulic Operator	SG-152X	1-521-V-0012	I	DC	A	N/A	MSIS Isolation Valve AMI Type B
MSIS	A	Main Steam Isolation Valve Electro Hydraulic Operator	SG-154X	1-521-V-0014	I	DC	A	N/A	MSIS Isolation Valve AMI Type B
MSIS	A	S/G -1 BLOWDOWN ISOLATION VALVE		1-455-V-0007	I	AC	C	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
MSIS	A	Main Feedwater(Economizer) Isolation Valve	SG-121	1-541-V-0121	I	DC	A	OUTSIDE	AMI Type B
MSIS	A	Main Feedwater(Economizer) Isolation Valve	SG-123	1-541-V-0123	I	DC	A	OUTSIDE	AMI Type B

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MSIS	A	Main Steam Isolation Valve Electro Hydraulic Operator	SG-151X	1-521-V-0011	I	DC	A	N/A	MSIS Isolation Valve AMI Type B
MSIS	A	Main Steam Isolation Valve Electro Hydraulic Operator	SG-153X	1-521-V-0013	I	DC	A	N/A	MSIS Isolation Valve AMI Type B
MSIS	A	S/G -1 BLOWDOWN ISOLATION VALVE		1-455-V-0005	I	DC	A	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
MSIS	A	Main Feedwater(Downcomer) Isolation Valve	SG-131	1-541-V-0131	I	DC	A	OUTSIDE	AMI Type B
MSIS	A	Main Feedwater(Downcomer) Isolation Valve	SG-133	1-541-V-0133	I	DC	A	OUTSIDE	AMI Type B
MSIS	A	FEEDWATER BOOSTER PUMP		1-541-M-PP04	I	AC	N/A	N/A	
MSIS	A	FEEDWATER BOOSTER PUMP		1-541-M-PP05	I	AC	N/A	N/A	
MSIS	A	FEEDWATER BOOSTER PUMP		1-541-M-PP06	I	AC	N/A	N/A	
MSIS	A	STARTUP FEEDWATER PUMP		1-541-M-PP07	I	AC	A	N/A	
MSIS	A	FEEDWATER PUMP TURBINE		1-541-M-TA01	N/A	N/A	N/A	N/A	
MSIS	A	FEEDWATER PUMP TURBINE		1-541-M-TA02	N/A	N/A	N/A	N/A	
MSIS	A	FEEDWATER PUMP TURBINE		1-541-M-TA03	N/A	N/A	N/A	N/A	
MSIS	B	MAIN STEAM DRAIN VALVE ISOLATION VALVE		1-521-V-0090	II	DC	B	N/A	AMI Type B
MSIS	B	MAIN STEAM DRAIN VALVE ISOLATION VALVE		1-521-V-0091	II	DC	B	N/A	AMI Type B
MSIS	B	MAIN STEAM DRAIN VALVE ISOLATION VALVE		1-521-V-0092	II	DC	B	N/A	AMI Type B
MSIS	B	MAIN STEAM DRAIN VALVE ISOLATION VALVE		1-521-V-0093	II	DC	B	N/A	AMI Type B
MSIS	B	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	SG-161Y	1-521-V-0015	II	DC	B	N/A	AMI Type B
MSIS	B	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	SG-162Y	1-521-V-0016	II	DC	B	N/A	AMI Type B
MSIS	B	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	SG-163Y	1-521-V-0017	II	DC	B	N/A	AMI Type B
MSIS	B	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	SG-164Y	1-521-V-0018	II	DC	B	N/A	AMI Type B
MSIS	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		1-791-V-0032	II	DC	B	OUTSIDE	AMI TYPE B
MSIS	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		1-791-V-0034	II	DC	B	OUTSIDE	AMI TYPE B
MSIS	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		1-791-V-0036	II	DC	B	OUTSIDE	AMI TYPE B
MSIS	B	S/G 2 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		1-791-V-0258	II	DC	B	OUTSIDE	AMI TYPE B
MSIS	B	FEEDWATER CHEMICAL INJECTION VALVE		1-541-V-0139	II	DC	B	N/A	
MSIS	B	Main Steam Isolation Valve Electro Hydraulic Operator	SG-152Y	1-521-V-0012	II	DC	B	N/A	MSIS Isolation Valve AMI Type B
MSIS	B	Main Steam Isolation Valve Electro Hydraulic Operator	SG-154Y	1-521-V-0014	II	DC	B	N/A	MSIS Isolation Valve AMI Type B
MSIS	B	S/G -2 BLOWDOWN ISOLATION VALVE		1-455-V-0008	II	AC	D	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B

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MSIS	B	Main Feedwater(Economizer) Isolation Valve	SG-122	1-541-V-0122	II	DC	B	OUTSIDE	AMI Type B
MSIS	B	Main Feedwater(Economizer) Isolation Valve	SG-124	1-541-V-0124	II	DC	B	OUTSIDE	AMI Type B
MSIS	B	Main Steam Isolation Valve Electro Hydraulic Operator	SG-151Y	1-521-V-0011	II	DC	B	N/A	MSIS Isolation Valve AMI Type B
MSIS	B	Main Steam Isolation Valve Electro Hydraulic Operator	SG-153Y	1-521-V-0013	II	DC	B	N/A	MSIS Isolation Valve AMI Type B
MSIS	B	S/G -2 BLOWDOWN ISOLATION VALVE		1-455-V-0006	II	DC	B	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
MSIS	B	Main Feedwater(Downcomer) Isolation Valve	SG-132	1-541-V-0132	II	DC	B	OUTSIDE	AMI Type B
MSIS	B	Main Feedwater(Downcomer) Isolation Valve	SG-134	1-541-V-0134	II	DC	B	OUTSIDE	AMI Type B
MSIS	B	FEEDWATER BOOSTER PUMP		1-541-M-PP04	II	AC	B	N/A	
MSIS	B	FEEDWATER BOOSTER PUMP		1-541-M-PP05	II	AC	B	N/A	
MSIS	B	FEEDWATER BOOSTER PUMP		1-541-M-PP06	II	AC	B	N/A	
MSIS	B	STARTUP FEEDWATER PUMP		1-541-M-PP07	II	AC	B	N/A	
MSIS	B	FEEDWATER PUMP TURBINE		1-541-M-TA01	N/A	N/A	N/A	N/A	
MSIS	B	FEEDWATER PUMP TURBINE		1-541-M-TA02	N/A	N/A	N/A	N/A	
MSIS	B	FEEDWATER PUMP TURBINE		1-541-M-TA03	N/A	N/A	N/A	N/A	
AFAS-1	A	S/G -1 BLOWDOWN ISOLATION VALVE		1-455-V-0005	I	DC	A	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
AFAS-1	A	S/G -1 BLOWDOWN ISOLATION VALVE		1-455-V-0007	I	AC	C	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
AFAS-1	A	EDG LOADING SEQUENCER			I		A	N/A	
AFAS-1	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		1-791-V-0031	I	DC	A	OUTSIDE	AMI TYPE B
AFAS-1	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		1-791-V-0033	I	DC	A	OUTSIDE	AMI TYPE B
AFAS-1	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		1-791-V-0035	I	DC	A	OUTSIDE	AMI TYPE B
AFAS-1	A	S/G 1 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		1-791-V-0257	I	DC	A	OUTSIDE	AMI TYPE B
AFAS-1	A	AUX. FEEDWATER MODULATING VALVE		1-542-V-0035	I	DC	A	N/A	
AFAS-1	A	AUX. FEEDWATER PUMP A –MOTOR DRIVEN		1-542-M-PP02A	I	AC	A	N/A	
AFAS-1	A	AUX. FEEDWATER ISOLATION VALVE (LATCHING)		1-542-V-0043	I	AC	A	OUTSIDE	AMI TYPE B
AFAS-1	A	AUX. FEEDWATER ISOLATION VALVE CYCLING)		1-542-V-0043	I	AC	A	OUTSIDE	AMI TYPE B
AFAS-1	B	S/G -2 BLOWDOWN ISOLATION VALVE		1-455-V-0006	II	DC	B	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
AFAS-1	B	S/G -2 BLOWDOWN ISOLATION VALVE		1-455-V-0008	II	AC	D	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
AFAS-1	B	EDG LOADING SEQUENCER			II		B	N/A	
AFAS-1	B	AF TURBINE STEAM SUPPLY VALVE		1-521-V-0110	II	DC	B	N/A	

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AFAS-1	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		1-791-V-0032	II	DC	B	OUTSIDE	AMI TYPE B
AFAS-1	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		1-791-V-0034	II	DC	B	OUTSIDE	AMI TYPE B
AFAS-1	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		1-791-V-0036	II	DC	B	OUTSIDE	AMI TYPE B
AFAS-1	B	S/G 2 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		1-791-V-0258	II	DC	B	OUTSIDE	AMI TYPE B
AFAS-1	B	AUX. FEEDWATER MODULATING VALVE		1-542-V-0037	II	DC	B	N/A	
AFAS-1	C	AF PUMP TURBINE STEAM ISOLATION VALVE		1-527-V-0009	I	DC	C	N/A	
AFAS-1	C	AUX. FEEDWATER ISOLATION VALVE (LATCHING)		1-542-V-0045	I	AC	C	OUTSIDE	AMI TYPE B
AFAS-1	C	AUX. FEEDWATER ISOLATION VALVE (CYCLING)		1-542-V-0045	I	AC	C	OUTSIDE	AMI TYPE B
AFAS-1	C	EDG LOADING SEQUENCER			I		C	N/A	
AFAS-1	D	EDG LOADING SEQUENCER			II		D	N/A	
AFAS-2	A	AUX. FEEDWATER MODULATING VALVE		1-542-V-0038	I	DC	A	N/A	
AFAS-2	A	AF TURBINE STEAM SUPPLY VALVE		1-521-V-0109	I	DC	A	N/A	
AFAS-2	A	EDG LOADING SEQUENCER			I		A	N/A	
AFAS-2	A	S/G -1 BLOWDOWN ISOLATION VALVE		1-455-V-0005	I	DC	A	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
AFAS-2	A	S/G -1 BLOWDOWN ISOLATION VALVE		1-455-V-0007	I	AC	C	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
AFAS-2	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		1-791-V-0031	I	DC	A	OUTSIDE	AMI TYPE B
AFAS-2	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		1-791-V-0033	I	DC	A	OUTSIDE	AMI TYPE B
AFAS-2	A	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		1-791-V-0035	I	DC	A	OUTSIDE	AMI TYPE B
AFAS-2	A	S/G 1 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		1-791-V-0257	I	DC	A	OUTSIDE	AMI TYPE B
AFAS-2	B	AUX. FEEDWATER MODULATING VALVE		1-542-V-0036	II	DC	B	N/A	
AFAS-2	B	AUX. FEEDWATER ISOLATION VALVE (LATCHING)		1-542-V-0044	II	AC	B	OUTSIDE	AMI TYPE B
AFAS-2	B	AUX. FEEDWATER PUMP B –MOTOR DRIVEN		1-542-M-PP02B	II	AC	B	N/A	
AFAS-2	B	EDG LOADING SEQUENCER			II		B	N/A	
AFAS-2	B	S/G -2 BLOWDOWN ISOLATION VALVE		1-455-V-0006	II	DC	B	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B
AFAS-2	B	S/G -2 BLOWDOWN ISOLATION VALVE		1-455-V-0008	II	AC	D	OUTSIDE	steam generator blowdown system isolation valves, AMI TYPE B

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AFAS-2	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		1-791-V-0032	II	DC	B	OUTSIDE	AMI TYPE B
AFAS-2	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		1-791-V-0034	II	DC	B	OUTSIDE	AMI TYPE B
AFAS-2	B	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		1-791-V-0036	II	DC	B	OUTSIDE	AMI TYPE B
AFAS-2	B	S/G 2 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		1-791-V-0258	II	DC	B	OUTSIDE	AMI TYPE B
AFAS-2	B	AUX. FEEDWATER ISOLATION VALVE (CYCLING)		1-542-V-0044	II	AC	B	OUTSIDE	AMI TYPE B
AFAS-2	C	EDG LOADING SEQUENCER			I		C	N/A	
AFAS-2	D	AUX. FEEDWATER ISOLATION VALVE (LATCHING)		1-542-V-0046	II	AC	D	OUTSIDE	AMI TYPE B
AFAS-2	D	AF PUMP TURBINE STEAM ISOLATION VALVE		1-527-V-0010	II	DC	D	N/A	
AFAS-2	D	AUX. FEEDWATER ISOLATION VALVE (CYCLING)		1-542-V-0046	II	AC	D	OUTSIDE	AMI TYPE B
AFAS-2	D	EDG LOADING SEQUENCER			II		D	N/A	
CREVAS	A	OUTSIDE AIR INTAKE ISOLATION DAMPER		1-601-Y-0011A	I	DC	C	N/A	
CREVAS	A	OUTSIDE AIR INTAKE ISOLATION DAMPER		1-601-Y-0012A	I	DC	C	N/A	
CREVAS	A	KITCHEN EXHAUST AIR ISOLATION DAMPER		1-601-Y-0027	I	DC	C	N/A	
CREVAS	A	SMOKE REMOVAL FAN ISOLATION DAMPER		1-601-Y-0029	I	DC	C	N/A	
CREVAS	A	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		1-601-M-AH02A	I	AC	A	N/A	
CREVAS	A	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		1-601-M-AH02C	I	AC	C	N/A	
CREVAS	A	AHU INLET ISOLATION DAMPER		1-601-Y-0013A	I	DC	A	N/A	
CREVAS	A	AHU INLET ISOLATION DAMPER		1-601-Y-0015A	I	DC	A	N/A	
CREVAS	A	AHU INLET ISOLATION DAMPER		1-601-Y-0013C	I	DC	C	N/A	
CREVAS	A	AHU INLET ISOLATION DAMPER		1-601-Y-0015C	I	DC	C	N/A	
CREVAS	A	AHU INLET ISOLATION DAMPER		1-601-Y-0014B	II	DC	B	N/A	
CREVAS	A	AHU INLET ISOLATION DAMPER		1-601-Y-0016B	II	DC	B	N/A	
CREVAS	A	AHU INLET ISOLATION DAMPER		1-601-Y-0014D	II	DC	D	N/A	
CREVAS	A	AHU INLET ISOLATION DAMPER		1-601-Y-0016D	II	DC	D	N/A	
CREVAS	B	OUTSIDE AIR INTAKE ISOLATION DAMPER		1-601-Y-0011B	II	DC	D	N/A	
CREVAS	B	OUTSIDE AIR INTAKE ISOLATION DAMPER		1-601-Y-0012B	II	DC	D	N/A	
CREVAS	B	KITCHEN EXHAUST AIR ISOLATION DAMPER		1-601-Y-0028	II	DC	D	N/A	
CREVAS	B	SMOKE REMOVAL FAN ISOLATION DAMPER		1-601-Y-0030	II	DC	D	N/A	
CREVAS	B	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		1-601-M-AH02B	II	AC	B	N/A	
CREVAS	B	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		1-601-M-AH02D	II	AC	D	N/A	
CREVAS	B	AHU INLET ISOLATION DAMPER		1-601-Y-0013A	I	DC	A	N/A	
CREVAS	B	AHU INLET ISOLATION DAMPER		1-601-Y-0015A	I	DC	A	N/A	

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CREVAS	B	AHU INLET ISOLATION DAMPER		1-601-Y-0013C	I	DC	C	N/A	
CREVAS	B	AHU INLET ISOLATION DAMPER		1-601-Y-0015C	I	DC	C	N/A	
CREVAS	B	AHU INLET ISOLATION DAMPER		1-601-Y-0014B	II	DC	B	N/A	
CREVAS	B	AHU INLET ISOLATION DAMPER		1-601-Y-0016B	II	DC	B	N/A	
CREVAS	B	AHU INLET ISOLATION DAMPER		1-601-Y-0014D	II	DC	D	N/A	
CREVAS	B	AHU INLET ISOLATION DAMPER		1-601-Y-0016D	II	DC	D	N/A	
FHEVAS	A	SUPPLY AHU AIR INTAKE ISOLATION DAMPER		1-604-Y-0001A	I	DC	A	N/A	
FHEVAS	A	NORMAL EXHAUST ACU OUTLET ISOLATION DAMPER		1-604-Y-0003A	I	DC	A	N/A	
FHEVAS	A	NORMAL EXHAUST AIR CONTORL DAMPER		1-604-Y-0009A	I	DC	A	N/A	
FHEVAS	A	FUEL HANDLING AREA EMERGENCY EXHAUST ACU FAN		1-604-M-AH02A	I	AC	A	N/A	
FHEVAS	B	SUPPLY AHU AIR INTAKE ISOLATION DAMPER		1-604-Y-0002B	II	DC	B	N/A	
FHEVAS	B	NORMAL EXHAUST ACU OUTLET ISOLATION DAMPER		1-604-Y-0004B	II	DC	B	N/A	
FHEVAS	B	NORMAL EXHAUST AIR CONTORL DAMPER		1-604-Y-0010B	II	DC	B	N/A	
FHEVAS	B	FUEL HANDLING AREA EMERGENCY EXHAUST ACU FAN		1-604-M-AH02B	II	AC	B	N/A	
CPIAS	A	HIGH VOLUME PURGE CONTAINMENT ISOLATION VALVE		1-612-V-0012	I	AC	A	INSIDE	AMI TYPE B
CPIAS	A	HIGH VOLUME PURGE CONTAINMENT ISOLATION VALVE		1-612-V-0013	I	AC	A	INSIDE	AMI TYPE B
CPIAS	A	HIGH VOLUME PURGE CONTAINMENT ISOLATION VALVE		1-612-V-0032	I	DC	A	INSIDE	AMI TYPE B
CPIAS	A	HIGH VOLUME PURGE CONTAINMENT ISOLATION VALVE		1-612-V-0033	I	DC	A	INSIDE	AMI TYPE B
CPIAS	B	HIGH VOLUME PURGE CONTAINMENT ISOLATION VALVE		1-612-V-0011	II	DC	B	OUTSIDE	AMI TYPE B

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.:	**295-8263**
SRP Section:	**16 – Technical Specifications**
Application Section:	**16.3.3**
Date of RAI Issue:	**11/05/2015**

Question No. 16-122

The “Surveillance Requirements” section of the Bases for generic TS Section 3.3 needs the following suggested clarifications to be useable. The applicant is requested to consider incorporating the suggested changes, as indicated; please explain and correct any errors in the suggested changes:

1. In the “Surveillance Requirements” section of the Bases for generic TS 3.3.1, 3.3.4, 3.3.4 and 3.3.6, revise first paragraph so the meaning is clear:

(TS 3.3.1 SR Bases) The OPERABILITY of **the** interface and test processor (ITP) is not ~~limited per~~ **required by** LCO 3.3.1 because **the RPS does not need the** ITP ~~does not~~ **to** perform the safety function of RPS. However, **the** ITP shall **be** maintain**ed** ~~the functional integrity to~~ ~~perform~~ **capable of supporting performance of the** CHANNEL FUNCTIONAL TEST of SRs 3.3.1.7, 3.3.1.10, and 3.3.1.12.

(TS 3.3.4 SR Bases) The OPERABILITY of the ~~ITP~~ **interface and test processor (ITP)** is not ~~limited per~~ **required by** LCO 3.3.4 because **the RPS does not need the** ITP ~~does not~~ **to** perform the safety function of RPS. However, the ITP shall **be** maintain**ed** ~~the functional integrity to~~ ~~perform~~ **capable of supporting performance of the** CHANNEL FUNCTIONAL TEST of SR**s** 3.3.4.1 and 3.3.4.2.

(TS 3.3.5 SR Bases) Since the ~~ITP~~ **interface and test processor (ITP) is not needed to** ~~does not~~ perform **any ESFAS** safety ~~related~~ function ~~for ESFAS~~, **the** OPERABILITY **of the ITP is not required by** ~~per~~ LCO 3.3.5 ~~is not required~~. However, the ITP shall **be** maintain**ed**

~~the functional integrity for~~ **capable of supporting performance of**
the CHANNEL FUNCTIONAL TEST ~~in~~ **of** SRs 3.3.5.2, 3.3.5.3, and 3.3.5.5.

(TS 3.3.6 SR bases) Since the ~~ITP~~ **interface and test processor (ITP) is not needed to** ~~does not~~ perform ~~the~~ **any ESFAS** safety ~~related~~ function~~s of~~ ~~ESFAS~~, the OPERABILITY **of the ITP** is not **required** ~~limited~~ by LCO 3.3.6. **However, the** ~~But,~~ ITP ~~must~~ **shall be** maintain**ed** ~~the functional integrity for operation~~ **capable of supporting performance** of **the** CHANNEL FUNCTIONAL TEST **of SR 3.3.6.1**.

In the above paragraphs, which do not exist in the STS, recommend changing the word “shall” to “must” in the second sentence, since using “shall” is not customary in the Bases.

2. Under the heading “SR 3.3.5.2” in the “Surveillance Requirements” section of the Bases for generic TS 3.3.5, are five paragraphs taken from STS Bases for SR 3.3.5.2, with design- difference related changes. The resulting paragraphs need clarification, such as the suggested changes indicated in the following markup (existing text as proposed is colored black; proposed text identical to STS text is colored green; added text is blue; and proposed text being removed is lined out and colored ~~red~~):

(1st paragraph) A CHANNEL FUNCTIONAL TEST on each channel is performed ~~every 31 days~~ to ensure the entire channel will perform its intended function when needed. The OPERABILITY of each ESFAS instrumentation channel is verified on a 31 day interval with applicable extensions. This Frequency is based on operating experience which shows that ESFAS instrument channels usually pass the CHANNEL FUNCTIONAL TEST when performed on a 31 day Frequency. ~~This test is part of an overlapping test sequence similar to that employed in the RPS.~~

(2nd paragraph) This test is part of an overlapping test sequence similar to that employed in the RPS. This sequence consists of SR~~s~~ 3.3.5.2, SR 3.3.6.1, and SR 3.3.6.2 and tests the entire ESFAS from sensor input to the bistable logic processor ~~input to actuational~~ through the automatic ESF actuation logic (actuational) output of each subgroup. These overlapping tests are described in ~~DCD~~ ~~Tier 2~~ FSAR Section 7.3 (Reference 1).

(3rd paragraph) SR~~s~~ 3.3.5.2 and SR 3.3.6.1 are performed together and in conjunction with ESFAS testing. SR 3.3.6.2 verifies that each subgroup can actuate ESF~~AS~~ equipment when actuational output of each subgroup is generated.

(4th paragraph) These tests verify that the ESFAS is capable of performing its intended function, from sensor input to the bistable logic processor ~~input~~ through the actuational output of each subgroup to the actuated ESF components. SR~~s~~ 3.3.6.1 and SR 3.3.6.2 are described in LCO 3.3.6. SR 3.3.5.2 includes bistable logic processor testing.

(5th paragraph) To assure that the actual trip ~~occurrence by~~ setting in the bistable logic processor is ~~within~~ conservative with respect to the Allowable Value ~~of setpoint~~, a test signal is superimposed on the input in one channel at a time to verify that the bistable *processor* trips within the specified *as-found setting* tolerance around the ~~setpoint~~ *previous as-left setting*[HC1] ~~infected in only one channel at a time~~. This is performed ~~in bypassed status of~~ with the corresponding RPS trip channel placed in trip channel bypass. Setpoint adjustment must be performed ~~consistent with the plant specific setpoint analysis~~ as specified in the Setpoint Control Program.

3. Under the heading "SR 3.3.6.1" in the "Surveillance Requirements" section of the Bases for generic TS 3.3.6, are three paragraphs taken from STS Bases for SR 3.3.6.1, with design- difference related changes. The resulting paragraphs need clarification, such as the suggested changes indicated in the following markup (existing text as proposed is colored black; proposed text identical to STS text is colored green; added text is blue; and proposed text being removed is lined out and colored ~~red~~):

(1st paragraph) A CHANNEL FUNCTIONAL TEST is performed ~~every 31 days~~ to ensure the entire channel will perform its intended function when needed. ~~The operability OPERABILITY of the each channel or automatic actuation logic channel~~ each ESFAS Logic channel, ESFAS Manual Trip channel, and Diverse Manual ESF Actuation channel is verified by the operator every 31 days at least to meet ~~the surveillance requirement~~ on a 31 day interval with applicable extensions. This Frequency is based on operating experience which shows that automatic ESF actuation logic channels, ESF manual trip channels, and diverse manual ESF actuation channels usually pass the CHANNEL FUNCTIONAL TEST when performed on a 31 day Frequency.

(2nd paragraph) The CHANNEL FUNCTIONAL TEST is part of an overlapping test sequence similar to that employed in the RPS. This sequence, consisting of SR~~s~~ 3.3.5.2, SR 3.3.6.1, and SR 3.3.6.2 tests the entire ESFAS from sensor input to the bistable logic processor ~~input~~ through the automatic ESF actuation logic (actuational) output of each ~~the actuation of the individual~~ subgroup. These overlapping tests are described in Reference

1. SR~~s~~ 3.3.5.2 and SR 3.3.6.1 are normally performed together and in conjunction with ESFAS testing. When the actuational output signal ~~of each~~ for a subgroup is generated, SR 3.3.6.2 verifies that the ~~actuation~~ ~~ability of~~ ESF components associated ~~actuation signal of the~~ ~~associated~~ with ~~each~~ the subgroup are capable of being actuated by the ESF-CCS.

(3rd paragraph) These tests verify that the ESFAS is capable of performing its intended function, from sensor input to the bistable logic processor ~~input~~ through the actuated components. SR 3.3.5.2 is addressed in LCO 3.3.5. SR 3.3.6.1 includes LCL testing, initiation logic (trip path) testing, and actuation logic testing.

(4th paragraph) <u>Local Coincidence Logic Testing</u>

LCL testing ~~is tested to verify~~ verifies the ~~operability~~ OPERABILITY of the two-out-of-four coincidence logic and trip channel bypass logic.

(5th paragraph) <u>Initiation Logic (Trip Path) Testing</u>

Testing of initiation logic, ~~Initiation logic testing is for~~ ~~Initiation Logic~~ which consists of logical "OR" (selective 2-out-of-4 logic), ~~and~~ is performed after the completion of LCL testing. This testing ~~implements the~~ exercises only one ~~Initiation~~ initiation logic ~~of one~~ channel at a time, which affects only one trip path.

(6th paragraph) <u>Actuation Logic Testing</u>

Actuation logic testing ~~is tested to verify~~ verifies the ~~operability~~ OPERABILITY of the two-out-of-four actuation logic after the completion of initiation logic (trip path) testing. *This test is performed only for one channel and one actuation logic by periodic automatic test.*

a. The applicant is requested to explain and clarify the last sentence of the 6th paragraph.

b. The applicant is requested to explain why the LCL, initiation logic, and actuation logic tests are described in the above Bases discussions as being performed sequentially, without any discussion of overlap.

c. Overall, the Bases descriptions of the ESFAS Actuation Logic are unclear, in large measure to there being no definitive statement of the correspondence to the various parts of an ESFAS Function instrumentation loop, and the various ESFAS instrument and logic functions, and what defines a channel (or division) in an ESFAS instrument

function, and in each type of ESFAS logic function. The applicant is requested to review the following correspondence list and correct errors; also provide a concise description of the correspondences between the items in the list.

Sensor and APC- S.. LCO 3.3.5

Bistable Logic Processor in the PPS .... LCO 3.3.5

ESF-CCS Group Controller and local coincidence logic (LCL).......................... LCO 3.3.6

ESF-CCS Local Controller (LC) and initiation logic (selective 2/4) (trip path).... LCO 3.3.6

ESF-CCS Component control logic and actuation logic, subgroups .... LCO 3.3.6

Component Interface Module (CIM) .... LCO on ssociated component

d. The applicant is requested to list all component groups, subgroups, which ESF-CCS ESFAS Actuation Logic Division is associated with the components in each subgroup, and which subgroups cannot be tested during power operation of the unit, and "must be tested in accordance with the Note to [SR 3.3.6.2]."

e. The applicant is requested to clarify the meaning of the Bases for the Frequency of SR 3.3.6.2, which says

> The 31-day Frequency on a staggered test basis complies with the operating experience and ensures the problems of individual logic signal can be detected within this time frame.

f. Because Table 3.3.6-1 does not list applicable SRs for each ESFAS Logic Function, ESFAS Manual Trip Function, and diverse Manual ESF actuation function, and no Note is provided in the SRs about the applicability of each SR to each Function, it is ambiguous whether SR 3.3.6.1 and SR 3.3.6.2 apply to Function 7. The applicant is requested to clarify this by making appropriate changes to generic TS 3.3.6.

[HC1]This text is from STS Rev 4 page B 3.3.5B-26

Response

1. The first paragraph in the "Surveillance Requirements" section of the Bases for generic TS 3.3.1, 3.3.4, 3.3.4 and 3.3.6 will be revised as follows:

(TS 3.3.1 SR Bases) The OPERABILITY of the interface and test processor (ITP) is not required by LCO 3.3.1 because the RPS does not need the ITP to perform the safety function of RPS. However, the ITP must be maintained capable of supporting performance of the CHANNEL FUNCTIONAL TEST of SRs 3.3.1.7, 3.3.1.10, and 3.3.1.12.

(TS 3.3.4 SR Bases) The OPERABILITY of the interface and test processor (ITP) is not required by LCO 3.3.4 because the RPS does not need the ITP to perform the safety function of RPS. However, the ITP must be maintained capable of supporting performance of the CHANNEL FUNCTIONAL TEST of SRs 3.3.4.1 and 3.3.4.2.

(TS 3.3.5 SR Bases) Since the interface and test processor (ITP) is not needed to perform any ESFAS safety function, the OPERABILITY of the ITP is not required by LCO 3.3.5. However, the ITP must be maintained capable of supporting performance of the CHANNEL FUNCTIONAL TEST of SRs 3.3.5.2, 3.3.5.3, and 3.3.5.5.

(TS 3.3.6 SR bases) Since the interface and test processor (ITP) is not needed to perform any ESFAS safety function, the OPERABILITY of the ITP is not required by LCO 3.3.6. However, the ITP must be maintained capable of supporting performance of the CHANNEL FUNCTIONAL TEST of SR 3.3.6.1.

2. The five paragraphs under the heading “SR 3.3.5.2” in the “Surveillance Requirements” section of the Bases for generic TS 3.3.5 will be revised as follows:

(1st paragraph) A CHANNEL FUNCTIONAL TEST on each channel is performed to ensure the entire channel will perform its intended function when needed. The OPERABILITY of each ESFAS instrumentation channel is verified on a 31 day interval with applicable extensions. This Frequency is based on operating experience which shows that ESFAS instrument channels usually pass the CHANNEL FUNCTIONAL TEST when performed on a 31 day Frequency.

(2nd paragraph) This test is part of an overlapping test sequence similar to that employed in the RPS. This sequence consists of SR 3.3.5.2, SR 3.3.6.1, and SR 3.3.6.2 and tests the entire ESFAS from sensor input to the bistable logic processor through the automatic ESF actuation logic (actuational) output of each subgroup. These overlapping tests are described in FSAR Section 7.3 (Reference 1).

(3rd paragraph) SR 3.3.5.2 and SR 3.3.6.1 are performed together and in conjunction with ESFAS testing. SR 3.3.6.2 verifies that each

subgroup can actuate ESF equipment when actuational output of each subgroup is generated.

(4th paragraph) These tests verify that the ESFAS is capable of performing its intended function, from sensor input to the bistable logic processor through the actuational output of each subgroup to the actuated ESF components. SR 3.3.6.1 and SR 3.3.6.2 are described in LCO 3.3.6. SR 3.3.5.2 includes bistable logic processor testing.

(5th paragraph) To assure that the actual trip setting in the bistable logic processor is conservative with respect to the Allowable Value, a test signal is superimposed on the input in one channel at a time to verify that the bistable *processor* trips within the specified *as-found setting* tolerance around the *previous as-left setting*. This is performed with the corresponding RPS trip channel placed in trip channel bypass. Setpoint adjustment must be performed as specified in the Setpoint Control Program.

3. a Including clarifying the last sentence in the 6th paragraph on Actuation logic testing, the six paragraphs under the heading “SR 3.3.6.21” in the “Surveillance Requirements” section of the Bases for generic TS 3.3.6 will be revised as follows:

(1st paragraph) A CHANNEL FUNCTIONAL TEST is performed to ensure the entire channel will perform its intended function when needed. Each ESFAS Logic channel, ESFAS Manual Trip channel, and Diverse Manual ESF Actuation channel is verified by the operator every 31 days at least to meet on a 31 day interval with applicable extensions. This Frequency is based on operating experience which shows that automatic ESF actuation logic channels, ESF manual trip channels, and diverse manual ESF actuation channels usually pass the CHANNEL FUNCTIONAL TEST when performed on a 31 day Frequency.

(2nd paragraph) The CHANNEL FUNCTIONAL TEST is part of an overlapping test sequence similar to that employed in the RPS. This sequence, consisting of SR 3.3.5.2, SR 3.3.6.1, and SR 3.3.6.2 tests the entire ESFAS from sensor input to the bistable logic processor through the automatic ESF actuation logic (actuational) output of each subgroup. These overlapping tests are described in Reference 1. SR 3.3.5.2 and SR 3.3.6.1 are normally performed together and in conjunction with ESFAS testing. When the actuational output signal for a subgroup is generated, SR 3.3.6.2 verifies that the ESF components associated with the subgroup are capable of being actuated by the ESF-CCS.

(3rd paragraph) These tests verify that the ESFAS is capable of performing its intended function, from sensor input to the bistable logic processor through the actuated components. SR 3.3.5.2 is addressed in LCO 3.3.5. SR 3.3.6.1 includes LCL testing, initiation logic (trip path) testing, and actuation logic testing.

(4th paragraph) Local Coincidence Logic Testing

LCL testing verifies the OPERABILITY of the two-out-of-four coincidence logic and trip channel bypass logic.

(5th paragraph) Initiation Logic (Trip Path) Testing

Testing of initiation logic, which consists of logical “OR” (selective 2-out-of-4 logic), is performed after the completion of LCL testing. This testing exercises only one initiation logic channel at a time, which affects only one trip path.

(6th paragraph) Actuation Logic Testing

Actuation logic testing verifies the OPERABILITY of the two-out-of-four actuation logic after the completion of initiation logic (trip path) testing. This test is performed only for one channel and one actuation logic at a time by periodic automatic test.

3. b The following sentences stated in SR 3.3.6.1 indicate that the CHANNEL FUNTIONAL TEST is performed using overlapping tests.

“The CHANNEL FUNCTIONAL TEST is part of an overlapping test sequence similar to that employed in the RPS. This sequence, consisting of SRs 3.3.5.2, 3.3.6.1, and 3.3.6.2 tests the entire ESFAS from the bistable input through the actuation of the individual subgroup. These overlapping tests are described in Reference 1.”

3. c LCO 3.3.5 covers the sensor, the APC-S, and the Bistable logic processor in the PPS. LCO 3.3.6 covers the PPS local coincidence logic (LCL), the PPS initiation logic (“OR” logic), the ESF-CCS Group Controller (GC), the ESF-CCS Loop Controller (LC), and the Component Interface Module (CIM). The initiation logic following the LCL in the PPS is not a selective 2/4 logic, but a logical “OR” and its output signal is transmitted to the ESF-CCS GC.

3. d A list of all components in the ESF-CCS ESFAS Actuation Logic Division Functions for the groups and subgroups is attached.

3. e The subgroup of Actuation Logic channels A and C are tested during the interval of the 31-day Frequency and then the remaining channels B and D are tested during the next interval of 31-day Frequency. Therefore, all channels are tested during the 62-day Frequency interval.

3. f The CHANNEL FUNCTIONAL TEST for the Function 7 “Diverse Manual ESF Actuation Signal” is separately performed by the SR 3.3.6.3.

Impact on DCD

Same as changes described in the impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

The Bases for TS 3.3.1, 3.3.4, 3.3.5, and 3.3.6 will be revised as indicated in Attachment 1.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical or Environmental Report.

BASES

ACTIONS (continued)

E.1

Condition E is entered when the Required Action and associated Completion Time of Condition A, B, C or D are not met.

If the Required Actions associated with these Conditions cannot be completed within the required Completion Times, the reactor must be brought to a MODE where the Required Actions do not apply. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The SRs for any particular RPS Function are found in the SR column of Table 3.3.1-1, for that Function. Most Functions are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, CHANNEL CALIBRATION, and response time testing.

~~The OPERABILITY of interface and test processor (ITP) is not limited per LCO 3.3.1 because ITP does not perform the safety function of RPS. However, ITP shall maintain the functional integrity to perform CHANNEL FUNCTIONAL TEST of SRs 3.3.1.7, 3.3.1.10, and 3.3.1.12.~~

The OPERABILITY of the interface and test processor (ITP) is not required by LCO 3.3.1 because the RPS does not need the ITP to perform the safety function of RPS. However, the ITP must be maintained capable of supporting performance of the CHANNEL FUNCTIONAL TEST of SRs 3.3.1.7, 3.3.1.10, and 3.3.1.12.

SR 3.3.1.1

Performance of the CHANNEL CHECK once every 12 hours ensures that gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels. CHANNEL CHECK will detect gross channel failure; thus, it is a key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the match criteria, it could be an indication that the transmitter or the signal processing equipment has drifted outside its limits.

BASES

ACTIONS (continued)

Of greater concern is the failure of the initiation circuit in a non-trip condition. With only one RPS logic channel failed in a non-trip condition, there is still the redundant set of RTSGs in the trip leg.

With both failed in a non-trip condition, the reactor will not trip automatically when required. In either case, the affected RTSGs must be opened immediately by using the appropriate manual trip push switches, since each of the four push buttons opens one RTSG. Caution is required since reactor will be shut down by pushing unrelated switches.

If the affected RTSG cannot be opened, Required Action D is entered. This would only occur if there is a failure in the manual trip circuitry or the RTSGs.

D.1 and D.2

Condition D is entered if Required Actions associated with Condition A or C are not met within the required Completion Time or if for one or more functions, more than one logic (coincidence logic, initiation logic), manual trip channel, or RTSG channel is inoperable for reasons other than Condition C.

If the RTSGs associated with the inoperable channel cannot be opened, the reactor must be shut down within 6 hours and all the RTSGs opened. A Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required plant conditions from full power conditions in an orderly manner and without challenging plant systems and for opening RTSGs. All RTSGs should then be opened, placing the plant in a MODE where the LCO does not apply and ensuring no CEA withdrawal occurs.

SURVEILLANCE REQUIREMENTS

The OPERABILITY of the interface and test processor (ITP) is not required by LCO 3.3.4 because the RPS does not need the ITP to perform the safety function of RPS. However, the ITP must be maintained capable of supporting performance of the CHANNEL FUNCTIONAL TEST of SRs 3.3.4.1 and 3.3.4.2.

~~The OPERABILITY of the ITP is not limited per LCO 3.3.4 because ITP does not perform the safety function of RPS. However, the ITP shall maintain the functional integrity to perform CHANNEL FUNCTIONAL TEST of SR 3.3.4.1 and 3.3.4.2.~~

SR 3.3.4.1

A CHANNEL FUNCTIONAL TEST on each channel is performed every 31 days to ensure the entire channel will perform its intended function when needed.

BASES

SURVEILLANCE REQUIREMENTS

~~Since the ITP does not perform safety related function for ESFAS, OPERABILITY per LCO 3.3.5 is not required. However, the ITP shall maintain the functional integrity for the CHANNEL FUNCTIONAL TEST in SRs 3.3.5.2, 3.3.5.3, and 3.3.5.5.~~

Since the interface and test processor (ITP) is not needed to perform any ESFAS safety function, the OPERABILITY of the ITP is not required by LCO 3.3.5. However, the ITP must be maintained capable of supporting performance of the CHANNEL FUNCTIONAL TEST of SRs 3.3.5.2, 3.3.5.3, and 3.3.5.5.

SR 3.3.5.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels. CHANNEL CHECK will detect gross channel failure; thus, it is a key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the match criteria, it could be an indication that the sensor or the signal processing equipment has drifted outside its limit. If the channels are within the match criteria, it is an indication that the channels are OPERABLE.

The CHECK FREQUENCY, twice a day, is based on operating experience that demonstrates channel failure is rare. Since the probability of two random failures in redundant channels in any 12-hour period is low, the CHANNEL CHECK minimizes the chance of loss of protection function due to failure of redundant channels.

The CHANNEL CHECK supplements checks of channel OPERABILITY during normal operational use of displays associated with the LCO required channels.

SR 3.3.5.2

~~A CHANNEL FUNCTIONAL TEST on each channel is performed every 31 days to ensure the entire channel will perform its intended function when needed. This test is part of an overlapping test sequence similar to that employed in the RPS.~~

A CHANNEL FUNCTIONAL TEST on each channel is performed to ensure the entire channel will perform its intended function when needed. The OPERABILITY of each ESFAS instrumentation channel is verified on a 31 day interval with applicable extensions. This Frequency is based on operating experience which shows that ESFAS instrument channels usually pass the CHANNEL FUNCTIONAL TEST when performed on a 31 day Frequency.

Replace with the markup on the next page

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~This sequence consists of SRs 3.3.5.2, 3.3.6.1, and 3.3.6.2 and tests the entire ESFAS from bistable input to actuational output. These overlapping tests are described in DCD Tier 2 Section 7.3 (Reference 1).~~

~~SRs 3.3.5.2 and 3.3.6.1 are performed together and in conjunction with ESFAS testing. SR 3.3.6.2 verifies that each subgroup can actuate ESFAS equipment when actuational output of each subgroup is generated.~~

~~These tests verify that the ESFAS is capable of performing its intended function, from bistable through the actuated components. SRs 3.3.6.1 and 3.3.6.2 are described in LCO 3.3.6. SR 3.3.5.2 includes bistable logic testing.~~

~~To assure the trip occurrence by bistable logic within Allowable Value of setpoint, test signal is infected in only one channel at a time. This is performed in bypassed status of corresponding RPS trip channel. Setpoint adjustment must be performed consistent with the plant specific setpoint analysis.~~

<u>SR 3.3.5.3</u>

CHANNEL CALIBRATION is a complete check of the instrument channel including the detector and the operating bypass removal Functions.

The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations to ensure that the channel remains operational between successive Surveillances. CHANNEL CALIBRATION must be performed consistent with the plant specific setpoint analysis.

The 18-month Frequency is based upon the possibility for the necessity of surveillance activity and upon the unexpected transients in case when the check is performed at plant operation.

<u>SR 3.3.5.4</u>

This Surveillance ensures that the actuation response times are within the maximum values assumed in the safety analyses.

Response time testing acceptance criteria are included in DCD Tier 2 Section 7.3 (Reference 1).

This test is part of an overlapping test sequence similar to that employed in the RPS. This sequence consists of SR 3.3.5.2, SR 3.3.6.1, and SR 3.3.6.2 and tests the entire ESFAS from sensor input to the bistable logic processor through the automatic ESF actuation logic (actuational) output of each subgroup. These overlapping tests are described in FSAR Section 7.3 (Reference 1).

SR 3.3.5.2 and SR 3.3.6.1 are performed together and in conjunction with ESFAS testing. SR 3.3.6.2 verifies that each subgroup can actuate ESF equipment when actuational output of each subgroup is generated.

These tests verify that the ESFAS is capable of performing its intended function, from sensor input to the bistable logic processor through the actuational output of each subgroup to the actuated ESF components. SR 3.3.6.1 and SR 3.3.6.2 are described in LCO 3.3.6. SR 3.3.5.2 includes bistable logic processor testing.

To assure that the actual trip setting in the bistable logic processor is conservative with respect to the Allowable Value, a test signal is superimposed on the input in one channel at a time to verify that the bistable *processor* trips within the specified *as-found setting* tolerance around the *previous as-left setting*. This is performed with the corresponding RPS trip channel placed in trip channel bypass. Setpoint adjustment must be performed as specified in the Setpoint Control Program.

BASES

SURVEILLANCE REQUIREMENTS

~~Since the ITP does not perform the safety related functions of ESFAS, the OPERABILITY is not limited by LCO 3.3.6. But, ITP must maintain the functional integrity for operation of CHANNEL FUNCTIONAL TEST.~~

Since the interface and test processor (ITP) is not needed to perform any ESFAS safety function, the OPERABILITY of the ITP is not required by LCO 3.3.6. However, the ITP must be maintained capable of supporting performance of the CHANNEL FUNCTIONAL TEST of SR 3.3.6.1.

SR 3.3.6.1

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A CHANNEL FUNCTIONAL TEST is performed every 31 days to ensure the entire channel will perform its intended function when needed. The operability of the each channel or automatic actuation logic channel is verified by the operator every 31 days at least to meet the surveillance requirement.

The CHANNEL FUNCTIONAL TEST is part of an overlapping test sequence similar to that employed in the RPS. This sequence, consisting of SRs 3.3.5.2, 3.3.6.1, and 3.3.6.2 tests the entire ESFAS from the bistable input through the actuation of the individual subgroup. These overlapping tests are described in Reference 1. SRs 3.3.5.2 and 3.3.6.1 are normally performed together and in conjunction with ESFAS testing. When actuation signal of each subgroup is generated, SR 3.3.6.2 verifies the actuation ability of ESF component associated actuation signal of the associated each subgroup.

These tests verify that the ESFAS is capable of performing its intended function, from bistable input through the actuated components. SR 3.3.5.2 is addressed in LCO 3.3.5. SR 3.3.6.1 includes LCL testing, initiation logic (trip path) testing, and actuation logic testing.

Local Coincidence Logic Testing

LCL testing is tested to verify the operability of two-out-of-four logic and trip channel bypass logic.

Initiation Logic (Trip Path) Testing

Initiation logic testing is for Initiation Logic which consists of logical “OR”, and performed after the completion of LCL testing. This testing implements the only one Initiation logic of one channel at a time.

Actuation Logic Testing

Actuation logic testing is tested to verify the operability of two-out-of-four actuation logic after the completion of initiation logic (trip path) testing. This test is performed only for one channel and one actuation logic by periodic automatic test.

SR 3.3.6.1

A CHANNEL FUNCTIONAL TEST is performed to ensure the entire channel will perform its intended function when needed. Each ESFAS Logic channel, ESFAS Manual Trip channel, and Diverse Manual ESF Actuation channel is verified by the operator every 31 days at least to meet on a 31 day interval with applicable extensions. This Frequency is based on operating experience which shows that automatic ESF actuation logic channels, ESF manual trip channels, and diverse manual ESF actuation channels usually pass the CHANNEL FUNCTIONAL TEST when performed on a 31 day Frequency.

The CHANNEL FUNCTIONAL TEST is part of an overlapping test sequence similar to that employed in the RPS. This sequence, consisting of SR 3.3.5.2, SR 3.3.6.1, and SR 3.3.6.2 tests the entire ESFAS from sensor input to the bistable logic processor through the automatic ESF actuation logic (actuational) output of each subgroup. These overlapping tests are described in Reference 1. SR 3.3.5.2 and SR 3.3.6.1 are normally performed together and in conjunction with ESFAS testing. When the actuational output signal for a subgroup is generated, SR 3.3.6.2 verifies that the ESF components associated with the subgroup are capable of being actuated by the ESF-CCS.

These tests verify that the ESFAS is capable of performing its intended function, from sensor input to the bistable logic processor through the actuated components. SR 3.3.5.2 is addressed in LCO 3.3.5. SR 3.3.6.1 includes LCL testing, initiation logic (trip path) testing, and actuation logic testing.

Local Coincidence Logic Testing

LCL testing verifies the OPERABILITY of the two-out-of-four coincidence logic and trip channel bypass logic.

Initiation Logic (Trip Path) Testing

Testing of initiation logic, which consists of logical “OR” (selective 2-out-of-4 logic), is performed after the completion of LCL testing. This testing exercises only one initiation logic channel at a time, which affects only one trip path.

Actuation Logic Testing

Actuation logic testing verifies the OPERABILITY of the two-out-of-four actuation logic after the completion of initiation logic (trip path) testing. This test is performed only for one channel and one actuation logic at a time periodic automatic test.

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
SIAS	A	CH-516	1-451-V-0516	Letdown Isolation Valve	3	PA03A-SIAS-V1
SIAS	A		1-461-V-0143	CCW Isolation Valve	3	PA03A-SIAS-V14
SIAS	A		1-606-Y-0017A	Aux. BLDG Controlled Area Supply AHU Outlet Isoation Damper		PA03A-SIAS-V5
SIAS	A		1-606-Y-0018A	Aux. BLDG Controlled Area Supply AHU Outlet Isoation Damper		PA03A-SIAS-V5
SIAS	A		1-606-M-AH01A	Aux. BLDG Controlled Area Emergency Exhaust ACU Fan		PA03A-SIAS-V4
SIAS	A		1-606-Y-0021A	Aux. BLDG Controlled Area Normal Exhaust ACU Inlet Isoation Damper		PA03A-SIAS-V2
SIAS	A		1-606-Y-0022A	Aux. BLDG Controlled Area Normal Exhaust ACU Inlet Isoation Damper		PA03A-SIAS-V2
SIAS	A		1-461-V-0937	Cross Connect Isolation Valve		PA03A-SIAS-V3
SIAS	A	SI-648	1-441-V-0648	Check Valve Leakage Line Isoation Valve		PA03A-SIAS-V3
SIAS	A	SI-641	1-441-V-0641	SIT Fill and Drain Line Isolation Valve		PA03A-SIAS-V3
SIAS	A			ESFAS CREVAS Train A		PA03A-SIAS-V7
SIAS	A		1-461-M-PP01A	CCW Pump		PA03A-SIAS-V8
SIAS	A		1-461-V-0351	Shutdown Cooling Heat Exchanger Isolation Valve		PA03A-SIAS-V10
SIAS	A	SI-646	1-441-V-0646	SIP 1 Isolation Valve		PA03A-SIAS-V11
SIAS	A		1-461-V-0021	CCW Train A Heat Exchanger Outlet Isolation Valve	3	PA03A-SIAS-V13
SIAS	A		1-461-V-0023	CCW Train A Heat Exchanger Outlet Isolation Valve	3	PA03A-SIAS-V13
SIAS	A		1-461-V-0025	CCW Train A Heat Exchanger Outlet Isolation Valve	3	PA03A-SIAS-V13
SIAS	A		1-461-V-0027	CCW Train A Heat Exchanger Outlet Isolation Valve	3	PA03A-SIAS-V13
SIAS	A		1-461-V-0149	CCW Train A Isolation Valve	3	PA03A-SIAS-V14
SIAS	A	SI-644	1-441-V-0644	SIT 1 (Dischage) Isolation Valve		PA03A-SIAS-V15
SIAS	A		1-461-V-0191	EDG HEAT EXCHANGER (HX) ISOLATION VALVE		PA03A-SIAS-V16
SIAS	A			EDG LOADING SEQUENCER	3	PA03A-SIAS-V6
SIAS	A		1-542-M-PP02A	AUXILIARY FEEDWATER PUMP	3	PA03A-SIAS-V6
SIAS	A	SIP-1	1-441-M-PP02A	SI Pump #1		PA03A-SIAS-P5
SIAS	A	SCP-1	1-441-M-PP01A	SC Pump #1		PA03A-SIAS-P6
SIAS	B	CH-515	1-451-V-0515	Letdown Isolation Valve	3	PA03B-SIAS-V1
SIAS	B		1-461-V-0144	CCW Train B Isolation Valve	3	PA03B-SIAS-V1
SIAS	B	SI-628	1-441-V-0628	Check Valve Leakage Line Isolation Valve		PA03B-SIAS-V2
SIAS	B	SI-621	1-441-V-0621	SIT Fill and Drain Line Isolation Valve		PA03B-SIAS-V2
SIAS	B		1-461-V-0150	CCW Train B Isolation Valve	3	PA03B-SIAS-V2
SIAS	B		1-461-V-0938	Cross Connect Isolation Valve		PA03B-SIAS-V3
SIAS	B			CREVAS TRAIN B		PA03B-SIAS-V7
SIAS	B		1-461-V-0192	EDG HEAT EXCHANGER (HX) ISOLATION VALVE		PA03B-SIAS-V4
SIAS	B		1-461-PP01B	CCW Pump		PA03B-SIAS-V8
SIAS	B		1-461-V-0352	Shutdown Cooling Heat Exchanger Isolation Valve		PA03B-SIAS-V10
SIAS	B		1-606-Y-0019B	Aux. BLDG Controlled Area Supply AHU Outlet Isoation Damper		PA03B-SIAS-V9
SIAS	B		1-606-Y-0020B	Aux. BLDG Controlled Area Supply AHU Outlet Isoation Damper		PA03B-SIAS-V9
SIAS	B		1-606-Y-0023B	Aux. BLDG Controlled Area Normal Exhaust ACU Inlet Isoation Damper		PA03B-SIAS-V11
SIAS	B		1-606-Y-0024B	Aux. BLDG Controlled Area Normal Exhaust ACU Inlet Isoation Damper		PA03B-SIAS-V11
SIAS	B		1-461-V-0022	CCW Train B Heat Exchanger Outlet Isolation Valve	3	PA03B-SIAS-V13

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
SIAS	B		1-461-V-0024	CCW Train B Heat Exchanger Outlet Isolation Valve	3	PA03B-SIAS-V13
SIAS	B		1-461-V-0026	CCW Train B Heat Exchanger Outlet Isolation Valve	3	PA03B-SIAS-V13
SIAS	B		1-461-V-0028	CCW Train B Heat Exchanger Bypass Line Isolation Valve	3	PA03B-SIAS-V13
SIAS	B		1-606-AH01B	Aux. BLDG Controlled Area Emergency Exhaust ACU Fan		PA03B-SIAS-V14
SIAS	B	SI-626	1-441-V-0626	SIP 2 Isolation Valve		PA03B-SIAS-V12
SIAS	B	SI-624	1-441-V-0624	SIT 2 (Discharge) Isolation Valve		PA03B-SIAS-V15
SIAS	B	SI-682	1-441-V-0682	SIT Fill Line Isolation Valve		PA03B-SIAS-V16
SIAS	B			EDG LOADING SEQUENCER	3	PA03B-SIAS-V6
SIAS	B		1-542-M-PP02B	AUXILIARY FEEDWATER PUMP	3	PA03B-SIAS-V6
SIAS	B	SIP-2	1-441-M-PP02B	SI Pump #2		PA03B-SIAS-P5
SIAS	B	SCP-2	1-441-M-PP01B	SC Pump #2		PA03B-SIAS-P6
SIAS	C		1-461-V-0145	CCW Train A Isolation Valve	3	PA03C-SIAS-V1
SIAS	C	SI-638	1-441-V-0638	Check Valve Leakage Line Isoation Valve		PA03C-SIAS-V2
SIAS	C	SI-631	1-441-V-0631	SIT Fill and Drain Line Isolation Valve		PA03C-SIAS-V2
SIAS	C		1-461-V-0939	Cross Connect Isolation Valve		PA03C-SIAS-V3
SIAS	C	SI-634	1-441-V-0634	SIT 3 Isolation(/Discharge) Valve		PA03C-SIAS-V14
SIAS	C	SI-322	1-441-V-0322	(Hot Leg) Check Valve Leakage Line Isoation Valve		PA03C-SIAS-V15
SIAS	C		1-461-PP02A	CCW Pump		PA03C-SIAS-V9
SIAS	C		1-461-V-0097	Spray Heat Exchanger Inlet Isolation Valve		PA03C-SIAS-V11
SIAS	C	SI-636	1-441-V-0636	SIP 3 Isolation Valve		PA03C-SIAS-V13
SIAS	C		1-461-V-0147	CCW Train A Isolation Valve	3	PA03C-SIAS-V12
SIAS	C		1-601-Y-0013A	Control Room Supply AHU Inlet Isolation Damper		PA03C-SIAS-V4
SIAS	C		1-601-M-AH02A	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		PA03C-SIAS-V4
SIAS	C		1-601-Y-0015A	Control Room Supply AHU Inlet Isolation Damper		PA03C-SIAS-V4
SIAS	C		1-601-Y-0011A	Outside Air Intake Isolation Damper		PA03C-SIAS-V4
SIAS	C		1-601-Y-0012A	Outside Air Intake Isolation Damper		PA03C-SIAS-V4
SIAS	C		1-601-M-AH02C	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		PA03C-SIAS-V4
SIAS	C		1-601-Y-0027	Kitchen and Toilet Exhaust Isolation Damper		PA03C-SIAS-V5
SIAS	C		1-601-Y-0013C	Control Room Supply AHU Inlet Isolation Damper		PA03C-SIAS-V5
SIAS	C		1-601-Y-0015C	Control Room Supply AHU Inlet Isolation Damper		PA03C-SIAS-V5
SIAS	C		1-601-Y-0029	Control Room Supply AHU Inlet Isolation Damper		PA03C-SIAS-V5
SIAS	C		1-601-Y-0014B	Smoke Removal Isolation Damper		PA03C-SIAS-V5
SIAS	C		1-601-Y-0016B	Control Room Supply AHU Inlet Isolation Damper		PA03C-SIAS-V5
SIAS	C		1-601-Y-0014D	Control Room Supply AHU Inlet Isolation Damper		PA03C-SIAS-V5
SIAS	C		1-601-Y-0016D	Control Room Supply AHU Inlet Isolation Damper		PA03C-SIAS-V5
SIAS	C		1-461-V-0031	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE	3	PA03C-SIAS-V6
SIAS	C		1-461-V-0033	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE	3	PA03C-SIAS-V6
SIAS	C		1-461-V-0035	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE	3	PA03C-SIAS-V6
SIAS	C		1-461-V-0037	CCW HEAT EXCHANGERS OUTLET BYPASS VALVE	3	PA03C-SIAS-V7

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
SIAS	C		1-606-M-AH01C	Aux. BLDG Controlled Area Emergency Exhaust ACU Fan		PA03C-SIAS-P1
SIAS	C			EDG LOADING SEQUENCER	3	PA03C-SIAS-V8
SIAS	C	SIP-3	1-441-M-PP02C	SI Pump #3		PA03C-SIAS-P5
SIAS	C		1-442-M-PP01A	CONTAINMENT SPRAY PUMP		PA03C-SIAS-P6
SIAS	C		1-461-V-0181	EDG HEAT EXCHANGER (HX) ISOLATION VALVE		PA03C-SIAS-P8
SIAS	D		1-461-V-0146	CCW TRAIN "B" NON-SAFETY HEADER INLET ISOLATION VALVE	3	PA03D-SIAS-V1
SIAS	D		1-461-V-0148	CCW TRAIN "B" NON-SAFETY HEADER INLET ISOLATION VALVE	3	PA03D-SIAS-V2
SIAS	D		1-461-V-0940	CROSS TIE RETURN HEADER ISOLATION VALVE		PA03D-SIAS-V3
SIAS	D	SI-618	1-441-V-0618	Check Valve Leakage Line Isoation Valve		PA03D-SIAS-V3
SIAS	D	SI-611	1-441-V-0611	SIT Fill and Drain Line Isolation Valve		PA03D-SIAS-V3
SIAS	D	SI-616	1-441-V-0616	SIP 3 Isolation Valve		PA03D-SIAS-V7
SIAS	D	SI-614	1-441-V-0614	SIT 4 Isolation Valve		PA03D-SIAS-V8
SIAS	D	SI-332	1-441-V-0332	Check Valve Leakage Line Isoation Valve		PA03D-SIAS-V9
SIAS	D		1-461-M-PP02B	CCW PUMP 2B		PA03D-SIAS-V9
SIAS	D		1-461-V-0098	CONTAINMENT SPRAY HX 01B INLET ISOLATION VALVE		PA03D-SIAS-V11
SIAS	D		1-601-M-AH02B	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		PA03D-SIAS-V4
SIAS	D		1-601-M-AH02D	CONTROL ROOM EMERGENCY MAKEUP ACU FAN		PA03D-SIAS-V4
SIAS	D		1-601-Y-0016B	Control Room Supply AHU Inlet Isolation Damper		PA03D-SIAS-V4
SIAS	D		1-601-Y-0014B	Control Room Supply AHU Inlet Isolation Damper		PA03D-SIAS-V4
SIAS	D		1-601-Y-0012B	OUTSIDE AIR INTAKE ISOLATION DAMPER		PA03D-SIAS-V4
SIAS	D		1-601-Y-0011B	OUTSIDE AIR INTAKE ISOLATION DAMPER		PA03D-SIAS-V4
SIAS	D		1-601-Y-0028	Kitchen and Toilet Exhaust Isolation Damper		PA03D-SIAS-V6
SIAS	D		1-601-Y-0013A	Control Room Supply AHU Inlet Isolation Damper		PA03D-SIAS-V6
SIAS	D		1-601-Y-0015A	Control Room Supply AHU Inlet Isolation Damper		PA03D-SIAS-V6
SIAS	D		1-601-Y-0030	SMOKE REMOVAL ISOLATION DAMPER		PA03D-SIAS-V6
SIAS	D		1-601-Y-0013C	Control Room Supply AHU Inlet Isolation Damper		PA03D-SIAS-V6
SIAS	D		1-601-Y-0015C	Control Room Supply AHU Inlet Isolation Damper		PA03D-SIAS-V6
SIAS	D		1-601-Y-0014D	Control Room Supply AHU Inlet Isolation Damper		PA03D-SIAS-V6
SIAS	D		1-601-Y-0016D	Control Room Supply AHU Inlet Isolation Damper		PA03D-SIAS-V6
SIAS	D		1-461-V-0032	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE	3	PA03D-SIAS-V12
SIAS	D		1-461-V-0034	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE	3	PA03D-SIAS-V12
SIAS	D		1-461-V-0036	CCW HEAT EXCHANGERS OUTLET JOGGING CONTROL VALVE	3	PA03D-SIAS-V12
SIAS	D		1-461-V-0038	CCW HEAT EXCHANGERS OUTLET BYPASS VALVE	3	PA03D-SIAS-V13
SIAS	D		1-606-M-AH01D	Aux. BLDG Controlled Area Emergency Exhaust ACU Fan		PA03D-SIAS-P1
SIAS	D			EDG LOADING SEQUENCER	3	PA03D-SIAS-V14

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
SIAS	D	SIP-4	1-441-M-PP02D	SI Pump #4		PA03D-SIAS-P5
SIAS	D		1-442-M-PP01B	CONTAINMENT SPRAY PUMP 2		PA03D-SIAS-P6
SIAS	D		1-461-V-0182	EDG HEAT EXCHANGER (HX) ISOLATION VALVE		PA03D-SIAS-P8
CIAS	A		1-491-V-0002	RCS HOTLEG LOOP1 SAMPLE CONTAINMENT ISOLATION VALVE		PA03A-CIAS-V1
CIAS	A		1-491-V-0003	PZR SURGE LINE SAMPLE CONTAINMENT ISOLATION VALVE		PA03A-CIAS-V1
CIAS	A		1-491-V-0005	PZR STEAM SPACE SAMPLE CONTAINMENT ISOLATION VALVE		PA03A-CIAS-V1
CIAS	A		1-791-V-0031	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		PA03A-CIAS-V1
CIAS	A		1-791-V-0033	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		PA03A-CIAS-V1
CIAS	A		1-447-V-0005	BORIC ACID MAKEUP PUMP ISOLATION VALVE		PA03A-CIAS-V1
CIAS	A		1-491-V-0042	CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03A-CIAS-V1
CIAS	A		1-461-V-0296	LETDOWN HX SUPPLY CONTAINMENT ISOLATION VALVE	3	PA03A-CIAS-P2
CIAS	A		1-461-V-0302	LETDOWN HX RETURN CONTAINMENT ISOLATION VALVE	3	PA03A-CIAS-P2
CIAS	A		1-491-V-0020	SI TANKS SAMPLE CONTAINMENT ISOLATION VALVE		PA03A-CIAS-V2
CIAS	A		1-491-V-0053	SAMPLE RETURN VALVE TO HOLDUP VOLUME TANK		PA03A-CIAS-V2
CIAS	A		1-791-V-0036	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		PA03A-CIAS-V2
CIAS	A		1-791-V-0257	S/G 1 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		PA03A-CIAS-V2
CIAS	A		1-761-V-0431	RE/RT-039A MONITORING SAMPLE INSIDE CONTAINMENT ISOLATION VALVE		PA03A-CIAS-V3
CIAS	A		1-471-V-0001	CVCS REACTOR DRAIN TANK GAS ISOLATION VALVE - INSIDE CONTAINMENT		PA03A-CIAS-V3
CIAS	A		1-594-V-0001	CONTAINMENT SERVICE AIR ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03A-CIAS-V3
CIAS	A		1-481-V-0006	CONTAINMENT SUMP DISCHARGE ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03A-CIAS-V3
CIAS	A		1-763-V-0001	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		PA03A-CIAS-V4
CIAS	A		1-763-V-0003	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03A-CIAS-V4
CIAS	A		1-763-V-0011	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		PA03A-CIAS-V4
CIAS	A		1-763-V-0013	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE-OUTSIDE CONTAINMENT		PA03A-CIAS-V4
CIAS	A		1-763-V-0009	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03A-CIAS-V4

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
CIAS	A		1-763-V-0023	H_2 MONITOR (TRAIN A) CONTAINMENT ISOLATION VALVE-INSIDE CONTAINMENT		PA03A-CIAS-V4
CIAS	A		1-612-V-0012	Containment High Volume Purge Supply System Containment Isolation Valve		PA03A-CIAS-V5
CIAS	A		1-612-V-0032	Containment Low Volume Purge Supply System Containment Isolation Valve		PA03A-CIAS-V5
CIAS	A		1-612-V-0013	Containment High Volume Purge Exhaust System Containment Isolation Valve		PA03A-CIAS-V5
CIAS	A		1-612-V-0033	Containment Low Volume Purge Exhaust System Containment Isolation Valve		PA03A-CIAS-V5
CIAS	A		1-455-V-0005	S/G -1 BLOWDOWN ISOLATION VALVE	3	PA03A-CIAS-V6
CIAS	A		1-455-V-0007	S/G -1 BLOWDOWN ISOLATION VALVE	3	PA03A-CIAS-V6
CIAS	A		1-691-V-0030	REACTOR CONTAINMENT BLDG FIRE PROTECTION DISCH VALVE		PA03A-CIAS-V7
CIAS	A		1-669-V-0004	HIGH PRESSURE N_2 SUPPLY CONTROL VALVE	3	PA03A-CIAS-V8
CIAS	A		1-632-V-0015	PCW Return from Containment Ventilation Units Containment Isolation Valve	3	PA03A-CIAS-V9
CIAS	A		1-632-V-0012	PCW Return from Containment Ventilation Units Containment Isolation Valve	3	PA03A-CIAS-P4
CIAS	A		1-632-V-0013	PCW Return from Containment Ventilation Units Containment Isolation Valve	3	PA03A-CIAS-P4
CIAS	A	CH-522	1-451-V-0522	Letdown Containment Isolation Shut Valve	3	PA03A-CIAS-V10
CIAS	A	**CH-560**	1-451-V-0560	REACTOR DRAIN TANK EFFLUENT CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		PA03A-CIAS-V11
CIAS	A	CH-580	1-451-V-0580	Resin Sluicing Supply Header to Reactor Drain Header Isolation Valve		PA03A-CIAS-V11
CIAS	A	CH-509	1-451-V-0509	IRWST MAKEUP LINE CONTAINMENT ISOLATION VALVE		PA03A-CIAS-V11
CIAS	B		1-491-V-0001	RCS HOTLEG LOOP1 SAMPLE CONTAINMENT ISOLATION VALVE		PA03B-CIAS-V1
CIAS	B		1-491-V-0004	PZR SURGE LINE SAMPLE CONTAINMENT ISOLATION VALVE		PA03B-CIAS-V1
CIAS	B		1-491-V-0006	PZR STEAM SPACE SAMPLE CONTAINMENT ISOLATION VALVE		PA03B-CIAS-V1
CIAS	B		1-491-V-0021	SI TANKS SAMPLE CONTAINMENT ISOLATION VALVE		PA03B-CIAS-V1
CIAS	B		1-791-V-0032	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		PA03B-CIAS-V1
CIAS	B		1-791-V-0034	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		PA03B-CIAS-V1
CIAS	B		1-447-V-0006	BORIC ACID MAKEUP PUMP ISOLATION VALVE		PA03B-CIAS-V1
CIAS	B		1-461-V-0297	LETDOWN HX SUPPLY CONTAINMENT ISOLATION VALVE	3	PA03B-CIAS-P4
CIAS	B		1-461-V-0301	LETDOWN HX RETURN CONTAINMENT ISOLATION VALVE	3	PA03B-CIAS-P4

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
CIAS	B		1-491-V-0041	CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		PA03B-CIAS-V2
CIAS	B		1-491-V-0043	CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03B-CIAS-V2
CIAS	B		1-791-V-0036	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		PA03B-CIAS-V2
CIAS	B		1-791-V-0258	S/G 2 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		PA03B-CIAS-V2
CIAS	B		1-761-V-0432	RE/RT-039A MONITORING SAMPLE OUTSIDE CONTAINMENT ISOLATION VALVE		PA03B-CIAS-V3
CIAS	B		1-761-V-0434	RE/RT-039A MONITORING SAMPLE OUTSIDE CONTAINMENT ISOLATION VALVE		PA03B-CIAS-V3
CIAS	B		1-471-V-0002	CVCS REACTOR DRAIN TANK GAS ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03B-CIAS-V3
CIAS	B		1-481-V-0005	CONTAINMENT SUMP DISCHARGE ISOLATION VALVE - INSIDE CONTAINMENT		PA03B-CIAS-V3
CIAS	B		1-535-V-0013	CONTAINMENT ISOLATION VALVE		PA03B-CIAS-V3
CIAS	B		1-763-V-0002	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT		PA03B-CIAS-V4
CIAS	B		1-763-V-0004	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03B-CIAS-V4
CIAS	B		1-763-V-0012	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE - INSIDE CONTAINMENT - IRWST		PA03B-CIAS-V4
CIAS	B		1-763-V-0014	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE-OUTSIDE CONTAINMENT		PA03B-CIAS-V4
CIAS	B		1-763-V-0010	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE - OUTSIDE CONTAINMENT		PA03B-CIAS-V4
CIAS	B		1-763-V-0024	H_2 MONITOR (TRAIN B) CONTAINMENT ISOLATION VALVE-INSIDE CONTAINMENT		PA03B-CIAS-V4
CIAS	B		1-612-V-0014	Containment High Volume Purge Exhaust System Containment Isolation Valve		PA03B-CIAS-V5
CIAS	B		1-612-V-0034	Containment Low Volume Purge Exhaust System Containment Isolation Valve		PA03B-CIAS-V5
CIAS	B		1-612-V-0011	Containment High Volume Purge Supply System Containment Isolation Valve		PA03B-CIAS-V5
CIAS	B		1-612-V-0031	Containment Low Volume Purge Supply System Containment Isolation Valve		PA03B-CIAS-V5
CIAS	B		1-455-V-0006	S/G -2 BLOWDOWN ISOLATION VALVE	3	PA03B-CIAS-V6
CIAS	B		1-455-V-0008	S/G -2 BLOWDOWN ISOLATION VALVE	3	PA03B-CIAS-V6
CIAS	B	CH-523	1-451-V-0523	Letdown Containment Isolation Shut Valve	3	PA03B-CIAS-V10
CIAS	B	CH-561	1-451-V-0561	Reactor Drain Tank Effluent Containment Isolation Valve		PA03B-CIAS-V11

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
CSAS	A		1-596-V-0020	CONTAINMENT INSTRUMENT AIR ISOLATION VALVE - OUTSIDE CONTAINMENT	3	PA03A-CSAS-V3
CSAS	A	SCP-1	1-441-M-PP01A	SC Pump #1		PA03A-CSAS-P3
CSAS	A	CH-506	1-451-V-0506	RCP CBO Containment Isolation Valve	3	PA03A-CSAS-V1
CSAS	A			EDG LOADING SEQUENCER	3	PA03A-CSAS-V5
CSAS	B	SCP-2	1-441-M-PP01B	SC Pump #2		PA03B-CSAS-P3
CSAS	B	CH-505	1-451-V-0505	RCP CBO Containment Isolation Valve	3	PA03B-CSAS-V1
CSAS	B			EDG LOADING SEQUENCER	3	PA03B-CSAS-V5
CSAS	C		1-442-M-PP01A	CONTAINMENT SPRAY PUMP 1		PA03C-CSAS-P1
CSAS	C		1-442-V-0003	PP01A - CONTAINMENT SPRAY HEADER ISOLATION VALVE		PA03C-CSAS-P1
CSAS	C		1-461-V-0097	CONTAINMENT SPRAY HX 01A INLET ISOLATION VALVE		PA03C-CSAS-P1
CSAS	C			EDG LOADING SEQUENCER	3	PA03C-CSAS-V1
CSAS	D		1-442-M-PP01B	CONTAINMENT SPRAY PUMP 2		PA03D-CSAS-P1
CSAS	D		1-442-V-0004	PP01B - CONTAINMENT SPRAY HEADER ISOLATION VALVE		PA03D-CSAS-P1
CSAS	D		1-461-V-0098	CONTAINMENT SPRAY HX 01B INLET ISOLATION VALVE		PA03D-CSAS-P1
CSAS	D			EDG LOADING SEQUENCER	3	PA03D-CSAS-V1
MSIS	A		1-521-V-0090	MAIN STEAM DRAIN VALVE ISOLATION VALVE	3	PA03A-MSIS-V1
MSIS	A		1-521-V-0091	MAIN STEAM DRAIN VALVE ISOLATION VALVE	3	PA03A-MSIS-V1
MSIS	A		1-521-V-0092	MAIN STEAM DRAIN VALVE ISOLATION VALVE	3	PA03A-MSIS-V1
MSIS	A		1-521-V-0093	MAIN STEAM DRAIN VALVE ISOLATION VALVE	3	PA03A-MSIS-V1
MSIS	A	SG-161X	1-521-V-0015	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	3	PA03A-MSIS-V10
MSIS	A	SG-162X	1-521-V-0016	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	3	PA03A-MSIS-V10
MSIS	A	SG-163X	1-521-V-0017	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	3	PA03A-MSIS-V10
MSIS	A	SG-164X	1-521-V-0018	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	3	PA03A-MSIS-V10
MSIS	A		1-791-V-0031	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		PA03A-MSIS-V2
MSIS	A		1-791-V-0033	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		PA03A-MSIS-V2
MSIS	A		1-791-V-0035	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		PA03A-MSIS-V2
MSIS	A		1-791-V-0257	S/G 1 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		PA03A-MSIS-V2
MSIS	A		1-541-V-0138	FEEDWATER CHEMICAL INJECTION VALVE		PA03A-MSIS-V2
MSIS	A	SG-152X	1-521-V-0012	Main Steam Isolation Valve Electro Hydraulic Operator	3	PA03A-MSIS-V3
MSIS	A	SG-154X	1-521-V-0014	Main Steam Isolation Valve Electro Hydraulic Operator	3	PA03A-MSIS-V3
MSIS	A		1-455-V-0007	S/G -1 BLOWDOWN ISOLATION VALVE	3	PA03A-MSIS-V3
MSIS	A	SG-121	1-541-V-0121	Main Feedwater(Economizer) Isolation Valve	3	PA03A-MSIS-V3
MSIS	A	SG-123	1-541-V-0123	Main Feedwater(Economizer) Isolation Valve	3	PA03A-MSIS-V3

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
MSIS	A	SG-151X	1-521-V-0011	Main Steam Isolation Valve Electro Hydraulic Operator	3	PA03A-MSIS-V4
MSIS	A	SG-153X	1-521-V-0013	Main Steam Isolation Valve Electro Hydraulic Operator	3	PA03A-MSIS-V4
MSIS	A		1-455-V-0005	S/G -1 BLOWDOWN ISOLATION VALVE	3	PA03A-MSIS-V4
MSIS	A	SG-131	1-541-V-0131	Main Feedwater(Downcomer) Isolation Valve	3	PA03A-MSIS-V4
MSIS	A	SG-133	1-541-V-0133	Main Feedwater(Downcomer) Isolation Valve	3	PA03A-MSIS-V4
MSIS	A		1-541-M-PP04	FEEDWATER BOOSTER PUMP		PA03A-MSIS-P3
MSIS	A		1-541-M-PP05	FEEDWATER BOOSTER PUMP		PA03A-MSIS-P3
MSIS	A		1-541-M-PP06	FEEDWATER BOOSTER PUMP		PA03A-MSIS-P3
MSIS	A		1-541-M-PP07	STARTUP FEEDWATER PUMP		PA03A-MSIS-P4
MSIS	A		1-541-M-TA01	FEEDWATER PUMP TURBINE		PA03A-MSIS-P4
MSIS	A		1-541-M-TA02	FEEDWATER PUMP TURBINE		PA03A-MSIS-P4
MSIS	A		1-541-M-TA03	FEEDWATER PUMP TURBINE		PA03A-MSIS-P4
MSIS	B		1-521-V-0090	MAIN STEAM DRAIN VALVE ISOLATION VALVE	3	PA03B-MSIS-V1
MSIS	B		1-521-V-0091	MAIN STEAM DRAIN VALVE ISOLATION VALVE	3	PA03B-MSIS-V1
MSIS	B		1-521-V-0092	MAIN STEAM DRAIN VALVE ISOLATION VALVE	3	PA03B-MSIS-V1
MSIS	B		1-521-V-0093	MAIN STEAM DRAIN VALVE ISOLATION VALVE	3	PA03B-MSIS-V1
MSIS	B	SG-161Y	1-521-V-0015	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	3	PA03B-MSIS-V10
MSIS	B	SG-162Y	1-521-V-0016	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	3	PA03B-MSIS-V10
MSIS	B	SG-163Y	1-521-V-0017	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	3	PA03B-MSIS-V10
MSIS	B	SG-164Y	1-521-V-0018	Main Steam Isolation Valve Bypass Valve Electro Hydraulic Operator	3	PA03B-MSIS-V10
MSIS	B		1-791-V-0032	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		PA03B-MSIS-V2
MSIS	B		1-791-V-0034	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		PA03B-MSIS-V2
MSIS	B		1-791-V-0036	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		PA03B-MSIS-V2
MSIS	B		1-791-V-0258	S/G 2 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		PA03B-MSIS-V2
MSIS	B		1-541-V-0139	FEEDWATER CHEMICAL INJECTION VALVE		PA03B-MSIS-V2
MSIS	B	SG-152Y	1-521-V-0012	Main Steam Isolation Valve Electro Hydraulic Operator	3	PA03B-MSIS-V3
MSIS	B	SG-154Y	1-521-V-0014	Main Steam Isolation Valve Electro Hydraulic Operator	3	PA03B-MSIS-V3
MSIS	B		1-455-V-0008	S/G -2 BLOWDOWN ISOLATION VALVE	3	PA03B-MSIS-V3
MSIS	B	SG-122	1-541-V-0122	Main Feedwater(Economizer) Isolation Valve	3	PA03B-MSIS-V3
MSIS	B	SG-124	1-541-V-0124	Main Feedwater(Economizer) Isolation Valve	3	PA03B-MSIS-V3
MSIS	B	SG-151Y	1-521-V-0011	Main Steam Isolation Valve Electro Hydraulic Operator	3	PA03B-MSIS-V4
MSIS	B	SG-153Y	1-521-V-0013	Main Steam Isolation Valve Electro Hydraulic Operator	3	PA03B-MSIS-V4
MSIS	B		1-455-V-0006	S/G -2 BLOWDOWN ISOLATION VALVE	3	PA03B-MSIS-V4

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
MSIS	B	SG-132	1-541-V-0132	Main Feedwater(Downcomer) Isolation Valve	3	PA03B-MSIS-V4
MSIS	B	SG-134	1-541-V-0134	Main Feedwater(Downcomer) Isolation Valve	3	PA03B-MSIS-V4
MSIS	B		1-541-M-PP04	FEEDWATER BOOSTER PUMP		PA03B-MSIS-P3
MSIS	B		1-541-M-PP05	FEEDWATER BOOSTER PUMP		PA03B-MSIS-P3
MSIS	B		1-541-M-PP06	FEEDWATER BOOSTER PUMP		PA03B-MSIS-P3
MSIS	B		1-541-M-PP07	STARTUP FEEDWATER PUMP		PA03B-MSIS-P4
MSIS	B		1-541-M-TA01	FEEDWATER PUMP TURBINE		PA03B-MSIS-P4
MSIS	B		1-541-M-TA02	FEEDWATER PUMP TURBINE		PA03B-MSIS-P4
MSIS	B		1-541-M-TA03	FEEDWATER PUMP TURBINE		PA03B-MSIS-P4
AFAS-1	A		1-455-V-0005	S/G -1 BLOWDOWN ISOLATION VALVE	3	PA03A-AFAS-1_V2
AFAS-1	A		1-455-V-0007	S/G -1 BLOWDOWN ISOLATION VALVE	3	PA03A-AFAS-1_V2
AFAS-1	A			EDG LOADING SEQUENCER	3	PA03A-AFAS-1_V2
AFAS-1	A		1-791-V-0031	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		PA03A-AFAS-1_V3
AFAS-1	A		1-791-V-0033	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		PA03A-AFAS-1_V3
AFAS-1	A		1-791-V-0035	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		PA03A-AFAS-1_V3
AFAS-1	A		1-791-V-0257	S/G 1 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		PA03A-AFAS-1_V3
AFAS-1	A		1-542-V-0035	AUX. FEEDWATER MODULATING VALVE		PA03A-AFAS-1_P2
AFAS-1	A		1-542-M-PP02A	AUX. FEEDWATER PUMP A –MOTOR DRIVEN	3	PA03A-AFAS-1_V4
AFAS-1	A		1-542-V-0043	AUX. FEEDWATER ISOLATION VALVE (LATCHING)	3	PA03A-AFAS-1_V4
AFAS-1	A		1-542-V-0043	AUX. FEEDWATER ISOLATION VALVE (CYCLING)		PA03A-AFAS-1_V1
AFAS-1	B		1-455-V-0006	S/G -2 BLOWDOWN ISOLATION VALVE	3	PA03B-AFAS-1_V1
AFAS-1	B		1-455-V-0008	S/G -2 BLOWDOWN ISOLATION VALVE	3	PA03B-AFAS-1_V1
AFAS-1	B			EDG LOADING SEQUENCER	3	PA03B-AFAS-1_V1
AFAS-1	B		1-521-V-0110	AF TURBINE STEAM SUPPLY VALVE		PA03B-AFAS-1_V2
AFAS-1	B		1-791-V-0032	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		PA03B-AFAS-1_V3
AFAS-1	B		1-791-V-0034	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		PA03B-AFAS-1_V3
AFAS-1	B		1-791-V-0036	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		PA03B-AFAS-1_V3
AFAS-1	B		1-791-V-0258	S/G 2 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		PA03B-AFAS-1_V3
AFAS-1	B		1-542-V-0037	AUX. FEEDWATER MODULATING VALVE		PA03B-AFAS-1_P1
AFAS-1	C		1-527-V-0009	AF PUMP TURBINE STEAM ISOLATION VALVE	3	PA03C-AFAS-1_V2
AFAS-1	C		1-542-V-0045	AUX. FEEDWATER ISOLATION VALVE (LATCHING)	3	PA03C-AFAS-1_V2
AFAS-1	C		1-542-V-0045	AUX. FEEDWATER ISOLATION VALVE (CYCLING)		PA03C-AFAS-1_V1
AFAS-1	C			EDG LOADING SEQUENCER	3	PA03C-AFAS-1_V3
AFAS-1	D			EDG LOADING SEQUENCER	3	PA03D-AFAS-1_V2

ESFAS	Division	NSSS No.	PNS No.	Component Name	Test Type	Subgrouping
AFAS-2	A		1-542-V-0038	AUX. FEEDWATER MODULATING VALVE		PA03A-AFAS-2_P1
AFAS-2	A		1-521-V-0109	AF TURBINE STEAM SUPPLY VALVE		PA03A-AFAS-2_P1
AFAS-2	A			EDG LOADING SEQUENCER	3	PA03A-AFAS-2_V2
AFAS-2	A		1-455-V-0005	S/G -1 BLOWDOWN ISOLATION VALVE	3	PA03A-AFAS-2_V2
AFAS-2	A		1-455-V-0007	S/G -1 BLOWDOWN ISOLATION VALVE	3	PA03A-AFAS-2_V2
AFAS-2	A		1-791-V-0031	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		PA03A-AFAS-2_V3
AFAS-2	A		1-791-V-0033	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		PA03A-AFAS-2_V3
AFAS-2	A		1-791-V-0035	S/G 1 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		PA03A-AFAS-2_V3
AFAS-2	A		1-791-V-0257	S/G 1 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		PA03A-AFAS-2_V3
AFAS-2	B		1-542-V-0036	AUX. FEEDWATER MODULATING VALVE		PA03B-AFAS-2_P1
AFAS-2	B		1-542-V-0044	AUX. FEEDWATER ISOLATION VALVE (LATCHING)	3	PA03B-AFAS-2_P2
AFAS-2	B		1-542-M-PP02B	AUX. FEEDWATER PUMP B –MOTOR DRIVEN	3	PA03B-AFAS-2_P2
AFAS-2	B			EDG LOADING SEQUENCER	3	PA03B-AFAS-2_V2
AFAS-2	B		1-455-V-0006	S/G -2 BLOWDOWN ISOLATION VALVE	3	PA03B-AFAS-2_V2
AFAS-2	B		1-455-V-0008	S/G -2 BLOWDOWN ISOLATION VALVE	3	PA03B-AFAS-2_V2
AFAS-2	B		1-791-V-0032	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN HOTLEG		PA03B-AFAS-2_V3
AFAS-2	B		1-791-V-0034	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-DOWNCOMER		PA03B-AFAS-2_V3
AFAS-2	B		1-791-V-0036	S/G 2 PROCESS SAMPLING CONTAINMENT ISOLATION VALVE-BLOWDOWN COLDLEG		PA03B-AFAS-2_V3
AFAS-2	B		1-791-V-0258	S/G 2 PRIMAARY SAMPLING CONTAINMENT ISOLATION VALVE		PA03B-AFAS-2_V3
AFAS-2	B		1-542-V-0044	AUX. FEEDWATER ISOLATION VALVE (CYCLING)		PA03B-AFAS-2_V1
AFAS-2	C			EDG LOADING SEQUENCER	3	PA03C-AFAS-2_V2
AFAS-2	D		1-542-V-0046	AUX. FEEDWATER ISOLATION VALVE (LATCHING)	3	PA03D-AFAS-2_V2
AFAS-2	D		1-527-V-0010	AF PUMP TURBINE STEAM ISOLATION VALVE	3	PA03D-AFAS-2_V2
AFAS-2	D		1-542-V-0046	AUX. FEEDWATER ISOLATION VALVE (CYCLING)		PA03D-AFAS-2_V1
AFAS-2	D			EDG LOADING SEQUENCER	3	PA03D-AFAS-2_V3

Note: Test Type 3 means the components which shall not be tested during normal power operation. Other components shall be tested in accordance with SR3.3.6.2.