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Chapter 6 Engineered Safety Features

6.0 General

This section of the referenced DCD is incorporated by reference with no departures or supplements.

6.1 Engineered Safety Feature Materials

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.1.2.3 Evaluation

Delete the parenthetical statement at the end of the second paragraph, and insert a new third paragraph as follows.

STD COL 6.1.3-1-A For protective coatings and organic materials used inside the containment that do not meet the requirements of ASTM D 5144 and RG 1.54 as per above, an evaluation is performed to determine the generation rate, as a function of time, of combustible gases that can be formed from these unqualified organic materials under DBA conditions. Surveys of the containment are used to identify this material. The technical basis and assumptions used for this evaluation are documented and retained as quality records. These evaluations will be completed before fuel load, and the FSAR will be revised, as necessary, in a subsequent update to incorporate the results of these evaluations.

6.1.3 COL Information

6.1.3-1-A Protective Coatings and Organic Materials

STD COL 6.1.3-1-A This COL item is addressed in Section 6.1.2.3.

6.2 Containment Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

6.2.1.6 Test and Inspection

Add the following at the end of this section.

STD SUP 6.2-1

Inspections to Limit Debris

Procedures describe the activities necessary to prevent debris from affecting the emergency core cooling and long-term cooling safety functions in accordance with RG 1.82, including: 1) inspection of the cleanliness of pools within containment, 2) a visual examination for evidence of structural degradation or corrosion of debris screens, 3) an inspection of the wetwell and the drywell, including the vents, downcomers, and deflectors, for the identification and removal of debris or trash that could contribute to the blockage of debris screens for the ECC and long-term cooling safety functions, 4) containment cleanliness programs to clean the pools within containment on a regular basis, and 5) plant procedures for control and removal of foreign materials from the containment and abatement procedures to avoid latent debris generation during removal and/or replacement of insulation within containment.

6.2.4.2 System Design

Replace the parenthetical after the third sentence in the first paragraph with the following.

STD COL 6.2-1-H

DCD Tables 6.2-16 through 6.2-42 require an entry for the length of pipe from the containment to the inboard and outboard isolation valves. Pipe lengths will be determined as part of completion of the piping design ITAAC identified in DCD Tier 1, Table 3.1-1. The FSAR will be revised to reflect the pipe length information in a subsequent update.

6.2.8 COL Information

STD COL 6.2-1-H

6.2-1-H **COL item is addressed in Section 6.2.4.2.**

6.3 Emergency Core Cooling Systems

This section of the referenced DCD is incorporated by reference with no departures or supplements.

6.4 Control Room Habitability Systems

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

Add the following as the fifth bullet to the bulleted listing that follows the first paragraph.

VCS SUP 6.4-1

- Toxic Gas Detection System (TGDS)

Replace the third paragraph with the following.

VCS SUP 6.4-2

These habitability features include missile protection, radiation shielding, radiation monitoring, toxic gas monitoring, air filtration and ventilation systems, lighting, personnel and administrative support, and fire protection.

Add the following between the sixth and seventh paragraphs.

VCS SUP 6.4-3

When toxic gases are detected by the toxic gas detectors (TGDs) in the CRHA outside air supply ducts, an alarm in the Main Control Room (MCR) will alert the control room operators to this condition. The operators will don self-contained breathing apparatus and protective clothing and may initiate a manual isolation of the CRHA.

Add the following after the first sentence in the seventh paragraph.

VCS SUP 6.4-4

The TGDS also monitors the outside air intake.

Replace the fifth bullet that is part of the ninth paragraph with the following.

VCS SUP 6.4-5

- Provision for protection from airborne radioactive contaminants and toxic gases.

6.4.1.1 Safety Design Basis

Replace the seventh bullet that is part of the first paragraph with the following.

VCS SUP 6.4-6

CRHA habitability requirements are satisfied without the need for individual breathing apparatus and/or special protective clothing, except during a toxic gas release as described in Subsection 6.4.5.

	6.4.1.2 **Power Generation Design Bases**
	Add the following as the third bullet.
VCS SUP 6.4-7	The TGDS detects the presence of the toxic gases identified in Section 2.2 and alarms in the control room.
	6.4.2 **System Design**
	Replace the third sentence in the first paragraph with the following.
VCS SUP 6.4-8	Descriptions of the TGDS, CRHAVS, FPS, Lighting System, and RMS are found in Subsections 6.4.5, 9.4.1.1, 9.5.1, 9.5.3, and Section 11.5, respectively.
	6.4.3 **Control Room Habitability Area**
	Add the following after the Shielding Design paragraph.
VCS SUP 6.4-9	**Toxic Gas Protection** A description of toxic gas detectors and control room instrumentation for monitoring toxic gases is given in Subsection 6.4.5.
	6.4.4 **System Operation Procedures**
	Replace the second paragraph with the following:
VCS COL 6.4-1-A	Operators are provided with training and procedures for control room habitability that address the applicable aspects of NRC Generic Letter 2003-01 and are consistent with the intent of Generic Issue 83. Training and procedures are developed and implemented in accordance with Sections 13.2 and 13.5, respectively. The implementation milestones for training and procedures are provided in Sections 13.4 and 13.5, respectively.
	Add the following after the last paragraph.
VCS SUP 6.4-10	Manual isolation of the CRHA may be initiated by control room operators following the receipt of a toxic gas alarm. Upon actuation of this toxic gas alarm, personnel in the MCR will don protective clothing and breathing apparatus. The manual action described above includes inhibiting the starting of the EFUs to prevent toxic gases from being introduced by way of the EFU system.

6.4.5 Design Evaluations

System Safety Evaluation

Delete DCD Table 6.4-2. Replace the third paragraph with the following. Delete the last paragraph.

VCS COL 6.4-2-A

Potential toxic gas sources are evaluated to determine whether an external release of hazardous chemicals would impact control room habitability. These sources include offsite industrial facilities and transportation routes.

Evaluation of potentially hazardous offsite chemicals within 5 miles (8 km) of the Unit 1 or Unit 2 control room is addressed in Section 2.2. As described therein, there are no industrial facilities within 5 miles (8 km) of the Unit 1 or Unit 2 control room. There is one navigable waterway, one road, and one railway within 5 miles (8 km) of the Unit 1 or 2 control rooms. As presented in Section 2.2, a transportation accident along U.S. Highway 77 or the Union Pacific Railway involving the hazardous chemicals listed in Table 2.2-213 would impact control room habitability.

To alert the control room operators to a hazardous chemical accident, toxic gas detection systems (TGDSs) are provided to monitor air passing through the normal and EFU outside air intake louvers. Each TGDS is designed and installed to continuously monitor incoming control room air for the presence of the five toxic gases listed in Table 2.2-213. Toxic gas monitor setpoint concentrations were selected at 20% of the upper limit of the detection range, but not lower than 5 ppm in order to avoid false alarms.

Each TGDS is comprised of multiple toxic gas detectors (TGDs). The locations of the TGDSs are shown schematically in Figure 6.4-1R. Each TGDS consists of a sample and analyzer panel that contains a sample pump, sample conditioning equipment, analyzers, signal conditioning equipment, system support components, and alarm signal outputs. The TGDS is installed as seismic Category I, nonsafety-related, and powered from independent nonsafety-related uninterruptible power that draws power from safety-related buses. Since the TGDS is located within the Control Building, it is not subject to harsh environments. Loss of power to any TGDS is annunciated in the MCR.

TGDSs are installed on the two normal outside air intakes and the two EFU outside air intakes. Redundant TGDSs are installed at each of these

locations for a total of eight TGDSs. The redundant TGDSs minimize the probability of a single failure impairing the functionality of the overall system and provide a higher level of confidence against a detector failure. Each TGDS is equipped with self diagnostic functionality that alarms in the event that any required component of the TGDS fails. Upon receipt of such a failure alarm the affected TGDS will be removed from service, repaired, and returned to service. A high level of toxic gas sensed by any detection system will initiate the MCR toxic gas alarm.

Air samples are continuously drawn into the TGDSs, from the CRHAVS duct, at or near the outside air intake. The extraction points are located as close as reasonably practicable to the intake louvers and the analyzer locations are selected in order to minimize the TGDS response time. The TGDS components are specifically selected such that in the event that the toxic gas of interest is present in the incoming air, the gas diffuses into the cell causing a chemical reaction, which in-turn generates an electric current. The electrical current generated is proportional to the rate of consumption of toxic gas in the cell, which in turn is proportional to the concentration of the toxic gas.

In the event the concentrations of any of the toxic gases listed in Table 2.2-213 reach or exceed the designated setpoint, the TGDS initiates an alarm in the MCR. Upon actuation of this toxic gas alarm, personnel in the MCR will don protective clothing and breathing apparatus within 2 minutes. As described in Subsections 2.2.3.1.3.4 and 2.2.3.1.3.5, the MCR personnel will have at least 5 minutes from the time of the toxic gas alarm to don protective gear before the Immediately Dangerous to Life and Health (IDLH) concentration is reached in the control room. Manual operator action may be taken to isolate the CRHA to minimize the amount of toxic gas that enters the CRHA. The manual action described above includes inhibiting the starting of the EFUs to prevent toxic gases from being introduced by way of the EFU system.

Adequate air capacity for the self-contained breathing apparatus of at least six hours will be readily available onsite to ensure that sufficient time is available to transport additional bottled air from offsite locations. Storage provisions for breathing apparatus and procedures for its use will be such that personnel can begin using the apparatus within 2 minutes after detection of a toxic gas release.

As described in Subsection 2.2.3.1.3, toxic gas analysis for potentially hazardous chemicals stored on site is performed in accordance with the

guidelines of RG 1.78 and on the basis of no action being taken by the control room operator. The results of the analysis, when compared to the toxicity limits given in RG 1.78 and National Air Quality Standards, show hazardous concentrations of toxic gas in the control room are not reached.

Onsite locations with potentially toxic chemicals are identified in Table 2.2-202.

Hydrogen and oxygen storage facilities are in excess of 1560 feet (475.5 meters) from the control room. This distance is acceptable for toxic gas concerns in accordance with RG 1.78 based on hazards of postulated instantaneous release followed by vapor cloud explosion or intake of a flammable vapor concentration into a safety-related intake. The hazard for the oxygen supply was a postulated release with an increased concentration at a safety-related intake. Calculations performed to evaluate the habitability of the control room for accidental releases of hydrogen or oxygen from the hydrogen water chemistry system indicate control room personnel are not subject to the hazard of breathing air with insufficient oxygen inside the control room due to a release of hydrogen. Other identified chemicals are stored in amounts and locations that are adequately separated from the control room intakes such that detection and/or control room isolation is not required.

6.4.9 COL Information

6.4-1-A CRHA Procedures and Training

VCS COL 6.4-1-A This COL item addressed in Subsection 6.4.4.

6.4-2-A Toxic Gas Analysis

VCS COL 6.4-2-A This COL item addressed in Subsections 6.4.5 and 2.2.3.1.3 and Tables 2.2-202, 2.2-212, and 2.2-213.

6.5 Atmosphere Cleanup Systems

This section of the referenced DCD is incorporated by reference with no departures or supplements.

6.6 Preservice and Inservice Inspection and Testing of Class 2 and 3 Components and Piping

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

Replace the last sentence and the parenthetical statement of the third paragraph of this section with the following.

STD COL 6.6-1-A The PSI/ISI program description for Class 2 and 3 components and piping is provided in DCD Section 6.6.

6.6.10 Plant Specific PSI/ISI Program Information

6.6.10.1 Relief Requests

Add the following at the end of this section.

STD COL 6.6-1-A No relief requests for the PSI/ISI program have been identified.

6.6.10.2 Code Edition

Replace the second sentence of this section with the following:

STD COL 6.6-1-A The initial ISI program incorporates the latest edition and addenda of the ASME Code approved in 10 CFR 50.55a(b) on the date 12 months before initial fuel load.

Add the following new section.

STD COL 6.6-1-A

6.6.10.3 Program Implementation

The milestones for preservice and inservice inspection program implementation are provided in Section 13.4.

6.6.11 COL Information

6.6-1-A PSI/ISI Program Description

STD COL 6.6-1-A This COL item is addressed in Section 6.6.

Appendix 6A TRACG Application for Containment Analysis

This section of the referenced DCD is incorporated by reference with no departures or supplements.

Appendix 6B Evaluation of the Tragg Nodalization For The ESBWR Licensing Analysis

This section of the referenced DCD is incorporated by reference with no departures or supplements.

Appendix 6C Evaluation of the Impact of Containment Back Pressure On the ECCS Performance

This section of the referenced DCD is incorporated by reference with no departures or supplements.

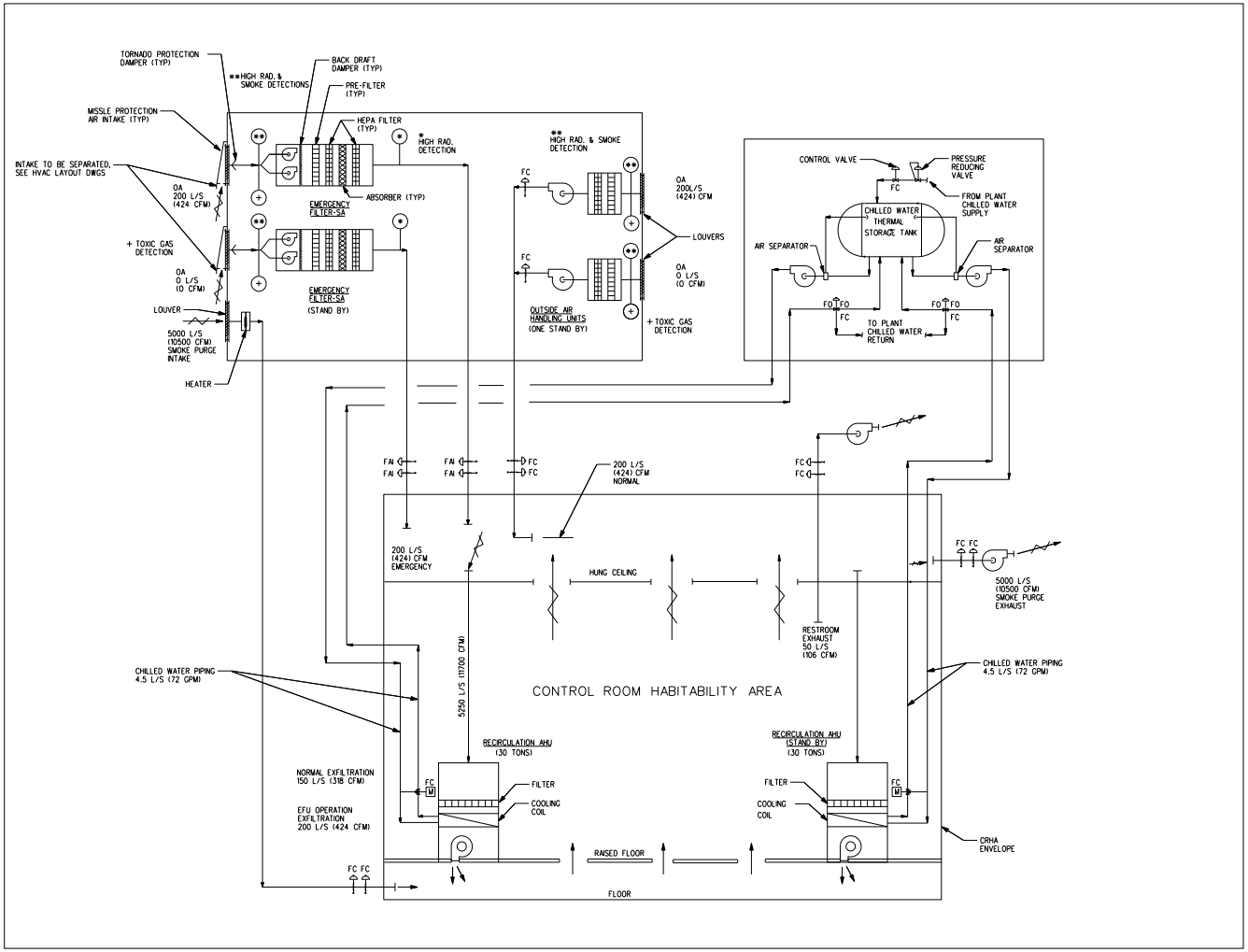

Figure 6.4-1R CRHAVS Schematic Diagram