2.5.5 Stability of Slopes

NAPS COL 2.0-30-A The information needed to address DCD COL Item 2.0-30-A is included in the following sections.

SSAR Section 2.5.5 is incorporated by reference with the following variances and/or supplements.

NAPS ESP VAR 2.5-1 SSAR Section 2.5.5 addressed the stability of slopes at the North Anna ESP site. However, the information presented in this FSAR section replaces the analyses presented in SSAR Section 2.5.5 because the slopes being considered have changed, and, for the seismic slope stability analysis, the peak ground acceleration being applied is different. The method of analysis remains essentially the same. In summary, the slopes considered herein are lower, less steep, and have a smaller applied seismic acceleration than the slopes analyzed in SSAR Section 2.5.5. As a result, the slopes addressed in this section have a higher computed factor of safety against failure, and are stable under both long-term static and short-term seismic conditions.

This section presents information on the stability of permanent slopes at the Unit 3 site. The information was developed from a review of reports prepared for the existing units and the originally planned Units 3 and 4, geotechnical literature, the ESP subsurface investigation, and the Unit 3 subsurface investigation. The review included the site-specific reports from the UFSAR (SSAR Reference 5), and reports prepared by Dames and Moore regarding the design and construction of the existing units (SSAR Reference 7) and the originally planned Units 3 and 4 (SSAR Reference 8).

a. Description of Slopes

The grading plan for Unit 3 is shown in Figure 2.5-255. The design plant grade for the power block area is at Elevation 88.4 m (290 ft) with elevations around the perimeter of this area ranging from about Elevation 88.1 m (289 ft) to 86.6 m (284 ft) to allow for adequate surface drainage. To the northeast of the power block area, going towards the existing Units 1 and 2, ground surface elevation reduces at a 2 percent slope down to the yard grade of Units 1 and 2 at Elevation 82.3 m (270 ft). (Coordinates and directions in this section are with reference to true north.) To attain these ground elevations, there is cut in the power block area, reaching as much as 12.2 m (40 ft) to the south of the reactor building. However, as existing grade falls off towards the northeast of the power block area, there is as much as 6.1 m (20 ft) of fill needed around portions of the northeast end of the turbine building. As much as 9.1 m (30 ft) of fill is provided to bring grade up to the planned ground surface in the area of the originally planned Units 3 and 4, where ground level is presently at around Elevation 76.2 m (250 ft).

As shown in Figure 2.5-255, there are no slopes that contribute to the support of any of the Unit 3 seismic Category I structures or any of the other major powerblock structures. The only slopes that could impact Unit 3 are cut slopes that surround and ascend from the southern edges of the plant. As discussed in Section 2.5.5b, material from sloughing or collapse of certain of these slopes could impact certain facilities. These new slopes are cut at a 3-horizontal to 1-vertical (3h:1v) slope into the existing natural ground surrounding the plant, with a 4.6 m (15 ft) wide bench constructed at about 6.1 m (20 ft) height from the bottom of the slope. These slopes reach a maximum height of 14.6 m (48 ft) (from Elevation 87.2 m (286 ft) up to Elevation 101.8 m (334 ft)) southwest of the plant, to the northwest of the administration building. The height of the slope reduces to the southeast of the plant. Southeast of the FWSC, the height is about 10.7 m (35 ft) (from Elevation 87.5 m (287 ft) up to Elevation 98.1 m (322 ft)). This is identified as Slope A-A in Figure 2.5-255.

The new cut slope to the southeast of the FWSC merges into an existing slope (see Slope ES in Figure 2.5-255) that runs in a northeasterly direction, to the south of the originally planned Units 3 and 4 and existing Units 1 and 2. Based on previous topographic maps, this slope was described in the SSAR as a 2h:1v slope, 16.8 m (55 ft) high. A new topographic survey performed for Unit 3 shows that the slope is actually about 2.4h:1v with a maximum height of 15.8 m (52 ft) (from Elevation 82.6 m (271 ft) to Elevation 98.5 m (323 ft)). Based on the final grade for Unit 3, the maximum height of this existing slope within the vicinity of any new structures is south of the service water cooling tower, where the height is about 13.1 m (43 ft) (from Elevation 85.3 m (280 ft) to Elevation 98.5 m (323 ft)).

The maximum depth of the storm water basin to the northeast of the main plant area is 6.7 m (22 ft) (from Elevation 86.0 m (282 ft) down to Elevation 79.2 m (260 ft)). This basin is cut at a 3h:1v slope.

SSAR Section 2.5.5 refers to slopes resulting from the nonsafety-related deepened intake channel. In fact, the intake channel for Unit 3 will not be deepened, and thus there will be no new slopes associated with the intake channel.

As shown in Figures 2.5-229 through 2.5-234, temporary excavation for Unit 3 construction will be performed using tied-back vertical walls.

b. **Impact of Slope Instability**

Instability of the storm water basin sides does not impact the safety of the plant, nor any of the other plant structures, and so such slopes are not addressed further here. Failure of any temporary slope or excavation created for construction of the plant cannot adversely affect the safety of the nuclear power plant facilities, and likewise this is not addressed further here.

The existing 2.4h:1v slope (Slope ES) was excavated during construction of the Units 1 and 2, and is almost entirely in cut material. The top of this slope is about 61 m (200 ft) from the top of the existing service water reservoir (SWR) embankment, and thus any potential instability of the slope will have no impact on the stability of the SWR embankment. However, material from sloughing or collapse of these slopes could impact the new diesel tanks and/or service water cooling tower. Slope ES is a representative section along the approximately 215 m (700 ft) length of the existing slope.

Instability of the new 3h:1v slope to the southeast of the FWSC (Slope A-A) does not impact the foundation stability of this Seismic Category I facility since the facility is founded on stable compacted crushed rock fill. However, material from sloughing or collapse of this slope could impact the facility, because the base of this new 10.7 m (35 ft) high slope is about 16.8 m (55 ft) from the FWSC. As can be seen from Figure 2.5-255, the new slopes extend to the south of Slope A-A and then west to northwest past the administration building, which is built into the slope. Although these slopes are somewhat higher than Slope A-A, they are much farther away from the Seismic Category I structures, and sloughing or collapse of these slopes would not impact any of the Seismic Category I structures. Thus, Slope A-A is considered the critical slope in the area.

The stability of the existing slope closest to the new service water cooling tower (Slope ES), and the stability of the new slope closest to the FWSC (Slope A-A) are addressed in the following subsections.

2.5.5.1 Slope characteristics

2.5.5.1.1 Existing Slope Characteristics

The location and direction of the existing 13.1 m (43 ft) high, 2.4h:1v slope to the north of the Units 1 and 2 SWR (Slope ES) is shown in plan view in Figure 2.5-255; the location is also shown in the photograph in SSAR Figure 2.5-66. The photograph in SSAR Figure 2.5-67 shows the existing slope clearly, descending from the SWR to close to the excavation for the originally planned Unit 3 and 4 containment buildings. The structure behind the slope on the SWR embankment is the Units 1 and 2 valve house, which was initially designed to be the originally planned Units 3 and 4 pump house. An approximate cross-section through the existing slope is shown in Figure 2.5-256.

As shown in Figures 2.5-255 and 2.5-256, a boring (B-18) was drilled close to the toe of the slope. This boring was made for the Units 1 and 2 investigation. During the Unit 3 subsurface investigation, cone penetrometer test (CPT) C-915 was performed near to the top of the slope. Also during the Unit 3 investigation, boring B-947 was drilled to the west of C-915, but at a similar elevation within the same original terrain as C-915. CPT C-916 and observation well OW-947 were located adjacent to B-947. The locations of boring B-18 and CPT C-915 are included in Figure 2.5-256, along with the ground water level measured in OW-947. The boring and CPT logs are presented in Section 2.5.5.3.

2.5.5.1.2 New Slope Characteristics

NAPS ESP COL 2.5-11 The location of the new 10.7 m (35 ft) high, 3h:1v slope to the southeast of the FWSC (Slope A-A) is shown in plan view in Figure 2.5-255. An approximate cross-section through the new slope is shown in Figure 2.5-257. As shown in Figure 2.5-255, boring B-947 was drilled relatively close to the final location of the top of the slope during the Unit 3 subsurface investigation. CPT C-916 and observation well OW-947 were located adjacent to B-947. The boring and CPT logs are presented in Section 2.5.5.3. The stability analysis performed for Slope A-A (Section 2.5.5.2.4) conservatively neglected the 4.6 m (15 ft) wide bench in the slope. For consistency, this bench is not shown in Figure 2.5-257.

NAPS COL 2.0-30-A

2.5.5.1.3 Slope Subsurface Conditions

The site soils and bedrock are described in detail in Section 2.5.4.2.2. As can be seen from Figures 2.5-256 and 2.5-257, the materials in the existing and new slopes, respectively, consist mostly of Zone IIA saprolites. Saprolites are a further stage of weathering beyond weathered rock. They have been derived by in-place disintegration and decomposition and have not been transported. Saprolites are classified as soils but still contain the relict structure of the parent rock, and they also typically still contain some core stone of the parent rock. The North Anna saprolites in many instances maintain the foliation (banded texture) characteristics of the parent rock. The majority of the saprolites in the Unit 3 area are classified as silty sands, although there are also sands, clayey sands, sandy silts, clayey silts and clays, depending very much on their degree of weathering. The fabric is strongly anisotropic. The texture shows angular geometrically interlocking grains with a lack of void network, very unlike the well-pronounced voids found in marine or alluvial sands and silts. The Zone IIA saprolites comprise a large majority of the saprolitic materials onsite. Most of the saprolites obtained from the borings in the slope area are medium dense to dense silty sands. The underlying Zone IIB saprolites are generally very dense silty sands.

Boring B-18 in Figure 2.5-256 indicates top of bedrock levels rising significantly towards the toe of the existing slope, with top of weathered rock close to the slope surface at the B-18 location at around Elevation 88.4 m (290 ft). This is consistent with the top of bedrock levels shown in Figure 2.5-2, from SSAR Reference 5. For the new slope shown in Figure 2.5-257, the top of weathered rock is closer to Elevation 76.2 m (250 ft). The bedrock at North Anna ranges from moderately to severely weathered (Zone III) as encountered in B-18, to fresh to slightly weathered (Zone IV). The bedrock throughout the North Anna site is classified as a gneiss, which is a metamorphic rock that exhibits foliation in which light and dark bands alternate. It is composed of feldspar, quartz, and one or more other minerals such as mica and hornblende.

The engineering properties of the site soils and bedrock are described in Section 2.5.4.2.5 and are tabulated in Table 2.5-212. These properties are based on extensive field and laboratory testing described in Section 2.5.4.2.

The liquefaction characteristics of all of the Zone IIA saprolites are thoroughly examined in Section 2.5.4.8. That section concludes that the results of the liquefaction analysis indicate that only a very limited amount of the Zone IIA saprolitic soil has a potential for liquefaction based on the Unit 3 seismic parameters. The liquefaction analysis did not take into account the beneficial effects of age, structure, fabric, and mineralogy of the saprolitic soils.

Details of the soils encountered in the new and existing slopes are outlined in the following paragraphs.

Boring B-947, close to the top of the new slope, indicates a predominantly silty sand profile, alternating with layers of silt in the top 4.6 m (15 ft) (boring and CPT logs are presented in Section 2.5.5.3). Grain size analyses performed on 10 samples ranging in depth from 1.5 m (5 ft) to 13.1 m (43 ft) (see Section 2.5.5.3) showed fines contents varying from about 14 to 70 percent, with a median of about 29 percent. The bottom 3.0 m (10 ft) of soil has an adjusted SPT N-value of over 50 blows/0.3 m (1 ft), which is characteristic of Zone IIB saprolite. The overlying soils are Zone IIA saprolites. Interpretation of CPT C-916 (performed adjacent to B-947) based on friction ratio, indicates mainly silty clays and clays, and thus, for these saprolites, this interpretation indicates a less granular composition than shown in the grain size tests.

For stability analyses of the new slope presented in Section 2.5.5.2, based on the results of B-947 and C-916, the new slope has the properties of Zone IIA silty sand saprolite given in Table 2.5-212 down to about 10.7 m (35 ft) below existing ground level. The bottom 3.0 m (10 ft) of saprolite above weathered rock has the Zone IIB saprolite properties given in Table 2.5-212.

The log of CPT-915 (located close to the top of the existing slope) is very similar to the log of CPT-916 in the top 9.1 m (30 ft). CPT-915 continues in a similar pattern below 9.1 m (30 ft) down to 15.2 m (50 ft) where it shows significantly increased tip resistance. Below 9.1 m (30 ft), C-916 shows higher tip resistance values than C-915 down to 15.2 m (50 ft) depth.

For the stability analysis of the existing slope presented in Section 2.5.5.2, based on the results of C-915 in comparison with C-916, the existing slope has the properties of Zone IIA silty sand saprolite given in Table 2.5-212 down to about 16.8 m (55 ft) below existing ground level. The thickness of Zone IIB saprolite below the Zone IIA material becomes less towards the toe of the slope and this layer eventually pinches out as the top of weathered rock rises, as postulated in Figure 2.5-256. The Zone IIB saprolite and the weathered rock have the properties given in Table 2.5-212.

2.5.5.1.4 **Slope Phreatic Surface**

The phreatic surfaces shown in Figure 2.5-256 (existing slope) and Figure 2.5-257 (new slope) have been developed from the water table levels measured in OW-947 and derived in Section 2.4.12. The depth of this phreatic surface precludes any potential for liquefaction of the near-surface soils in the slope.

2.5.5.2 **Design Criteria and Analyses**

2.5.5.2.1 **Required Factor of Safety**

Factors of safety for the required stability of slopes are provided in DCD Table 2.0-1. Minimum factors of safety for static (non-seismic) loading and for dynamic (seismic) loading are 1.5 and 1.1, respectively.

2.5.5.2.2 **Stability of Existing Slope**

The photograph in SSAR Figure 2.5-67 of the existing 2.4h:1v slope to the north of the SWR was taken over 20 years ago. The condition of the slope is essentially the same today. It was thoroughly inspected during the ESP site investigation. The slope shows no signs of distress.

2.5.5.2.3 **Analysis of Existing Slope**

The static and dynamic stability of the existing slope to the north of the SWR was analyzed using the computer program SLOPE/W (Reference 2.5-219).

a. **Long-Term Static Analysis**

The SLOPE/W Program used the Bishop method of slices (SSAR Reference 185) for analysis of the long-term static condition. As noted in Section 2.5.5.1.3, the analysis assumed the saprolite was predominantly coarse grained. The effective strength parameters given in Table 2.5-212 are an angle of internal friction ϕ' = 33 degrees and effective cohesion c' = 6.0kPa (0.125 ksf) for the Zone IIA saprolite and

ϕ' = 40 degrees and effective cohesion c' = 0 kPa (0 ksf) for the Zone IIB saprolite. The underlying weathered rock used c = 3350 kPa (70 ksf), approximately half of the value for unconfined compressive strength given in Table 2.5-212.

The input to the analysis and the results are shown in Figure 2.5-258. The computed factor of safety is 2.09. This value is above the minimum 1.5 factor of safety required.

b. **Seismic Slope Stability Analysis**

NAPS ESP COL 2.5-10 The pseudo-static approach is used as a first approximation for the seismic analysis of slopes. In this approach, the horizontal and vertical seismic forces are assumed to act on the slope in a static manner, that is, as a constant static force. This is an obviously conservative approach, since the actual seismic event occurs for only a short period of time, and during that time, the forces alternate their direction at a relatively high frequency. Also, the pseudo-static analysis tends to be run using the peak seismic acceleration; the mean acceleration during the design seismic event can be significantly less than the peak value. A pseudo-static analysis using peak acceleration values can be a useful tool in a limit analysis where the peak acceleration is relatively low. In such analyses, the computed factor of safety may well exceed the minimum of 1.1, thus requiring no further analysis. However, where the peak seismic acceleration values are high, the pseudo-static analysis produces unreasonably low safety factor values.

The pseudo-static analysis was run on the existing 13.1 m (43 ft) high slope (Slope ES) using SLOPE/W with the Bishop method of slices. For the low frequency earthquake, the peak horizontal acceleration used was about 0.23g. This is the average peak acceleration in the top 13.1 m (43 ft) of soil shown in Table 2.5-217. (The peak horizontal acceleration is 0.31g at the ground surface.) The vertical acceleration used was about 0.115g. The computed factor of safety was 1.29, more than the minimum 1.1 required. For the high frequency earthquake, the equivalent peak horizontal acceleration used was 0.50g with a vertical acceleration of 0.25g. The computed factor of safety was about 0.90, less than the minimum 1.1 required. The input to the analysis, and the results, are shown in Figure 2.5-259 for the low frequency earthquake and Figure 2.5-260 for the high frequency earthquake.

Seed (SSAR Reference 186), in the 19th Rankine Lecture, addressed the over-conservatism intrinsic in the pseudo-static analysis. He looked at the more rational approach proposed by Newmark (SSAR Reference 187), where the effective acceleration time-history is integrated to determine velocities and displacements of the slope. He also examined dams in California that had been subjected to seismic forces, including several dams that survived the 1906 San Francisco earthquake. Based on his studies, he concluded that for embankments that consist of materials that do not tend to build up large pore pressures or lose significant percentages of their shear strength during seismic shaking, seismic coefficients of only 0.15g are adequate to ensure acceptable embankment performance for earthquakes up to Magnitude M = 8.25 with peak ground accelerations of 0.75g. For earthquakes in the range of M = 6.5, Seed recommends a horizontal seismic coefficient of only 0.1g with a vertical seismic coefficient of zero. Note that it is the magnitude of the earthquake that determines the acceleration to be used here; magnitude is not part of the input to the pseudo-static analysis.

The liquefaction analysis of the Zone IIA saprolite indicated that only a very limited amount of the material has a potential for liquefaction. Also, because of its age, fabric and interlocking angular grain structure, this material does not lose a significant proportion of its shear strength during shaking. Thus, for the low frequency earthquake, with a design Magnitude M = 7.2, the pseudo-static analysis should be limited to a horizontal acceleration of 0.15g. A pseudo-static design using an inertia force of 0.1g is adequate for the high frequency earthquake.

The pseudo-static analysis was run again using SLOPE/W. This time the horizontal accelerations used were 0.1g and 0.15g, with zero vertical acceleration. The computed factors of safety were 1.63 and 1.47, respectively, greater than the minimum 1.1 required. The input to the analysis, and the results, for the 0.1g and 0.15g cases are shown in Figure 2.5-261 and 2.5-262, respectively.

Other researchers have also recommended substantially reducing the peak acceleration when applying the pseudo-static analysis. Kramer (SSAR Reference 188) recommends using an acceleration of 50 percent of the peak acceleration. For the low frequency earthquake, where the average peak acceleration in the top 13.1 m (43 ft) is about 0.23g, the horizontal input using Kramer's recommendations was about 0.115g and the vertical input was about 0.058g. This results in a factor of safety of

1.59. Using the average peak acceleration for the high frequency earthquake in the top 13.1 m (43 ft) of 0.50g, the horizontal input using Kramer's recommendation was 0.25g and the vertical input was 0.125g. This level of input provides a factor of safety against slope failure of 1.24. Thus the low and high frequency inputs give factors of safety above the minimum 1.1 required. The input to the analysis, and the results, for the low frequency and high frequency cases are shown in Figure 2.5-263 and 2.5-264, respectively.

In the preceding analyses (both long-term static, and seismic), the only case that gave a factor of safety lower than the required minimum was the pseudo-static analysis using the high frequency peak acceleration. As noted above, the pseudo-static analysis does not take into account the frequency of the motion nor the magnitude of the earthquake. For high frequency, low magnitude earthquakes, (as is the case at North Anna) the pseudo-static analysis is particularly conservative. Thus, it is concluded that the existing 2.4h:1v slope to the north of the SWR remains stable under long-term static and design seismic conditions.

NAPS COL 2.0-30-A

2.5.5.2.4 Analysis of New Slope

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The static and dynamic stability of the new 10.7 m (35 ft) high 3h:1v slope (Slope A-A) to the southeast of the FWSC was analyzed using the computer program SLOPE/W (Reference 2.5-219).

a. Long-Term Static Analysis

The SLOPE/W Program used the Bishop method of slices (SSAR Reference 185) for analysis of the long-term static condition. As noted in Section 2.5.5.1.3, the properties assumed for the Zone IIA and Zone IIB saprolite were the same as those for the existing slope that was analyzed.

The input to the analysis and the results are shown in Figure 2.5-265. The computed factor of safety is 2.23. This value is above the minimum 1.5 factor of safety required.

b. Seismic Slope Stability Analysis

NAPS ESP COL 2.5-10

The pseudo-static analysis was run on the new 10.7 m (35 ft) high slope using SLOPE/W with the Bishop method of slices. For the low frequency earthquake, the average peak horizontal acceleration in the top 10.7 m (35 ft) used was about 0.23g with a vertical acceleration of about 0.115g. The computed factor of safety was 1.30, greater than the minimum 1.1

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required. For the high frequency earthquake, the peak horizontal acceleration used was about 0.50g. This is the average peak acceleration in the top 10.7 m (35 ft) of soil shown in Table 2.5-217. (The maximum horizontal acceleration is 0.55g at the ground surface.) The vertical acceleration used was about 0.25g. The computed factor of safety was 0.90, less than the minimum 1.1 required. The input to the analysis, and the results, for the low frequency and high frequency cases are shown in Figure 2.5-266 and 2.5-267, respectively.

The pseudo-static analysis was run again using SLOPE/W and Seed's (SSAR Reference 186) approach described in Section 2.5.5.2.3. Again the horizontal accelerations used were 0.1g and 0.15g for the high and low frequency cases, respectively, with zero vertical acceleration. The computed factors of safety were 1.64 and 1.44, respectively, greater than the minimum 1.1. The input to the analysis, and the results, for the 0.1g and 0.15g cases are shown in Figure 2.5-268 and 2.5-269, respectively.

The pseudo-static analysis was then run using SLOPE/W and Kramer's (SSAR Reference 188) recommendations described in Section 2.5.5.2.3. For the low frequency earthquake, where the average peak acceleration in the top 10.7 m (35 ft) is about 0.23g, the horizontal input using Kramer's recommendations was about 0.115g and the vertical input was about 0.06g. Using the average peak acceleration for the high frequency earthquake in the top 10.7 m (35 ft) of about 0.50g, the horizontal input using Kramer's recommendation was 0.25g and the vertical input was 0.125g. These levels of input provide a factor of safety against slope failure of 1.63 and 1.25 for the low and high frequency cases, respectively, greater than the minimum 1.1 required. The input to the analysis, and the results, for the low frequency and high frequency cases are shown in Figure 2.5-270 and 2.5-271, respectively.

The results of the stability analyses for the new slope are almost identical to those for the existing slope, and the conclusion about stability is the same, i.e., the new 3h:1v slope to the southeast of the FWSC remains stable under long-term static and design seismic conditions.

NAPS COL 2.0-30-A

2.5.5.3 Logs of Borings

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2.5.5.3.1 Boring Logs

As noted in Section 2.5.5.1, boring B-18 was drilled close to the toe of the existing 2.4h:1v slope to the north of the SWR and boring B-947 was drilled near the top of the proposed new 3h:1v slope southeast of the FWSC. The logs of borings B-18 and B-947 are reproduced in Figure 2.5-272 and 2.5-273, respectively.

2.5.5.3.2 **CPT Logs**

As noted in Section 2.5.5.1, CPT C-915 was drilled close to the top of the existing 2.4h:1v slope to the north of the SWR and CPT C-916 was drilled adjacent to B-947 near the top of the new 3h:1v slope southeast of the FWSC. The logs of CPTs C-915 and C-916 are reproduced in Figure 2.5-274 and 2.5-275, respectively.

2.5.5.3.3 **Observation Wells**

As noted in Section 2.5.5.1, observation well OW-947 was installed adjacent to boring B-947 near the top of the new 3h:1v slope southeast of the FWSC. The log of OW-947 is reproduced in Figure 2.5-276. Water levels measured in this well over a 12-month period are shown in Table 2.5-218.

2.5.5.3.4 **Laboratory Test Results**

The grain size tests results for the saprolites in boring B-947 and noted in Section 2.5.5.1 are provided in Table 2.5-219. Details of these test results are provided in Appendix 2.5.4AA.

2.5.5.4 **Compacted Fill**

The existing 2.4h:1v slope described and analyzed in the previous sections is a cut slope and does not contain fill materials in any significant quantity.

As shown in Figure 2.5-257, the grading plan results in the top approximately 2.1 m (7 ft) of the new 3h:1v slope southeast of the FWSC being new fill. This is not structural fill since it is used only for site grading and consists of re-compacted saprolitic soils obtained from plant excavations. These are described in Section 2.5.4.5. For slope stability analysis, this fill has been given the same properties as the in-situ Zone IIA saprolite.

2.5.5.5 **Conclusions**

Existing slopes and embankments that are not impacted by Unit 3 (such as the SWR embankments) do not require analysis for Unit 3 and are not addressed here. New slopes, such as in the storm water basin that will not impact the safety of the plant or any other structure if they fail also do not require analysis and are not addressed here. Failure of any temporary slope or excavation created for construction of Unit 3 cannot adversely affect the safety of Unit 3, consequently, this is not addressed further here.

The only existing slope which, by its failure, could adversely affect the safety of Unit 3, because of its proximity, is the 13.1 m (43 ft) high, 2.4h:1v slope that descends from north of the SWR down to south of the existing excavation made for the originally planned Units 3 and 4. The slope is made almost entirely in cut material. The stability of this existing slope was analyzed using the computer program SLOPE/W. The only case that gave a factor of safety lower than the required minimum was the pseudo-static analysis using the high frequency peak acceleration. This analysis does not take into account the frequency of the motion or the magnitude of the earthquake. For high frequency, low magnitude earthquakes, (as is the case at North Anna) the pseudo-static analysis is particularly conservative. Thus, it is concluded that this slope remains stable under long-term static and design seismic conditions.

The results of the stability analyses for the new 3h:1v slope to the southeast of the FWSC are almost identical to those for the existing slope described above, and the conclusion about stability is the same, i.e., the new slope remains stable under long-term static and design seismic conditions.

2.5.6 Embankments and Dams

SSAR Section 2.5.6 is incorporated by reference with the following supplement.

This SSAR section is supplemented as follows with a new paragraph on Unit 3 embankments and dams.

NAPS COL 2.0-30-A Because Lake Anna is only used as a source of makeup water for Unit 3, the North Anna Dam, which is designed and constructed to meet requirements for a seismic Category I structure in support of the existing Units 1 and 2, was not re-analyzed as part of this FSAR. Construction of Unit 3 does not adversely affect the slopes of the SWR for Units 1 and 2. There is an existing slope to the north of the SWR and a new slope to the southeast of the FWSC. These slopes are described and analyzed in Section 2.5.5. I N0586

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NAPS COL 2.0-27-A

IN058b

Table 2.5-201 Selected Horizontal Response Spectrum Amplitudes, V/H Spectral Ratios from SSAR Reference 171, and Resulting Vertical Response Spectrum Amplitudes for the Control Point, Zone III-IV, Top of Competent Rock (Elevation 83.2 m (273 ft))

Frequency (Hz)	Horizontal - SA (g)	V/H Spectral Ratio	Vertical - SA (g)
100.00	0.448	1.00	0.448
50.00	0.969	1.12[a]	1.085
30.00	1.206	0.94[a]	1.134
25.00	1.193	0.88	1.050
20.00	1.163	0.83[a]	0.965
10.00	0.877	0.75	0.658
8.00	0.687	0.75	0.515
6.00	0.468	0.75	0.351
5.00	0.367	0.75	0.275
4.00	0.283	0.75	0.212
3.00	0.214	0.75	0.161
2.50	0.18	0.75	0.135
2.00	0.143	0.75	0.107
1.00	0.0676	0.75	0.0507
0.80	0.0578	0.75	0.0434
0.60	0.0492	0.75	0.0369
0.50	0.0432	0.75	0.0324
0.40	0.0344	0.75	0.0258
0.30	0.0234	0.75	0.0176
0.20	0.0131	0.75	0.00983
0.10	0.00386	0.75	0.00290

a. V/H ratios calculated by log-log interpretation

NAPS COL 2.0-27-A

IN058b

Table 2.5-202 Selected Horizontal Response Spectrum Amplitudes, V/H Spectral Ratios from SSAR Reference 171, and Resulting Vertical Response Spectrum Amplitudes for the Base of the CB Foundation (Elevation 73.5 m (241 ft))

Frequency (Hz)	Horizontal - SA (g)	V/H Spectral Ratio	Vertical - SA (g)
100.00	0.433	1.00	0.433
50.00	0.962	1.12[a]	1.077
30.00	1.158	0.94[a]	1.089
25.00	1.151	0.88	1.013
20.00	1.135	0.83[a]	0.942
10.00	0.872	0.75	0.654
8.00	0.685	0.75	0.514
6.00	0.468	0.75	0.351
5.00	0.368	0.75	0.276
4.00	0.283	0.75	0.212
3.00	0.214	0.75	0.161
2.50	0.18	0.75	0.135
2.00	0.143	0.75	0.107
1.00	0.0676	0.75	0.0507
0.80	0.0578	0.75	0.0434
0.60	0.0492	0.75	0.0369
0.50	0.0432	0.75	0.0324
0.40	0.0344	0.75	0.0258
0.30	0.0234	0.75	0.0176
0.20	0.0131	0.75	0.00983
0.10	0.00385	0.75	0.00289

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a. V/H ratios calculated by log-log interpretation

NAPS COL 2.0-27-A

IN058b

Table 2.5-203 Selected Horizontal Response Spectrum Amplitudes, V/H Spectral Ratios from SSAR Reference 171, and Resulting Vertical Response Spectrum Amplitudes for the Base of the RB/FB Foundation (Elevation 68.3 m (224 ft))

Frequency (Hz)	Horizontal - SA (g)	V/H Spectral Ratio	Vertical - SA (g)
100.00	0.434	1.00	0.434
50.00	0.979	1.12[a]	1.096
30.00	1.174	0.94[a]	1.104
25.00	1.155	0.88	1.016
20.00	1.128	0.83[a]	0.936
10.00	0.868	0.75	0.651
8.00	0.684	0.75	0.513
6.00	0.468	0.75	0.351
5.00	0.368	0.75	0.276
4.00	0.283	0.75	0.212
3.00	0.214	0.75	0.161
2.50	0.18	0.75	0.135
2.00	0.143	0.75	0.107
1.00	0.0676	0.75	0.0507
0.80	0.0579	0.75	0.0434
0.60	0.0492	0.75	0.0369
0.50	0.0432	0.75	0.0324
0.40	0.0344	0.75	0.0258
0.30	0.0234	0.75	0.0176
0.20	0.0131	0.75	0.00983
0.10	0.00386	0.75	0.00290

a. V/H ratios calculated by log-log interpretation

NAPS COL 2.0-27-A

IN0586

Table 2.5-204 Selected Horizontal Response Spectrum Amplitudes, V/H Spectral Ratios from SSAR Reference 171, and Resulting Vertical Response Spectrum Amplitudes a the Base of the FWSC Foundation (Elevation 86.0 m (282 ft))

Frequency (Hz)	Horizontal - SA (g)	V/H Spectral Ratio	Vertical - SA (g)
100.00	0.427	1.00	0.427
50.00	0.545	1.12[a]	0.610
30.00	1.887	0.94[a]	0.834
25.00	1.027	0.88	0.904
20.00	1.155	0.83[a]	0.958
10.00	1.910	0.75	0.683
8.00	0.812	0.75	0.609
6.00	0.780	0.75	0.585
5.00	0.783	0.75	0.588
4.00	0.746	0.75	0.560
3.00	0.565	0.75	0.424
2.50	0.409	0.75	0.307
2.00	0.249	0.75	0.187
1.00	0.0744	0.75	0.0558
0.80	0.0626	0.75	0.0469
0.60	0.0511	0.75	0.0383
0.50	0.0436	0.75	0.0327
0.40	0.0345	0.75	0.0259
0.30	0.0242	0.75	0.0182
0.20	0.0131	0.75	0.00984
0.10	0.00419	0.75	0.00314

a. V/H ratios calculated by log-log interpretation

IN058b

NAPS COL 2.0-29A

Table 2.5-205 Borehole Information

Boring Number	Coordinates (ft)		Ground Surface Elevation (ft)	Penetration Depth (ft)
	Northing	Easting		
B-901	3,909,777.72	11,685,928.59	309.42	300.0
B-902	3,909,874.19	11,685,884.28	302.20	201.7
B-903	3,909,812.10	11,686,028.80	301.59	151.0
B-904	3,909,692.47	11,685,970.43	316.75	151.7
B-905	3,909,732.86	11,685,821.97	306.75	150.4
B-906	3,909,670.03	11,685,795.34	311.72	150.5
B-907	3,909,607.90	11,685,938.35	322.71	200.5
B-908	3,909,716.65	11,686,060.89	307.71	151.4
B-909	3,909,695.46	11,686,107.40	304.90	201.9
B-910	3,909,667.63	11,685,883.11	316.54	148.4
B-911	3,909,919.91	11,685,992.68	299.79	101.0
B-911A	3,909,916.04	11,686,000.53	299.91	21.7
B-912	3,910,021.70	11,686,051.36	275.10	151.8
B-913	3,910,148.50	11,686,114.71	273.37	100.9
B-914	3,909,939.55	11,685,922.35	297.45	200.5
B-915	3,909,877.48	11,686,088.55	301.79	112.8
B-916	3,910,049.54	11,686,008.70	276.24	100.3
B-917	3,910,160.68	11,686,029.45	274.85	150.8
B-918	3,910,115.28	11,686,194.05	272.13	150.1
B-919	3,909,575.39	11,685,764.67	317.79	76.2
B-920	3,909,545.07	11,685,980.20	327.17	150.7
B-921	3,909,680.19	11,686,162.71	307.96	73.9
B-921A	3,909,686.89	11,686,161.68	307.39	40.4
B-922	3,909,943.65	11,686,232.99	271.30	26.0
B-922A	3,909,949.30	11,686,244.02	271.33	76.5
B-923	3,910,076.97	11,686,309.48	272.00	75.4
B-924	3,909,969.53	11,686,475.40	271.52	75.6
B-925	3,910,036.67	11,686,576.27	270.01	75.8

NAPS COL 2.0-29A

Table 2.5-205 Borehole Information

Boring Number	Coordinates (ft)		Ground Surface Elevation (ft)	Penetration Depth (ft)
	Northing	Easting		
B-926	3,910,043.20	11,685,709.26	289.03	155.5
B-927	3,909,966.07	11,685,878.59	292.51	100.4
B-928	3,910,222.75	11,686,159.07	272.17	75.2
B-928A	3,910,220.39	11,686,165.35	271.82	37.5
B-929	3,909,214.44	11,685,654.82	329.02	74.0
B-929A	3,909,214.15	11,685,665.51	329.03	52.5
B-930	3,909,275.95	11,685,842.87	326.12	123.6
B-931	3,910,152.94	11,685,921.54	278.52	74.0
B-932	3,910,444.31	11,686,415.70	249.88	35.1
B-933	3,909,827.41	11,685,790.97	296.48	100.3
B-933A	3,909,826.28	11,685,802.01	296.58	27.5
B-934	3,909,860.37	11,685,686.09	294.80	101.6
B-936	3,910,745.87	11,685,929.15	286.56	100.7
B-937	3,910,688.52	11,686,672.12	270.25	55.3
B-939	3,911,317.60	11,686,605.91	254.03	76.1
B-940	3,910,266.77	11,688,901.02	268.32	76.1
B-941	3,910,403.63	11,688,912.87	267.19	75.8
B-942	3,909,614.69	11,684,326.45	291.85	100.8
B-943	3,909,355.39	11,683,892.47	300.40	101.9
B-944	3,908,772.38	11,684,127.62	334.69	86.4
B-945	3,910,135.55	11,683,779.79	281.51	100.6
B-946	3,908,787.24	11,683,810.59	333.36	100.7
B-947	3,909,574.53	11,686,367.21	312.48	88.8
B-948	3,909,619.26	11,685,565.69	310.41	100.6
B-949	3,909,018.09	11,685,157.27	334.82	106.4
B-950	3,910,835.82	11,686,282.11	282.50	100.8
B-951	3,910,548.26	11,686,821.80	249.93	101.0

INo58b

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Table 2.5-206 Observation Well Information

Well Number	Coordinates (ft)		Surface Elev. (ft)	Depth (ft)	Elev. of Top of Screen (ft)	Screen Length (ft)
	Northing	Easting				
OW-901	3,909,772	11,685,917	309.6	108.0	214.6	10
OW-945	3,910,136	11,683,793	281.6	54.5	240.1	10
OW-946	3,908,788	11,683,823	334.0	43.4	303.6	10
OW-947	3,909,580	11,686,372	313.3	58.0	268.3	10
OW-949	3,909,025	11,685,153	335.7	105.0	243.2	0
OW-950	3,910,842	11,686,285	283.0	92.0	203.0	10
OW-951	3,910,521	11,686,786	249.7	67.0	194.6	10

NAPS COL 2.0-29-A

Table 2.5-207 Information on the CPTs Performed

IN058b

CPT Number	Coordinates (ft)		Ground Surface Elevation (ft)	Depth (ft)
	Northing	Easting		
C-901	3,909,627.77	11,686,012.67	318.56	20.0
C-902	3,909,552.59	11,685,842.21	323.66	29.0
C-903	3,909,719.02	11,685,775.66	306.84	29.0
C-904	3,910,026.29	11,685,793.52	283.92	35.5
C-905	3,910,137.61	11,685,857.21	279.29	45.6
C-906	3,910,013.77	11,686,269.94	270.75	2.6
C-907	3,910,174.67	11,686,277.14	271.66	13.1
C-908	3,910,326.76	11,686,187.39	271.91	28.1
C-909	3,909,346.74	11,685,717.77	330.26	60.0
C-910	3,909,154.43	11,685,782.42	326.99	25.1
C-911	3,910,716.79	11,685,941.76	286.69	15.3
C-912	3,909,959.42	11,686,349.77	271.16	2.8
C-913	3,910,999.95	11,686,812.54	268.65	20.0
C-914	3,910,360.20	11,688,917.62	267.86	31.0
C-915	3,909,784.60	11,686,794.40	320.92	54.0
C-916	3,909,584.68	11,686,372.70	312.91	49.1
C-917	3,909,337.29	11,686,293.79	320.37	49.2
C-918	3,909,151.49	11,685,509.11	329.55	25.1
C-919	3,909,154.30	11,685,255.41	338.06	25.1
C-920	3,909,071.70	11,685,870.40	324.73	25.1
C-921	3,910,112.20	11,685,717.17	281.10	30.0
C-922	3,909,889.28	11,684,055.95	311.73	20.3
C-923	3,910,107.49	11,683,828.42	283.03	22.2

N0586

NAPS COL 2.0-29-A

Table 2.5-208 Elevation, Depth, and Thickness of the Subsurface Zones

Boring Number	Top Elevation of Zones (ft)						Top Depth of Zones (ft)						Thickness of Zones (ft)				
	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV
B-901	309.4	309.4	279.9	269.5	229.4	174.4	0.0	0.0	29.5	39.9	80.0	135.0	0.0	29.5	10.4	40.1	55.0
B-902	302.2	302.2	283.0	283.0	-	278.4	0.0	0.0	19.2	19.2	-	23.8	0.0	19.2	0.0	4.6	-
B-903	301.6	301.6	281.9	279.0	220.8	185.6	0.0	0.0	19.7	22.6	80.8	116.0	0.0	19.7	2.9	58.2	35.2
B-904	316.8	316.8	288.3	270.0	235.1	195.1	0.0	0.0	28.5	46.8	81.7	121.7	0.0	28.5	18.3	34.9	40.0
B-905	306.7	306.7	286.8	282.9	271.4	176.2	0.0	0.0	19.9	23.8	35.3	130.5	0.0	19.9	3.9	11.5	95.2
B-906	311.7	311.7	282.8	276.8	262.0	176.2	0.0	0.0	28.9	34.9	49.7	135.5	0.0	28.9	6.0	14.8	85.8
B-907	322.7	322.7	287.7	283.7	207.2	177.2	0.0	0.0	35.0	39.0	115.5	145.5	0.0	35.0	4.0	76.5	30.0
B-908	307.7	307.7	280.7	245.0	-	241.3	0.0	0.0	27.0	62.7	-	66.4	0.0	27.0	35.7	3.7	-
B-909	304.9	304.9	275.9	248.0	-	223.0	0.0	0.0	29.0	56.9	-	81.9	0.0	29.0	27.9	25.0	-
B-910	316.5	316.5	294.5	274.5	226.1	-	0.0	0.0	22.0	42.0	90.4	-	0.0	22.0	20.0	48.4	-
B-911	299.8	299.8	282.8	278.8	268.7	233.8	0.0	0.0	17.0	21.0	31.1	66.0	0.0	17.0	4.0	10.1	34.9
B-911A	299.9	299.9	282.9	278.8	268.7	233.8	0.0	0.0	17.0	21.1	31.2	66.1	0.0	17.0	4.1	10.1	34.9
B-912	275.1	275.1	255.5	251.0	-	238.3	0.0	0.0	19.6	24.1	-	36.8	0.0	19.6	4.5	12.7	-
B-913	273.4	273.4	223.4	217.9	-	215.5	0.0	0.0	50.0	55.5	-	57.9	0.0	50.0	5.5	2.4	-
B-914	297.4	297.4	275.4	275.4	236.9	202.1	0.0	0.0	22.0	22.0	60.5	95.3	0.0	22.0	0.0	38.5	34.8
B-915	301.8	301.8	288.3	284.8	279.4	-	0.0	0.0	13.5	17.0	22.4	-	0.0	13.5	3.5	5.4	-
B-916	276.2	276.2	251.1	-	-	250.6	0.0	0.0	25.1	-	-	25.6	0.0	25.1	0.5	-	-
B-917	274.9	274.9	217.9	206.4	187.1	178.8	0.0	0.0	57.0	68.5	87.8	96.1	0.0	57.0	11.5	19.3	8.3
B-918	272.1	271.1	267.0	245.8	-	239.8	0.0	1.0	5.1	26.3	-	32.3	1.0	4.1	21.2	6.0	-
B-919	317.8	317.8	294.8	279.9	264.7	-	0.0	0.0	23.0	37.9	53.1	-	0.0	23.0	14.9	15.2	-

NAPS COL 2.0-29-A

Table 2.5-208 Elevation, Depth, and Thickness of the Subsurface Zones

Boring Number	Top Elevation of Zones (ft)						Top Depth of Zones (ft)						Thickness of Zones (ft)				
	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV
B-920	327.2	324.8	289.2	274.2	-	221.5	0.0	2.4	38.0	53.0	-	105.7	2.4	35.6	15.0	52.7	-
B-921	308.0	308.0	260.0	236.2	-	-	0.0	0.0	48.0	71.8	-	-	0.0	48.0	23.8	-	-
B-921A	307.4	307.4	259.4	236.2	-	-	0.0	0.0	48.0	71.2	-	-	0.0	48.0	23.2	-	-
B-922	271.3	271.3	265.0	262.5	257.3	-	0.0	0.0	6.3	8.8	14.0	-	0.0	6.3	2.5	5.2	-
B-922A	271.3	271.3	271.3	263.1	254.8	209.8	0.0	0.0	0.0	8.2	16.5	61.5	0.0	0.0	8.2	8.3	45.0
B-923	272.0	269.2	266.8	-	266.8	260.3	0.0	2.8	5.2	-	5.2	11.7	2.8	2.4	0.0	-	6.5
B-924	271.5	271.1	265.0	265.0	252.9	227.9	0.0	0.4	6.5	6.5	18.6	43.6	0.4	6.1	0.0	12.1	25.0
B-925	270.0	270.0	253.0	-	249.6	213.7	0.0	0.0	17.0	-	20.4	56.3	0.0	17.0	3.4	-	35.9
B-926	289.0	289.0	235.0	235.0	225.2	179.5	0.0	0.0	54.0	54.0	63.8	109.5	0.0	54.0	0.0	9.8	45.7
B-927	292.5	292.5	268.5	-	252.7	217.9	0.0	0.0	24.0	-	39.8	74.6	0.0	24.0	15.8	-	34.8
B-928	272.2	272.2	244.2	235.1	220.1	212.0	0.0	0.0	28.0	37.1	52.1	60.2	0.0	28.0	9.1	15.0	8.1
B-928A	271.8	271.8	243.8	235.1	220.1	212.0	0.0	0.0	28.0	36.7	51.7	59.8	0.0	28.0	8.7	15.0	8.1
B-929	329.0	329.0	283.0	265.0	-	-	0.0	0.0	46.0	64.0	-	-	0.0	46.0	18.0	-	-
B-929A	329.0	329.0	283.0	265.0	-	-	0.0	0.0	46.0	64.0	-	-	0.0	46.0	18.0	-	-
B-930	326.1	323.7	265.1	244.1	-	-	0.0	2.4	61.0	82.0	-	-	2.4	58.6	21.0	-	-
B-931	278.5	278.5	228.7	221.5	-	-	0.0	0.0	49.8	57.0	-	-	0.0	49.8	7.2	-	-
B-932	249.9	231.9	221.9	-	-	-	0.0	18.0	28.0	-	-	-	18.0	10.0	-	-	-
B-933	296.5	291.0	274.5	269.5	248.3	239.6	0.0	5.5	22.0	27.0	48.2	56.9	5.5	16.5	5.0	21.2	8.7
B-933A	296.6	291.1	274.6	269.5	248.3	239.6	0.0	5.5	22.0	27.1	48.3	57.0	5.5	16.5	5.1	21.2	8.7
B-934	294.8	294.8	252.8	252.8	-	246.4	0.0	0.0	42.0	42.0	-	48.4	0.0	42.0	0.0	6.4	-

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Table 2.5-208 Elevation, Depth, and Thickness of the Subsurface Zones

Boring Number	Top Elevation of Zones (ft)						Top Depth of Zones (ft)						Thickness of Zones (ft)				
	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV
B-936	286.6	286.6	266.3	253.1	190.6	-	0.0	0.0	20.3	33.5	96.0	-	0.0	20.3	13.2	62.5	-
B-937	270.3	270.3	245.3	237.0	220.0	-	0.0	0.0	25.0	33.3	50.3	-	0.0	25.0	8.3	17.0	-
B-939	254.0	254.0	215.2	-	-	-	0.0	0.0	38.8	-	-	-	0.0	38.8	-	-	-
B-940	268.3	268.3	249.8	249.8	212.1	-	0.0	0.0	18.5	18.5	56.2	-	0.0	18.5	0.0	37.7	-
B-941	267.2	267.2	258.7	219.3	-	205.8	0.0	0.0	8.5	47.9	-	61.4	0.0	8.5	39.4	13.5	-
B-942	291.8	291.8	285.8	-	-	263.0	0.0	0.0	6.0	-	-	28.8	0.0	6.0	22.8	-	-
B-943	300.4	300.4	283.9	278.0	268.5	220.1	0.0	0.0	16.5	22.4	31.9	80.3	0.0	16.5	5.9	9.5	48.4
B-944	334.7	334.7	299.7	-	281.2	-	0.0	0.0	35.0	-	53.5	-	0.0	35.0	18.5	-	-
B-945	281.5	281.5	228.1	-	221.0	210.6	0.0	0.0	53.4	-	60.5	70.9	0.0	53.4	7.1	-	10.4
B-946	333.4	333.4	301.2	-	291.6	-	0.0	0.0	32.2	-	41.8	-	0.0	32.2	9.6	-	-
B-947	312.5	312.5	260.8	248.8	-	-	0.0	0.0	51.7	63.7	-	-	0.0	51.7	12.0	-	-
B-948	310.4	310.4	288.4	281.9	274.7	-	0.0	0.0	22.0	28.5	35.7	-	0.0	22.0	6.5	7.2	-
B-949	334.8	334.8	281.9	-	258.4	-	0.0	0.0	52.9	-	76.4	-	0.0	52.9	23.5	-	-
B-950	282.5	282.5	261.8	-	232.2	218.7	0.0	0.0	20.7	-	50.3	63.8	0.0	20.7	29.6	-	13.5
B-951	249.9	249.9	230.4	209.3	-	179.9	0.0	0.0	19.5	40.6	-	70.0	0.0	19.5	21.1	29.4	-

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Table 2.5-209 Type and Number of Laboratory Tests Performed

N058b

Material	Test	Number
Soil	Natural moisture content	111
	Specific gravity	6
	Sieve and hydrometer analysis	52
	Grain size analysis with no. 200 wash	64
	Atterberg limits	18
	Chemical analysis (pH, chloride, sulfate)	20
	Triaxial consolidated-undrained compression	6
	Resonant column torsional shear	5
	California bearing ratio	5
	Moisture density (modified Proctor)	9
Rock	Unit weight	82
	Unconfined compression	55
	Unconfined compression with stress-strain measurements	27

- For Information Only -

N058b

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel (1) (%)	Sand (1) (%)	Fines (2) (%)	Silt (1) (%)	0.005 mm Clay (1) (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-901	B-901-2	3.5-5.0	SPT	0.0	53.6	46.4	10.8	35.6	(8)	21.5	(8)	(8)	(8)	(8)	(8)	(8)
B-901	B-901-4	11.5-13.0	SPT	0.0	76.6	23.4	16.0	7.4		10.2				5.8	ND (5)	ND (5)
B-901	B-901-6	22.2-23.7	SPT	0.0	76.8	23.2				16.4						
B-901	B-901-9	37.2-38.7	SPT	0.7	71.9	22.5	15.2	7.3		16.4						
B-901	UD-2	9.5-11.5 (4)	UD	0.0	78.0	22.0	12.6	9.4		15.0						
B-902	B-902-2	3.5-5.0	SPT	0.0	86.1	13.9				5.6						
B-902	B-902-4	8.5-10.0	SPT	1.3	71.0	29.0	13.4	15.6	SM	23.9	33	7				
B-902	B-902-6	13.5-15.0	SPT	0.0	80.0	20.0				14.0						
B-907	B-907-2	3.5-5.0	SPT	0.0	67.0	33.0	17.7	15.3	SM	14.0	33	8				
B-907	B-907-3	5.5-7.0	SPT	0.0	74.9	25.1				16.4				4.8	51.1 ^{J}	ND (5)
B-907	B-907-5	11.0-12.5	SPT	0.0	76.0	24.0				20.2						
B-907	B-907-7	17.5-19.0	SPT	0.0	80.9	19.1	11.7	7.4		12.3						
B-907	B-907-9	27.5-29.0	SPT	0.0	73.9	26.1										
B-907	B-907-10	32.5-34.0	SPT	0.0	66.6	23.4										
B-908	B-908-3	6.0-7.5	SPT	2.0	72.6	25.4	11.6	13.8		12.3			2.62			
B-908	B-908-6	13.5-15.0	SPT	0.0	76.6	23.4							2.69			
B-908	B-908-8	23.7-25.2	SPT	0.0	68.1	31.9										
B-908	B-908-13	47.1-48.6	SPT	0.0	76.0	24.0	18.9	5.1		14.5						
B-909	B-909-3	6.0-7.5	SPT	0.0	66.9	33.1	19.3	13.8	SM	25.9	57	12				

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel $^{(1)}$ (%)	Sand $^{(1)}$ (%)	Fines $^{(2)}$ (%)	Silt $^{(1)}$ (%)	0.005 mm Clay $^{(1)}$ (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-909	B-909-5	11.0-12.5	SPT	0.0	77.6	22.4				31.4				5.4	137 ^{J}	6.7
B-909	B-909-7	18.5-20.0	SPT	0.0	63.7	36.3	29.0	7.3	SM	25.1	30	4				
B-909	B-909-8	23.5-25.0	SPT	1.7	56.1	42.2				35.4						
B-909	B-909-12	41.9-43.4	SPT	0.0	75.3	24.7				17.6						
B-910	B-910-2	3.5-5.0	SPT	4.0	31.9	64.1	12.1	52.0		27.7						
B-910	B-910-5	11.0-12.5	SPT							30.5	45	13		5.8	3.6 ^{J}	5.1 ^{B}
B-910	B-910-7	18.5-20.0	SPT	0.0	46.4	53.6	43.1	10.5		33.1						
B-910	B-910-9	25.9-27.4	SPT	2.3	76.3	21.4				14.6				6.7	5.2 ^{J}	4.2 ^{B}
B-911	B-911-2	3.5-5.0	SPT	0.3	59.1	40.6				12.8						
B-911	B-911-4	8.0-9.5	SPT	0.0	70.6	29.4	13.6	15.8		19.6						
B-911	B-911-5	11.0-12.5	SPT	0.0	78.3	21.7								5.6	3.4 ^{J}	ND $^{(5)}$
B-911	B-911-7	18.5-20.0	SPT	0.1	80.0	19.9				11.1						
B-912	B-912-1	9.1-10.6	SPT	0.0	73.7	26.3	20.8	5.5		24.0						
B-912	B-912-3	14.1-15.6	SPT	0.0	72.6	27.4				15.2						
B-912	B-912-4	19.1-19.9	SPT	14.5	84.9	0.6				15.7						
B-913	B-913-8	43.5-48.5	SPT	0.0	72.3	27.7										
B-914	B-914-2	3.5-5.0	SPT	0.1	52.9	47.0	21.0	26.0	SC	16.6	27	10				
B-914	B-914-3	6.0-7.5	SPT	4.0	63.0	33.0										
B-914	B-914-5	11.0-13.5	SPT	2.1	78.0	19.9										

Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel (1) (%)	Sand (1) (%)	Fines (2) (%)	Silt (1) (%)	0.005 mm Clay (1) (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-914	B-914-7	19.0-20.5	SPT	27.8	61.0	11.2	8.6	2.6		20.8						
B-914	B-914-9	35.6-37.1	SPT	5.7	70.1	24.2								6.8	8.4 ^{J}	ND (5)
B-914	B-914-10	40.6-42.1	SPT	0.1	74.4	25.5	19.5	6.0		20.5						
B-917	B-917-13	48.5-53.5	SPT	0.0	81.9	18.1	15.0	3.1								
B-918	B-918-2	1.8-3.2	SPT	1.2	85.7	13.1	7.3	5.8		15.8			2.68			
B-918	B-918-3	5.1-6.6	SPT	0.0	85.0	15.0				13.3				6.9	8.0 ^{J}	9.4
B-918	B-918-4	9.3-10.8	SPT	0.0	80.6	19.4	13.4	6.0		13.7						
B-918	B-918-6	13.2-14.7	SPT	0.0	77.7	22.3				13.9						
B-918	B-918-8	22.4-23.9	SPT	1.4	79.4	19.2				17.8						
B-919	B-919-1	1.5-3.0	SPT							18.6	32	11				
B-919	B-919-3	5.9-7.4	SPT	2.5	80.9	16.6				11.1						
B-919	B-919-5	11.0-12.5	SPT	0.6	80.4	19.0				11.2						
B-919	B-919-7	18.9-19.4	SPT	3.7	75.5	20.8	10.8	10.0		13.8						
B-919	B-919-13	51.3-52.8	SPT	0.0	65.9	34.1	26.0	8.1		17.9						
B-920	B-920-1	2.0-3.5	SPT							25.2						
B-920	B-920-2	3.8-5.3	SPT											5.9	1.5 $^{B\ J}$	7.5
B-920	B-920-3	6.0-7.5	SPT	0.3	58.9	40.8				24.1						
B-920	B-920-6	13.8-15.3	SPT							15.7				6.5	63.0 ^{J}	7.5
B-920	B-920-7	18.8-20.3	SPT	0.0	72.3	27.7	21.3	6.4		15.4						

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel $^{(1)}$ (%)	Sand $^{(1)}$ (%)	Fines $^{(2)}$ (%)	Silt $^{(1)}$ (%)	0.005 mm Clay $^{(1)}$ (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-920	B-920-9	27.3-28.8	SPT	0.0	79.9	20.1				19.5						
B-920	B-920-12	43.5-44.7	SPT							12.9				6.9	$1.4^{B\ J}$	2.3^{B}
B-921	B-921-1	1.5-3.0	SPT	11.5	52.1	36.4				12.0						
B-921	B-921-3	6.0-7.5	SPT	0.0	41.3	58.7	29.2	29.5	CL	24.8	34	14				
B-921	B-921-4	8.5-10.0	SPT	0.0	53.5	46.5	37.3	9.2		28.0				7.0	4.4^{J}	10.8
B-921	B-921-6	13.5-15.0	SPT	0.0	74.2	25.8	16.1	9.7		26.0						
B-921	B-921-8	23.8-25.3	SPT							32.1	38	NP				
B-921	B-921-10	33.8-35.3	SPT	0.0	75.5	24.5				20.4						
B-921	B-921-11	38.8-40.3	SPT	0.0	81.3	18.7				15.8						
B-921	B-921-16	63.8-65.3	SPT	0.0	75.1	24.9	18.2	6.7		8.5						
B-923	B-923-2	3.3-4.8	SPT	10.9	55.5	33.6	16.7	16.9	SC	22.5	33	10				
B-924	B-924-2	3.5-5.0	SPT	23.2	65.8	11.0	7.9	3.1		2.1						
B-924	B-924-3	6.0-7.5	SPT	11.1	74.5	14.4				4.8						
B-927	B-927-1	1.5-3.0	SPT	0.0	61.4	38.6	12.6	26.0	SC	14.1	28	10				
B-927	B-927-2	3.5-5.0	SPT	0.0	75.8	24.2				11.7						
B-927	B-927-3	6.0-7.5	SPT	0.0	73.2	26.8	17.1	9.7		12.2						
B-927	B-927-4	8.5-10.0	SPT	0.0	83.3	16.7				6.8				5.8	2.8^{J}	4.3^{B}
B-927	B-927-6	13.5-15.0	SPT	0.0	81.2	18.8				11.2						
B-927	B-927-7	18.5-20.0	SPT	0.0	76.2	23.8				11.4						

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel (1) (%)	Sand (1) (%)	Fines (2) (%)	Silt (1) (%)	0.005 mm Clay (1) (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-927	B-927-8	23.5-25.0	SPT	0.0	79.7	20.3				15.7				7.4	5.6 ^{J}	3.4 ^{B}
B-928	B-928-2	3.5-5.0	SPT	0.0	78.4	21.6				17.9						
B-928	B-928-4	8.3-9.8	SPT	0.0	73.4	26.6				18.5				6.8	120.0 ^{J}	4.9 ^{B}
B-928	B-928-6	14.0-15.5	SPT	0.0	77.0	23.0	17.8	5.2		24.5						
B-928	B-928-8	22.1-23.6	SPT	0.0	78.7	21.3				17.0						
B-928	B-928-9	27.1-28.6	SPT	0.0	74.7	25.3	19.2	6.1		16.4						
B-928 A	UD-3	20-22 (4)	UD	0.0	82.0	18.0	13.2	4.8								
B-929	B-929-1	1.5-3.0	SPT	12.2	43.7	44.1	16.6	27.5	SC	14.5	36	17				
B-929	B-929-2	3.5-5.0	SPT								54	16				
B-929	B-929-4	8.7-10.2	SPT	0.0	65.5	34.5				18.9				5.9	2.8 ^{J}	2.7 ^{B}
B-929	B-929-5	13.5-15.0	SPT	0.0	73.8	26.2				19.6						
B-929	B-929-7	23.0-24.5	SPT	0.0	76.9	23.1	17.0	6.1		18.8						
B-929	B-929-9	33.0-34.5	SPT	0.0	82.7	17.3				16.9						
B-929	B-929-11	43.0-44.5	SPT	0.7	81.4	17.9				17.2						
B-929	B-929-13	53.0-54.5	SPT	0.0	80.0	20.0				13.8						
B-929A	UD-1	15.0-16.8 (4)	UD	0.0	78.6	21.4	15.1	6.3		13.1						
B 929A	UD-6	40-41.8 (4)	UD	0.0	83.3	16.7	11.7	5.0		16.9						
B-931	B-931-10	47.3-48.8	SPT	0.0	78.5	21.5	15.9	5.6								
B-932	B-932-5	19.0-20.5	SPT	0.0	77.7	22.3	15.7	6.6		21.5						

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel [1] (%)	Sand [1] (%)	Fines [2] (%)	Silt [1] (%)	0.005 mm Clay [1] (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-933	B-933-3	6.0-7.5	SPT	0.0	62.3	37.7	22.6	15.1	SM	24.2	28	3				
B-933	B-933-5	11.2-12.7	SPT	0.0	58.8	41.2				25.9				5.4	210 ^{J}	3.0 ^{B}
B-933	B-933-7	19.5-21.0	SPT	0.0	76.6	23.4				26.7						
B-933	B-933-8	24.5-25.0	SPT	0.0	80.5	19.5				18.7						
B-945	B-945-1	1.5-3.0	SPT	0.0	82.0	18.0				14.5						
B-945	B-945-3	4.7-6.2	SPT	0.0	75.5	24.5	16.2	8.3		15.9						
B-945	B-945-5	11.3-12.8	SPT	0.0	84.2	15.8				21.6				6.4	6.9 ^{J}	3.1 ^{B}
B-945	B-945-7	19.4-20.9	SPT	0.0	84.8	15.2				27.6			2.58			
B-945	B-945-9	27.8-29.4	SPT	0.0	82.9	17.1	10.2	6.9		24.1						
B-945	B-945-11	39.4-40.9	SPT	0.0	90.1	9.9				20.4						
B-945	B-945-13	49.4-50.9	SPT	0.0	90.3	9.7				15.6						
B-947	B-947-1	1.5-3.0	SPT							16.7	55	25	2.60			
B-947	B-947-3	4.5-6.0	SPT	0.0	38.3	61.7	23.5	38.2	MH	36.0	56	19				
B-947	B-947-4	8.5-10.0	SPT	0.0	60.0	40.0			SM	20.7	38	9				
B-947	B-947-5	9.5-11.0	SPT	1.6	55.9	42.5	21.1	21.4		28.2			2.78			
B-947	B-947-6	13.5-15.0	SPT	0.0	30.5	69.5				22.5						
B-947	B-947-7	17.2-18.7	SPT	0.0	75.8	24.2				21.1				6.4	21.4 ^{J}	6.4
B-947	B-947-8	22.2-23.7	SPT	0.6	79.4	20.0	10.7	9.3		24.3						
B-947	B-947-9	28.7-30.2	SPT	0.0	66.6	33.4				28.8	33	NP				

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel (1) (%)	Sand (1) (%)	Fines (2) (%)	Silt (1) (%)	0.005 mm Clay (1) (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-947	B-947-10	33.7-35.2	SPT	0.0	81.3	18.7				20.2						
B-947	B-947-11	38.7-40.2	SPT	0.0	85.8	14.2				16.9						
B-947	B-947-12	42.2-43.7	SPT	0.0	79.7	20.3	13.4	6.9		20.5						
B-948	B-948-1	1.5-3.0	SPT	0.0	54.7	45.3				83.7						
B-948	B-948-3	6.0-7.5	SPT	0.0	51.1	48.9				16.2				5.7	3.8 J	ND (5)
B-948	B-948-5	9.5-11.0	SPT	0.0	31.0	69.0	61.9	7.1		13.7						
B-948	B-948-7	18.5-20.0	SPT	0.0	35.9	64.1				15.2						
B-948	B-948-8	23.5-24.4	SPT	0.0	77.7	22.3				13.6						
B-951	B-951-8	23.0-24.5	SPT	0.2	82.9	16.9	10.5	6.4		13.9						

(1) Due to computer roundoff, particle size fractions may total 100 ±1. Fines include silt plus clay.

(2) Fines include silt plus clay.

(3) Tests performed by STL - St. Louis, MO

(4) Depth interval shown reflects total pushed depth of UD tube.

(5) ND indicates analyte not detected at or above the Method Detection Limit

(6) B = Estimated Result. Analyte detected above the Method Detection Limit but not above the Reporting Limit.

(7) J = Method blank contamination. The associated method blank contains the target analyte at a reportable level

(8) Shaded cells indicate that information not obtained.

NAPS COL 2.0-29-A

Table 2.5-210 Results of Laboratory Tests on Soil Samples; Consolidated-Undrained Triaxial Tests

Source of Sample	Sample No.	Sample Depth (1) (ft)	Sample Type	Test Type	C' (psf)	Φ' (degree)	C (psf)	Φ' (degree)	Comment
B-901	UD-2	9.5-11.5	UD Tube	CU	0.0	33.6	0.0	37.5	
B-928 A	UD-3	20-22	UD Tube	CU	423.4	31.4	103.7	41.2	
B-929 A	UD-1	15-16.75	UD Tube	CU	5.4	32.4	178.6	35.8	Only 2 points tested due to limited sample
B-929 A	UD-4	30-31.5	UD Tube	CU	0.0	33.0	0.0	33.0	Only 2 points tested due to limited sample
B-929 A	UD-6	40-41.5	UD Tube	CU	0.0	36.1	318.2	36.4	
B-933 A	UD-2	15-16.25	UD Tube	CU	55.0	32.6	479.5	30.5	Only 2 points tested due to limited sample

(1) Sample depth shown reflects the depth of start of push plus the length of the recovered sample

NAPS COL 2.0-29-A Table 2.5-210 Results of Laboratory Tests on Soil Samples Moisture-Density and CBR Tests

		Moisture/Density Results [A]			CBR Results [B]			
Source of Sample	Sample No.	Natural Moisture (%)	Maximum Dry Density (pcf)	Optimum Moisture (%)	Molded Density (pcf)	Molded Moisture (%)	Soaked CBR (0.10") (%)	Soaked CBR (0.20") (%)
Test Pit 1	TP-1-1	23.4	108.7	17.6	Not Tested			
Test Pit 1	TP-1-2	22.6	108.8	17.1	90.3	17.0	1.2	1.6
					94.4	17.0	6.3	5.5
					105.3	17.2	14.7	15.6
Test Pit 2	TP-2	22.6	100.4	22.3	83.0	22.8	1.1	1.1
					89.1	22.0	1.3	1.2
					101.0	22.0	6.2	6.5
Test Pit 3	TP 3-1	16.1	124.9	9.5	Not Tested			
Test Pit 3	TP 3-2	12.4	124.5	10.9	117.5	10.7	5.9	6.0
					122.9	10.6	3.2	5.0
					125.6	10.5	4.2	8.4
Test Pit 4	TP 4-1	30.2	108.6	17.1	Not Tested			
Test Pit 4 [C]	TP 4-2	15.2	125.5	10.8	119.4	11.0	4.9	7.3
					121.5	10.6	8.8	11.9
Test Pit 5	TP 5	9.4	126	9.2	Not Tested			
Test Pit 6	TP 6	18.2	116.1	13.2	110.3	12.3	6.9	8.0
					111.7	12.7	6.4	9.5
					115.1	12.3	12.1	13.8

A Proctor Test results, ASTM D 1557-02 Method A Modified

B California Bearing Ratio Test results, ASTM D 1883-05 (Section 7.12)

C Insufficient Material for three tests

N058b

NAPS COL 2.0-29-A **Table 2.5-211 Results of Unconfined Compression Tests on Rock**

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break (1)	Unconfined Compressive Strength (psi)(2)	Young's Modulus (psi)	Poisson's Ratio
B-901	5	54.0	5.27	2.49	2.1	160	Shear	4,375	(ND) [3]	(ND)
B-901	7	60.3	5.27	2.49	2.1	162	Columnar	15,425	3,970,000	* (4)
B-901	14	97.9	5.34	2.50	2.1	162	C&S	12,629	(ND)	(ND)
B-901	25	129.5	5.35	2.49	2.1	164	C&S	14,171	(ND)	(ND)
B-901	34	170.5	5.33	2.40	2.2	168	Shear	10,865	5,360,000	0.31
B-901	42	208.5	5.32	2.40	2.2	163	Shear	12,777	(ND)	(ND)
B-901	51	240.5	5.35	2.39	2.2	165	C&S	23,619	(ND)	(ND)
B-901	59	280.5	5.36	2.39	2.2	164	C&S	25,335	8,320,000	0.39
B-902	3	27.3	5.29	2.38	2.2	162	C&S	14,947	4,090,000	* (4)
B-902	9	47.4	5.35	2.40	2.2	163	Shear	21,007	(ND)	(ND)
B-902	14	72.3	5.34	2.40	2.2	164	C&S	25,100	(ND)	(ND)
B-902	18	92.8	5.32	2.40	2.2	164	Shear	6,030	1,840,000	0.42
B-902	28	141.9	5.31	2.40	2.2	170	Shear	6,982	(ND)	(ND)
B-902	38	184.6	5.36	2.40	2.2	163	C&S	27,303	(ND)	(ND)
B-907	3	51.9	5.29	2.45	2.2	152	Shear	957	(ND)	(ND)
B-907	12	90.0	5.23	2.46	2.1	155	Shear	751	(ND)	(ND)
B-907	24	116.8	5.27	2.47	2.1	173	Shear	4,599	(ND)	(ND)
B-907	27	131.8	5.32	2.48	2.1	173	C&S	8,519	(ND)	(ND)
B-907	33	160.8	5.32	2.50	2.1	163	Columnar	19,333	7,700,000	0.30

NAPS COL 2.0-29-A

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break (1)	Unconfined Compressive Strength (psi)(2)	Young's Modulus (psi)	Poisson's Ratio
B-907	40	200.0	5.35	2.50	2.1	165	C&S	20,166	(ND)	(ND)
B-908	2	67.5	5.32	2.38	2.2	163	Shear	5,476	(ND) 3	(ND)
B-908	4	79.4	5.25	2.39	2.2	164	C&S	14,695	3,400,000	0.41
B-908	7	96.0	5.31	2.39	2.2	163	Shear	17,164	(ND)	(ND)
B-908	11	112.7	5.32	2.38	2.2	178	Shear	15,284	(ND)	(ND)
B-908	17	135.7	5.28	2.38	2.2	187	Shear	5,670	3,180,000	0.21
B-908	20	146.8	5.31	2.38	2.2	173	Shear	7,687	(ND)	(ND)
B-909	11	82.4	5.32	2.39	2.2	176	C&S	9,464	3,520,000	* (4)
B-909	14	96.5	5.28	2.39	2.2	190	Shear	5,897	(ND)	(ND)
B-909	17	107.4	5.35	2.39	2.2	179	Shear	3,938	(ND)	(ND)
B-909	21	127.4	5.35	2.39	2.2	174	Shear	8,167	(ND)	(ND)
B-909	26	152.3	5.27	2.38	2.2	184	C&S	6,467	4,600,000	0.39
B-909	33	187.3	5.32	2.39	2.2	175	Shear	9,305	(ND)	(ND)
B-910	5	53.1	5.27	2.15	2.2	159	Shear	6,935	(ND)	(ND)
B-910	13	91.1	5.24	2.15	2.2	159	Shear	4,821	670,000	* (4)
B-910	20	120.9	5.27	2.40	2.2	163	Columnar	9,395	(ND)	(ND)
B-910	24	142.1	5.35	2.40	2.2	168	C&S	28,834	(ND)	(ND)
B-911	3	34.3	5.27	2.37	2.2	161	Shear	5,558	1,230,000	* (4)
B-911	5	44.3	5.28	2.38	2.2	162	Cone	10,209	(ND)	(ND)

NAPS COL 2.0-29-A

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break [(1)]	Unconfined Compressive Strength (psi)[(2)]	Young's Modulus (psi)	Poisson's Ratio
B-911	10	66.5	5.35	2.39	2.2	164	Cone	24,646	(ND)	(ND)
B-911	13	82.1	5.36	2.40	2.2	164	C&S	20,431	5,730,000	0.40
B-911	16	97.6	5.36	2.40	2.2	163	Shear	6,561	(ND) [3]	(ND)
B-912	3	37.1	5.32	2.39	2.2	170	C&S	3,524	2,570,000	(ND)
B-912	5	48.9	5.26	2.40	2.2	163	C&S	12,992	(ND)	(ND)
B-912	8	62.2	5.26	2.40	2.2	164	C&S	32,680	(ND)	(ND)
B-912	12	82.4	5.25	2.40	2.2	163	Shear	27,356	(ND)	(ND)
B-912	17	111.4	5.32	2.40	2.2	163	Shear	16,702	8,220,000	0.31
B-912	24	143.9	5.26	2.40	2.2	161	Columnar	15,996	(ND)	(ND)
B-914	8	63.8	5.34	2.40	2.2	169	Cone	17,866	(ND)	(ND)
B-914	10	75.3	5.32	2.40	2.2	164	C&S	36,600	(ND)	(ND)
B-914	15	95.8	5.37	2.40	2.2	164	C&S	29,776	8,980,000	0.31
B-914	20	120.6	5.32	2.39	2.2	169	C&S	17,942	(ND)	(ND)
B-914	26	151.4	5.31	2.40	2.2	166	C&S	16,517	8,930,000	0.32
B-914	34	192.7	5.32	2.40	2.2	163	Cone	30,162	(ND)	(ND)
B-918	2	31.7	5.29	2.39	2.2	164	Shear	19,038	(ND)	(ND)
B-918	4	37.1	5.32	2.40	2.2	164	C&S	29,636	9,530,000	0.35
B-918	7	51.6	5.29	2.40	2.2	165	Cone	15,409	(ND)	(ND)
B-918	9	60.7	5.32	2.40	2.2	164	Columnar	21,064	(ND)	(ND)

NAPS COL 2.0-29-A

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break (1)	Unconfined Compressive Strength (psi)(2)	Young's Modulus (psi)	Poisson's Ratio
B-918	15	88.1	5.28	2.40	2.2	165	Shear	21,944	7,850,000	0.24
B-918	22	122.0	5.25	2.40	2.2	166	C&S	33,610	(ND)	(ND)
B-920	7	90.2	5.28	2.39	2.2	160	Shear	1,021	(ND)	(ND)
B-920	11	107.7	5.32	2.39	2.2	163	Cone	29,621	8,500,000	0.34
B-920	13	119.1	5.33	2.39	2.2	181	Shear	9,456	(ND)	(ND)
B-920	18	141.1	5.35	2.40	2.2	166	Cone	18,040	5,970,000	* (4)
B-923	6	20.0	5.35	2.39	2.2	164	C&S	28,911	8,510,000	0.28
B-923	9	30.8	5.35	2.39	2.2	162	C&S	26,779	(ND)	(ND)
B-923	12	45.7	5.33	2.39	2.2	163	Shear	13,477	(ND)	(ND)
B-923	16	65.7	5.35	2.39	2.2	164	Cone	21,069	7,150,000	0.29
B-924	1	21.7	5.33	2.39	2.2	162	Shear	10,588	(ND) [3]	(ND)
B-924	3	30.2	5.35	2.39	2.2	163	C&S	15,110	(ND)	(ND)
B-924	6	44.0	5.33	2.39	2.2	174	Shear	6,384	2,620,000	* (4)
B-924	12	75.1	5.33	2.40	2.2	179	C&S	5,681	(ND)	(ND)
B-927	2	43.0	5.35	2.39	2.2	163	C&S	19,288	(ND)	(ND)
B-927	6	51.6	5.35	2.39	2.2	163	C&S	27,239	6,550,000	0.49
B-927	13	74.9	5.33	2.39	2.2	164	Cone	30,297	(ND)	(ND)
B-927	18	96.3	5.35	2.39	2.2	164	C&S	28,266	(ND)	(ND)
B-928	2	52.6	5.33	2.39	2.2	153	Shear	1,318	(ND)	(ND)

NAPS COL 2.0-29-A

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break (1)	Unconfined Compressive Strength (psi)(2)	Young's Modulus (psi)	Poisson's Ratio
B-928	6	74.7	5.35	2.39	2.2	162	Cone	20,333	5,070,000	0.35
B-933	3	50.5	5.33	2.39	2.2	163	Cone	19,395	(ND)	(ND)
B-933	7	66.6	5.34	2.38	2.2	162	Columnar	15,764	8,600,000	* (4)
B-933	11	90.1	5.32	2.39	2.2	164	Cone	30,993	(ND)	(ND)
B-948	6	56.8	5.28	2.39	2.2	162	C&S	17,089	(ND)	(ND)
B-948	10	76.1	5.25	2.40	2.2	167	C&S	22,435	(ND)	(ND)

(1) Type of Breaks: Columnar; Cone (C); Shear (S); Cone & Shear (C&S)

(2) Unconfined compressive strength corrected for L/D Ratio
Compressive strength testing was performed in general accordance with ASTM D7012-04.

(3) (ND) indicates that information was not determined

(4) Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.

N058b
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NAPS COL 2.0-29-A

Table 2.5-212 Engineering Properties for Soil and Bedrock

Stratum	Structural Fill	Zone IIA	Zone IIB	Zone III	Zone III-IV	Zone IV
Description	**Gravelly materials derived from crushing rock material**	**Saprolite – core stone less than 10% of volume of overall mass**	**Saprolite – core stone 10% to 50% of volume of overall mass**	**Weathered rock – core stone more than 50% of volume of overall mass**	**Moderately weathered to slightly weathered rock**	**Parent rock – slightly weathered to fresh rock**
USCS symbol	GW	SM, SC	SM	-	-	-
Total unit weight, g (pcf)	130	125	130	150	163	164
Fines Content (%)	0-5	25	20	-	-	-
Natural water content, w_N (%)	-	19	14	-	-	-
Atterberg limits						
Liquid limit, LL	-	-	-	-	-	-
Plastic limit, PL	-	-	-	-	-	-
Plasticity index, PI	-	-	-	-	-	-
Measured SPT N-value (blows/ft)	-	15	75	Ref	-	-
Adjusted SPT N_{60}-value (blows/ft)	50	20	100	Ref	-	-
Undrained properties						
Undrained shear strength, s_u (ksf)	-	-	-	-	-	-
Unconfined compressive strength, q_u(ksi)	-	-	-	1.0	9.0	17.0
Drained properties						
Effective cohesion, c' (ksf)	0	0.125	0	-	-	-
Effective friction angle, ' (degrees)	40	33	40	-	-	-

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Table 2.5-212 Engineering Properties for Soil and Bedrock

Stratum	Structural Fill	Zone IIA	Zone IIB	Zone III	Zone III-IV	Zone IV
Description	**Gravelly materials derived from crushing rock material**	**Saprolite – core stone less than 10% of volume of overall mass**	**Saprolite – core stone 10% to 50% of volume of overall mass**	**Weathered rock – core stone more than 50% of volume of overall mass**	**Moderately weathered to slightly weathered rock**	**Parent rock – slightly weathered to fresh rock**
Shear wave velocity, V_s (ft/sec)	1,100	850	1,600	3,000	4,500	9,000
Compression wave velocity, V_p (ft/sec)	2,400	1,800	3,500	7,300	9,000	16,000
Poisson's ratio, u (high strain)	0.3	0.35	0.3	0.4	0.33	0.27
Poisson's ratio, u (low strain)	0.37	0.35	0.37	0.4	0.33	0.27
Elastic modulus (high strain), E_h	1,800 ksf	720 ksf	3,600 ksf	400 ksi	1,900 ksi	7,250 ksi
Elastic modulus (low strain), E_l	13,000 ksf	7,500 ksf	28,000 ksf	800 ksi	1,900 ksi	7,250 ksi
Shear modulus (high strain), G_h	700 ksf	270 ksf	1,400 ksf	150 ksi	700 ksi	2,900 ksi
Shear modulus (low strain), G_l	5,000 ksf	2,800 ksf	10,000 ksf	300 ksi	700 ksi	2,900 ksi
Consolidation characteristics						
Compression ratio, CR				-	-	-
Recompression ratio, RR				-	-	-
Coefficient of subgrade reaction, k_1 (kcf)	2,000	260	2,000	-	-	-
Coefficient of sliding	0.55	0.35	0.45	0.6	0.65	0.7

NAPS COL 2.0-29-A

Table 2.5-212 Engineering Properties for Soil and Bedrock

Stratum	Structural Fill	Zone IIA	Zone IIB	Zone III	Zone III-IV	Zone IV
Description	**Gravelly materials derived from crushing rock material**	**Saprolite – core stone less than 10% of volume of overall mass**	**Saprolite – core stone 10% to 50% of volume of overall mass**	**Weathered rock – core stone more than 50% of volume of overall mass**	**Moderately weathered to slightly weathered rock**	**Parent rock – slightly weathered to fresh rock**
Static earth pressure coefficients						
Active, K_a	0.22	0.30	0.22	-	-	-
Passive, K_p	4.60	3.40	4.60	-	-	-
At-rest, K_0	0.36	0.50	0.36	-	-	-
Optimum moisture content, w_{opt} (%)		14		-	-	-
Maximum dry unit weight, g_{max} (pcf)		116		-	-	-
Rock Quality Designation, RQD (%)	-	-	-	20	65	95

NAPS ESP COL 2.5-6

Table 2.5-213 Summary of Major Structures

I N058b

Structure	Seismic Category	Approximate Dimensions (ft)	Bottom of Foundation Elevation$^{(1)}$ (ft)	Embed-ment Depth (ft)	Design Load (ksf)	
					Static	Dynam-ic
Reactor/Fuel Building	I	161 x 230	223.9	65.6	14.6	112.8
Control Building	I	78 x 99	240.6	48.9	6.1	50.2
Fire Water Service Complex	I	66 x 171	281.8	7.7	3.45	14.0
Turbine Building	NS	194 x 377	263.6	25.9	6	—
Radwaste Building	NS$^{(2)}$	108 x 213	237.5	52.0	6	—
Service Building	II	111 x 163	274.1	15.4	4	—
Ancillary Diesel Building	II	61 x 71	286.2	3.3	4	—

I N021

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Note: (1) The bottom of foundation is derived from the finished ground level grade at Elevation 289.5 ft.

(2) The Radwaste Building is seismically designed. See DCD Table 2.0-1, Note 1.

S128e

NAPS ESP COL 2.5-6

Table 2.5-214 Allowable Static Bearing Capacities of Rock

I N058b

Rock Type	Unconfined Compressive Strength, q_u (ksi)	$q_a = 0.2\ q_u$ (ksf)	Recommended q_a (ksf)
Zone III	1	29	20
Zone III-IV	9	259	80
Zone IV	17	490	160

NAPS ESP COL 2.5-6

Table 2.5-215 Summary of Allowable Bearing Capacities for the Major Structures

N058b

Structure	Calculated Allowable Bearing Capacity, q_a (ksf)						Minimum q_a (ksf)	
	Structural Fill	Concrete Fill	Zone IIB	Zone III	Zone III-IV	Zone IV	Static	Dynamic
Reactor/Fuel Building	-	214	-	-	80	160	80	214
Control Building	-	214	-	20	80	160	50	144
Fire Water Service Complex	83.4	-	-	20	80	160	20	29
Turbine Building	242.5	-	242.5	20	80	160	20	29
Radwaste Building	214.1	-	-	20	80	160	20	29
Service Building	134.9	-	134.9	20	80	160	20	29
Ancillary Diesel Building	—	—	57.5	20	80	160	20	29

N095a

NAPS ESP COL 2.5-6

Table 2.5-216 Estimated Settlements of the Major Structures

I N058b

Structure	Applied Load (ksf)	Settlement (in.) Center	Edge	Average(1)	Corner
Reactor/Fuel Building	14.6	0.12	0.08	0.10	0.05
Control Building	6.1	0.04	0.03	0.035	0.02
Fire Water Service Complex	3.45(2) 2.30(3)	0.94 0.62	0.51 0.34	0.73 0.48	0.26 0.17
Turbine Building	6	2.24	1.14	1.69	0.58
Radwaste Building	6	0.75	0.38	0.57	0.19
Service Building	4	1.56	0.83	1.20	0.43
Ancillary Diesel Building	4	0.14	0.07	0.11	0.04

| N095a

Notes: (1) Average is average of center and edge settlements
(2) Applied load including weight of basemat
(3) Applied load excluding weight of basemat

NAPS ESP COL 2.5-10 **Table 2.5-217 Maximum Acceleration Results** | N058b

Depth (ft)	Low Frequency Max. Acc. (g)	High Frequency Max. Acc. (g)
0.0	0.2964	0.5531
2.5	0.2693	0.5237
5.0	0.2338	0.4691
7.5	0.2200	0.4461
10.0	0.2099	0.4356
12.5	0.2065	0.4444
15.0	0.2065	0.4692
17.5	0.2079	0.4761
20.0	0.2088	0.4841
22.5	0.2112	0.4831
25.0	0.2200	0.4975
27.5	0.2266	0.5042
30.0	0.2291	0.5180
32.5	0.2279	0.5366
35.0	0.2273	0.5510
37.5	0.2265	0.5467
40.0	0.2219	0.5367
42.5	0.2164	0.5275
45.0	0.2091	0.5115
50.0	0.1881	0.4395
55.0	0.1794	0.4085

NAPS COL 2.0-30-A

Table 2.5-218 Water Level Measurements for Well OW-947

N058b

Date	Groundwater Elevation, Ft
11/29/2006	297.61
2/28/2007	297.81
5/30/2007	297.92
8/29/2007	296.00

NAPS COL 2.0-30-A

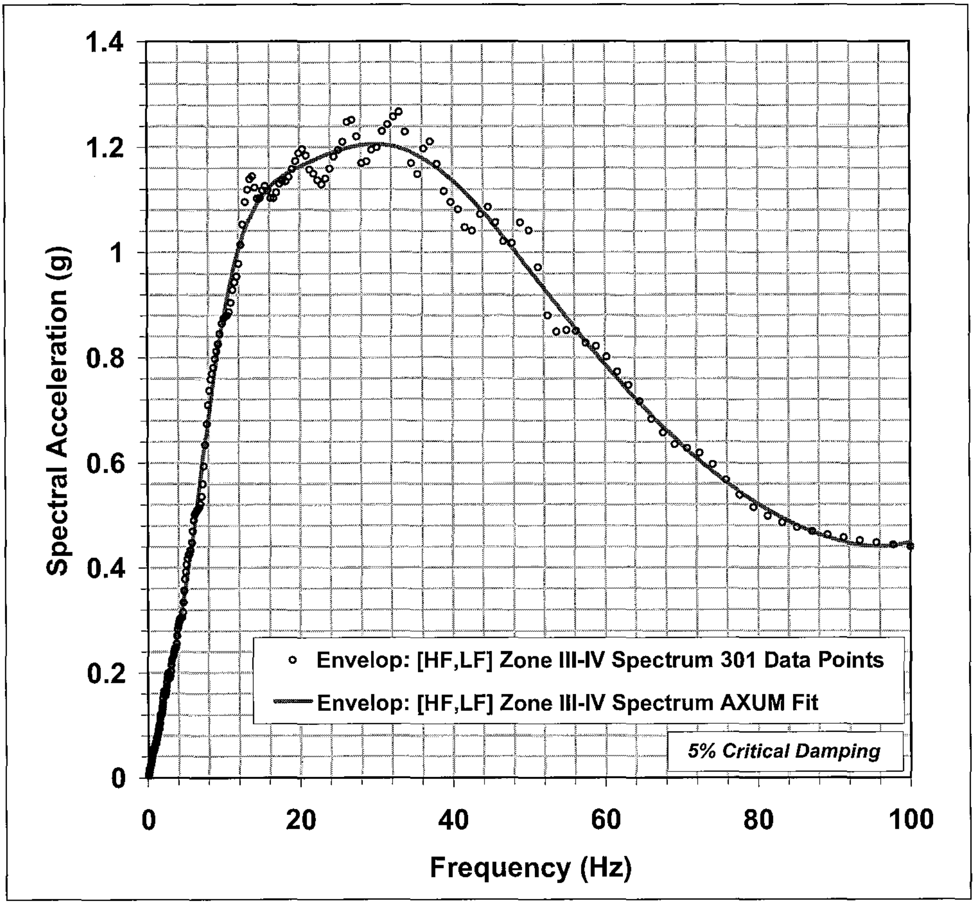
Table 2.5-219 Grain-Size Test Results for Boring B-947

N058b

Sample No.	Depth (Ft)	Gravel (%)	Sand (%)	Fines (%)	Silt (%)	Clay (%)
B-947-3	4.5–6.0	0.0	38.3	61.7	23.5	38.2
B-947-4	8.5–10.0	0.0	60.0	40.0	-	-
B-947-5	9.5–11.0	1.6	55.9	42.5	21.1	21.4
B-947-6	13.5–15.0	0.0	30.5	69.5	-	-
B-947-7	17.2–18.7	0.0	75.8	24.2	-	-
B-947-8	22.2–23.7	0.6	79.4	20.0	10.7	9.3
B-947-9	28.7–30.2	0.0	66.6	33.4	-	-
B-947-10	33.7–35.2	0.0	81.3	18.7	-	-
B-947-11	38.7–40.2	0.0	85.8	14.2	-	-
B-947-12	42.2–43.7	0.0	79.7	20.3	13.4	6.9

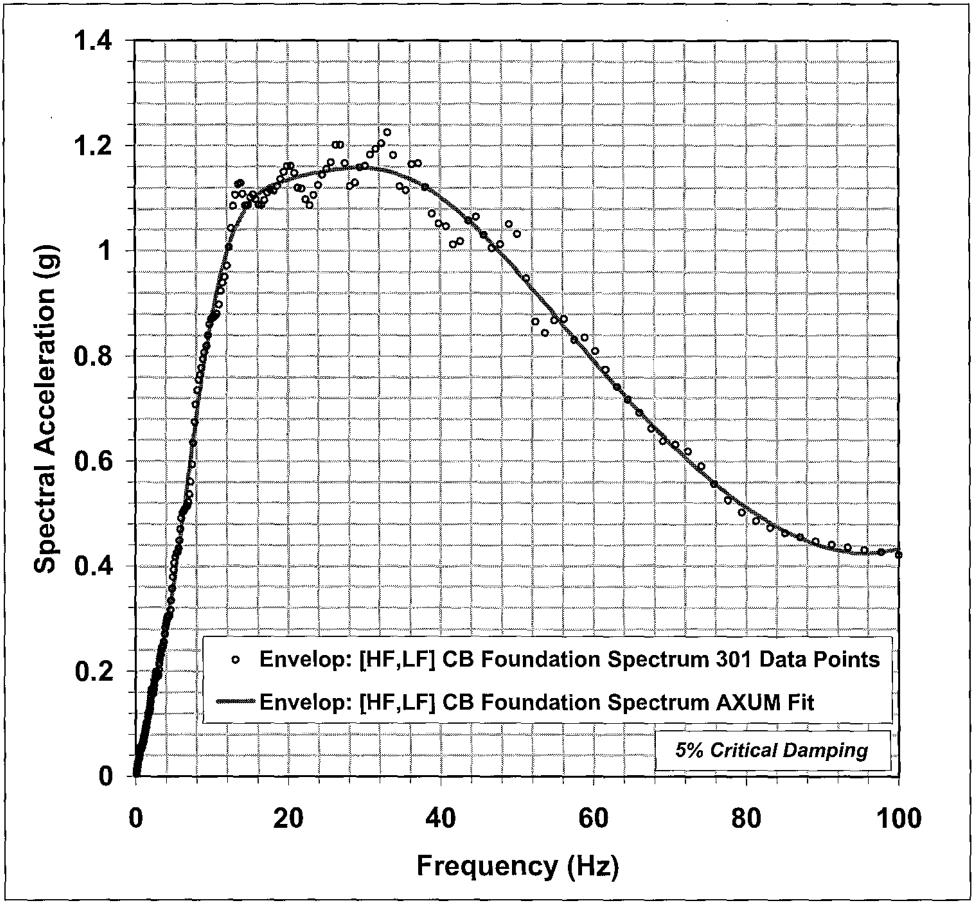
NAPS COL 2.0-27-A **Figure 2.5-201 Plot of the 301-Point Response Spectrum Processed from SHAKE Output and the Smooth Fitting Function for the Control Point, Zone III-IV, Top of Competent Rock (Elevation 83.2 m (273 ft))**

IN058b



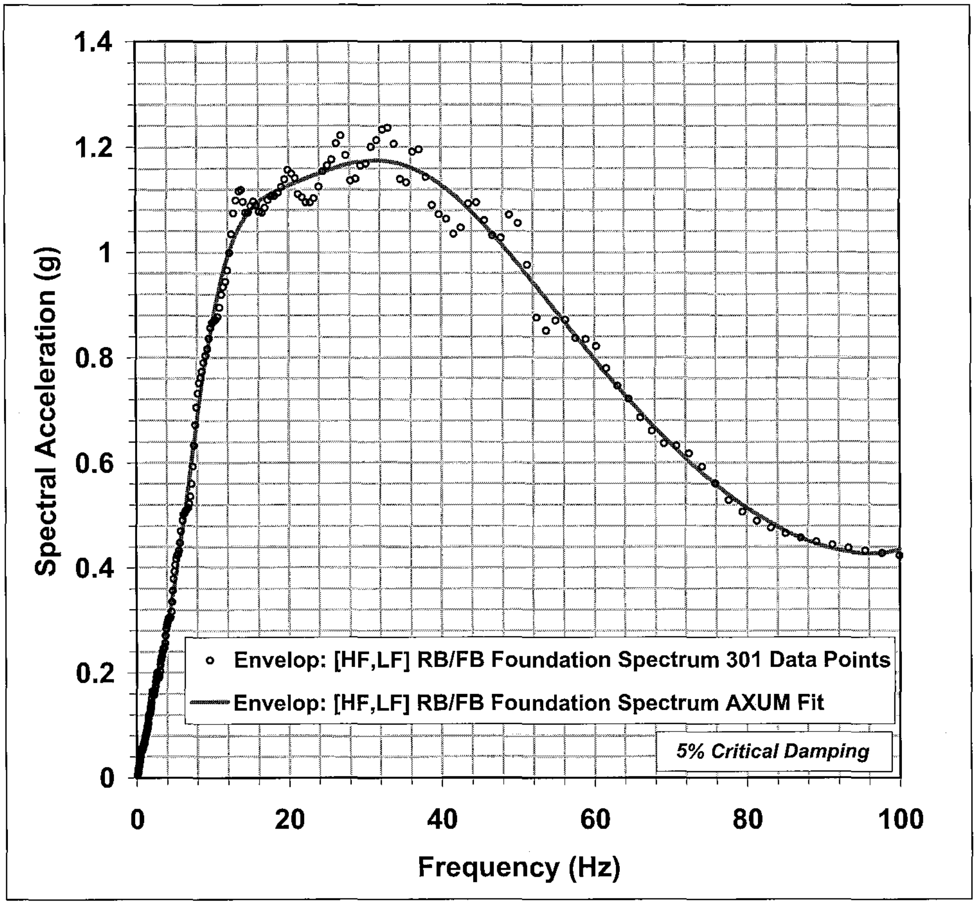
NAPS COL 2.0-27-A **Figure 2.5-202 Plot of the 301-Point Response Spectrum Processed from SHAKE Output and the Smooth Fitting Function for the Base of CB Foundation (Elevation 73.5 m (241 ft))**

I N0586



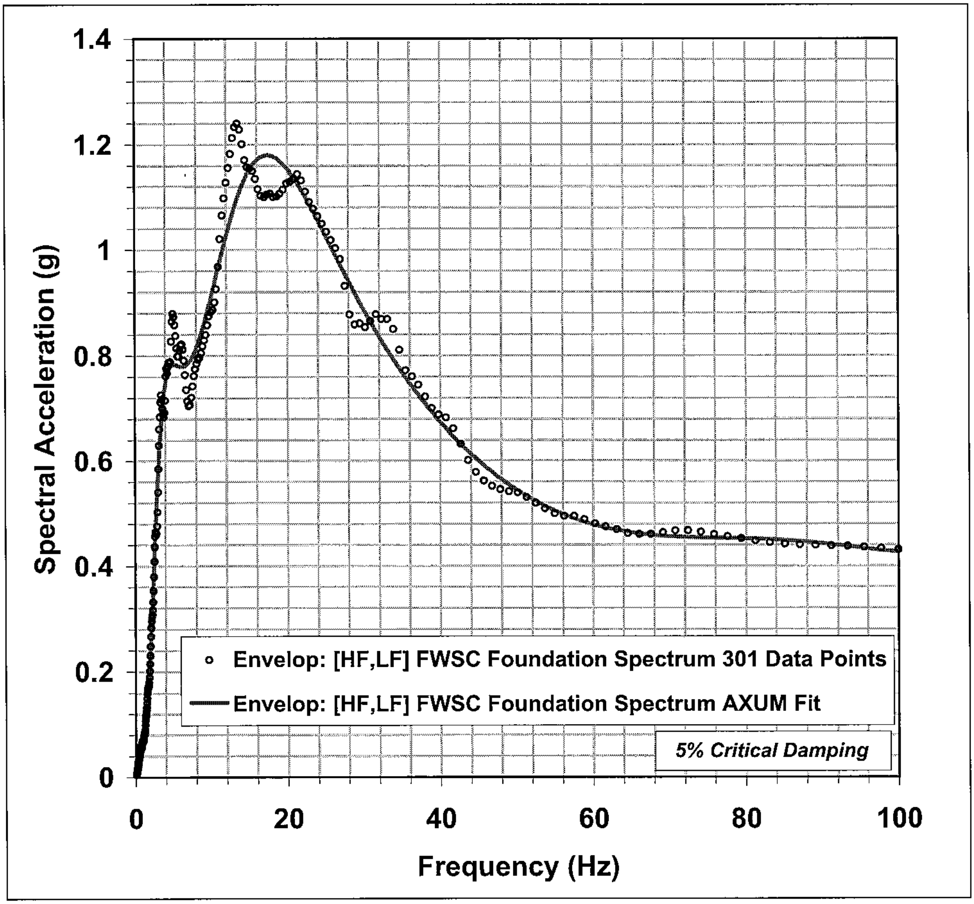
NAPS COL 2.0-27-A **Figure 2.5-203** **Plot of the 301-Point Response Spectrum Processed from SHAKE Output and the Smooth Fitting Function for the Base of the RB/FB Foundation (Elevation 68.3 m (224 ft))**

| N058b



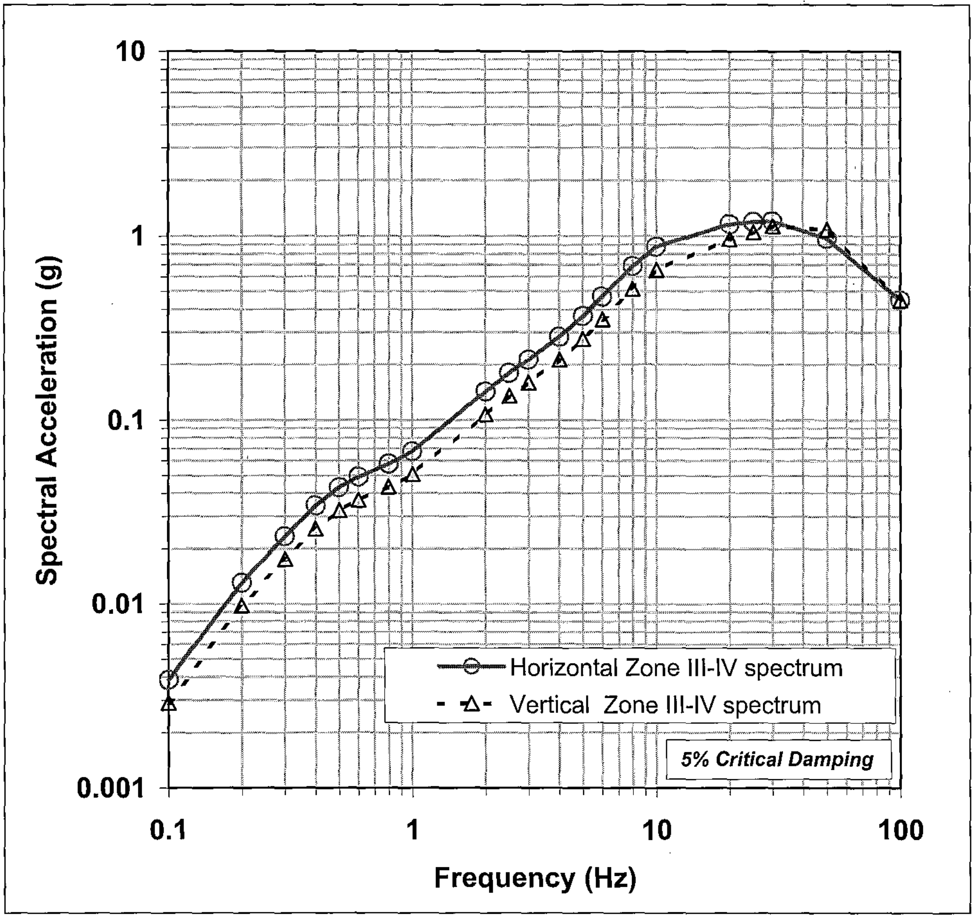
NAPS COL 2.0-27-A **Figure 2.5-204 Plot of the 301-Point Response Spectrum Processed from SHAKE Output and the Smooth Fitting Function for the Base of the FWSC Foundation (Elevation 86.0 m (282 ft))**

I N0586



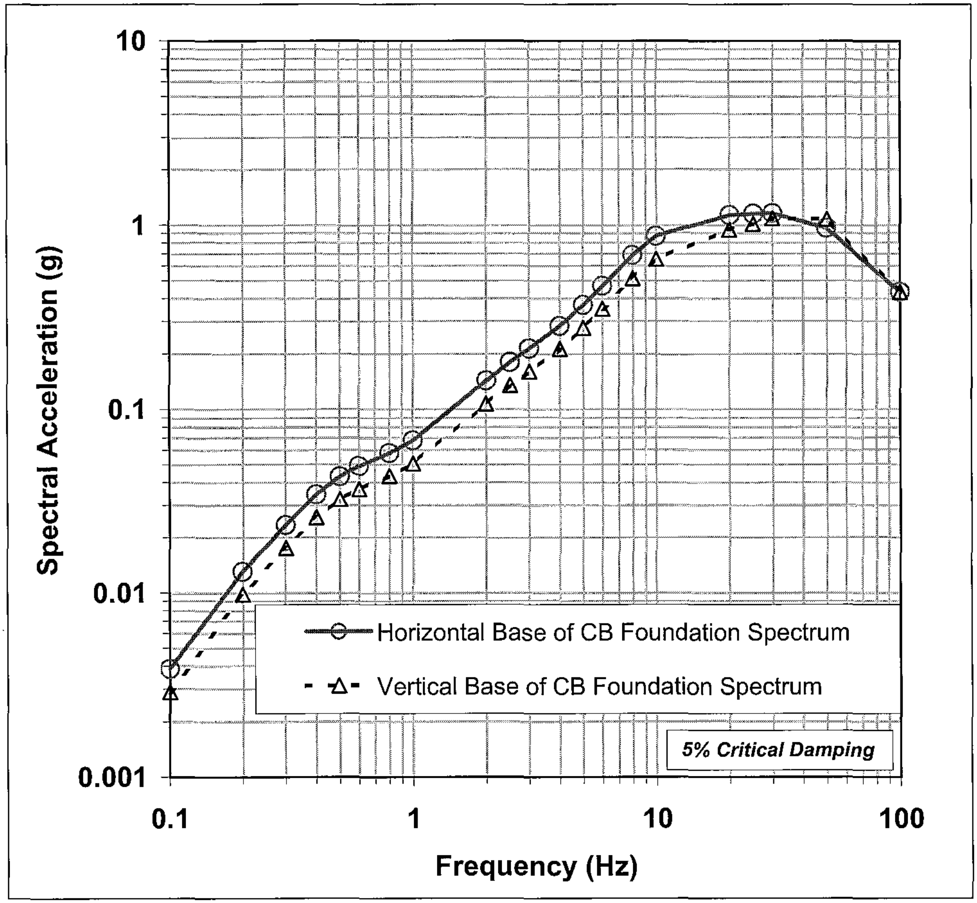
IN0586

NAPS COL 2.0-27-A **Figure 2.5-205 Selected Horizontal and Vertical Control Point SSE Response Spectra at the Top of Zone III-IV Material, Top of Competent Rock (Elevation 83.2 m (273 ft))**



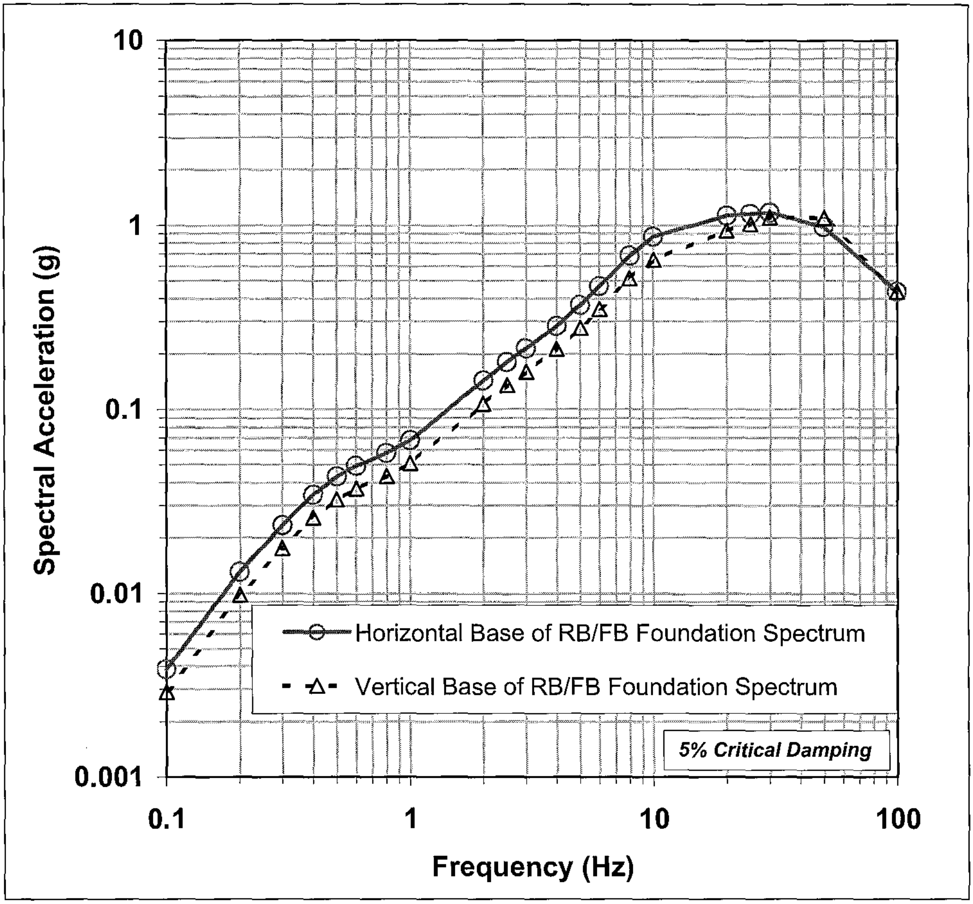
NAPS COL 2.0-27-A **Figure 2.5-206 Selected Horizontal and Vertical SSE Response Spectra at the Base of the CB Foundation (Elevation 73.5 m (241 ft))**

I N058b



NAPS COL 2.0-27-A **Figure 2.5-207 Selected Horizontal and Vertical SSE Response Spectra at the Base of the RB/FB Foundation (Elevation 68.3 m (224 ft))**

IN058b



NAPS COL 2.0-27-A **Figure 2.5-208 Selected Horizontal and Vertical SSE Response Spectra at the Base of the FWSC Foundation (Elevation 86.0 m (282 ft))**

IN058b

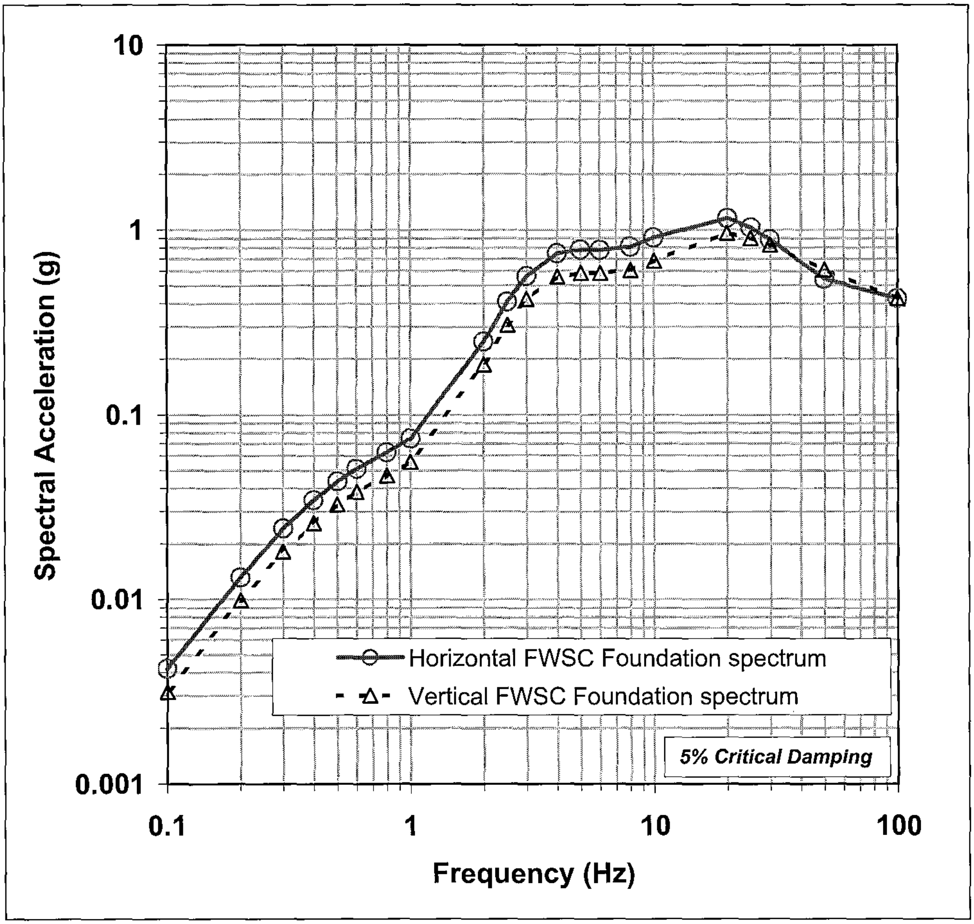


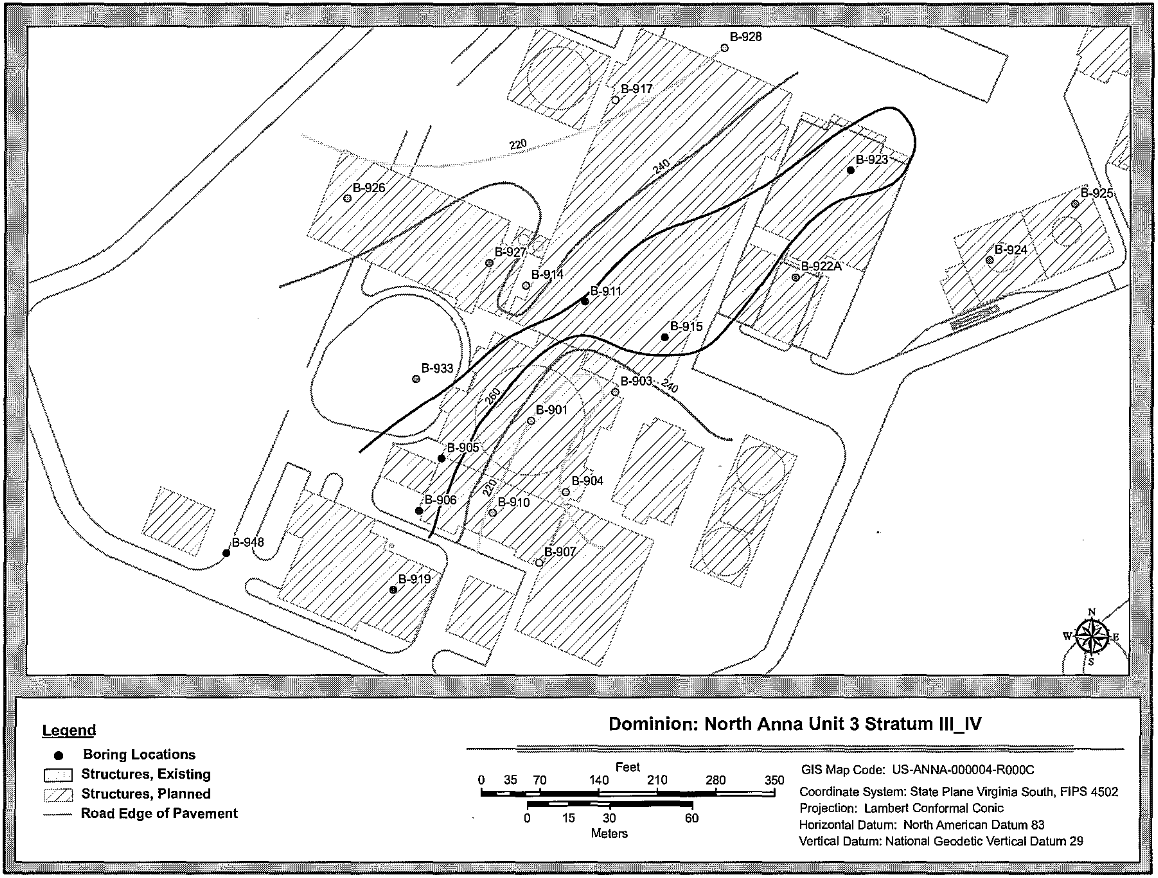
Figure 2.5-209 Contours of Top of Zone IV

N058b

N095a

N058b

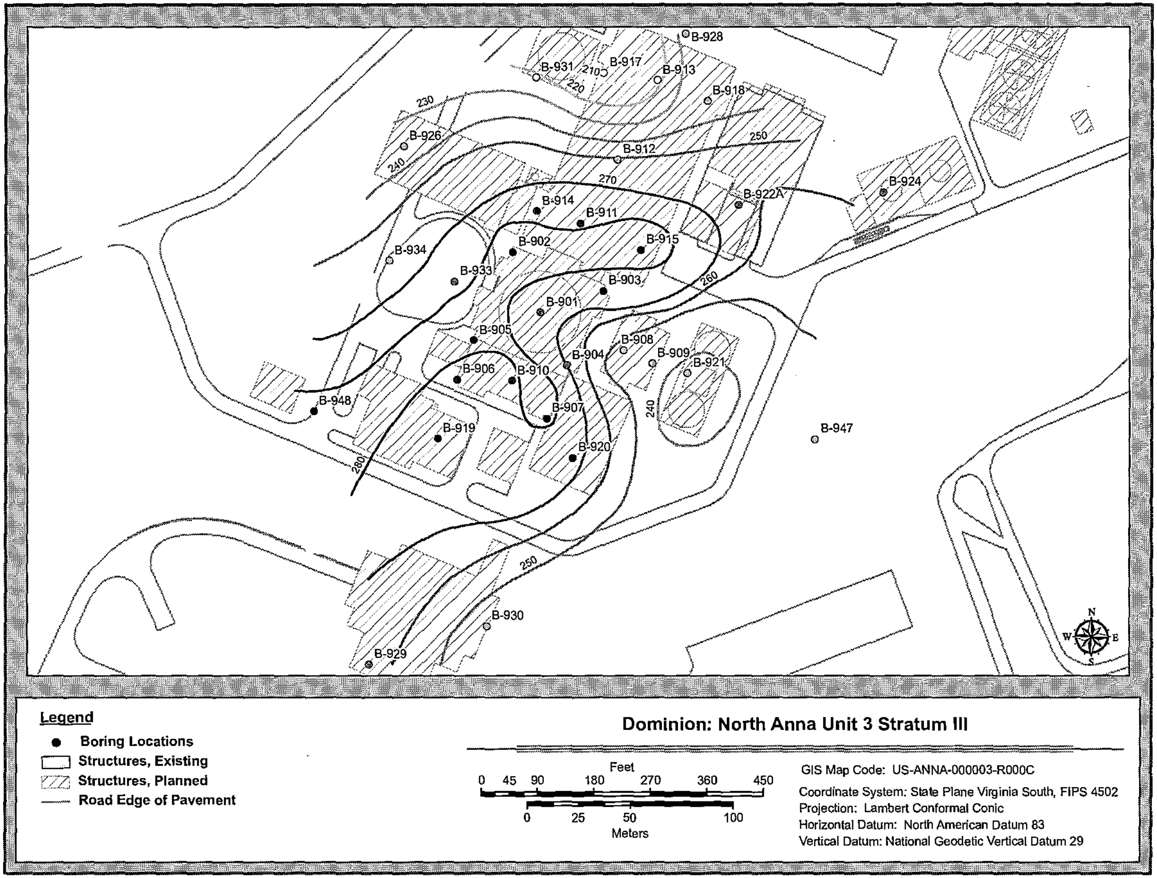
NAPS COL 2.0-29-A **Figure 2.5-210 Contours of Top of Zone III-IV**



N095a

N058b

NAPS COL 2.0-29-A **Figure 2.5-211 Contours of Top of Zone III**

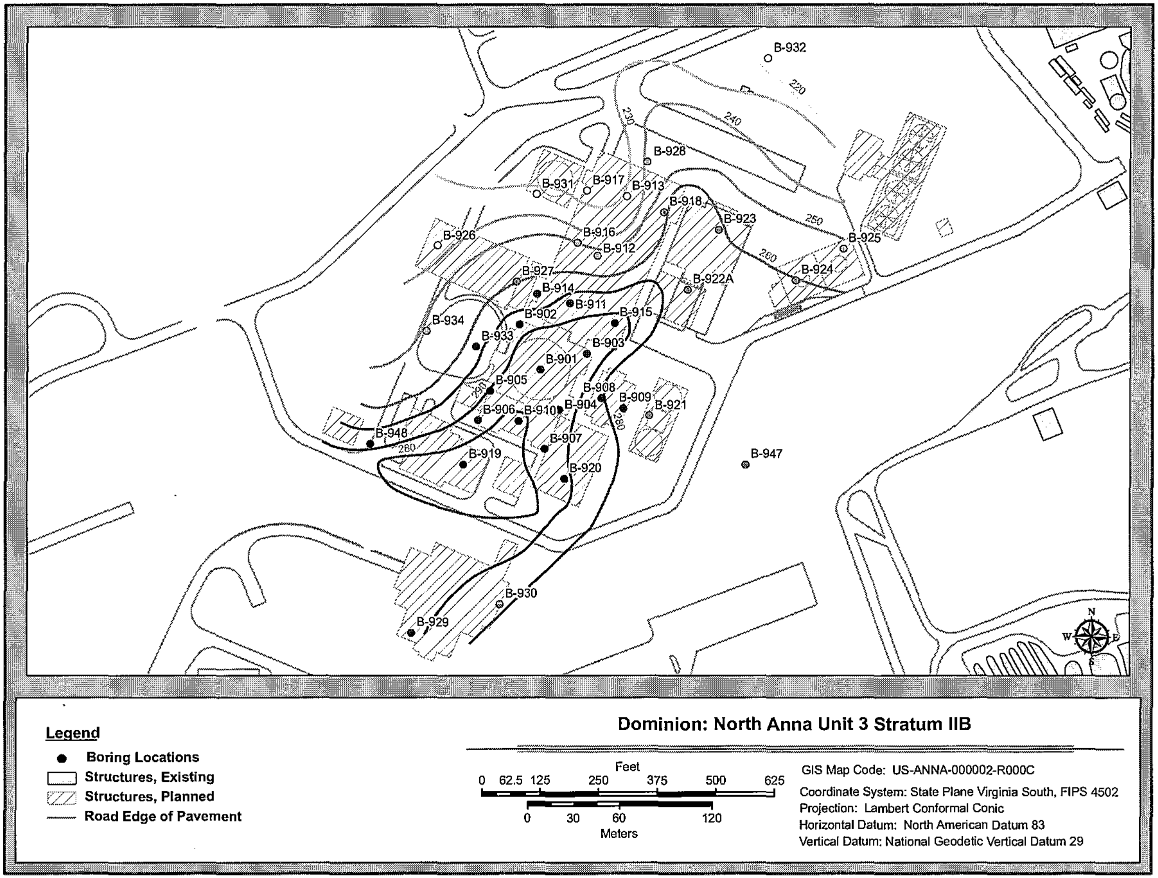


N095a

NAPS COL 2.0-29-A **Figure 2.5-212 Contours of Top of Zone IIB**

N058b

N095a



Dominion: North Anna Unit 3 Stratum IIB

GIS Map Code: US-ANNA-000002-R000C

Coordinate System: State Plane Virginia South, FIPS 4502

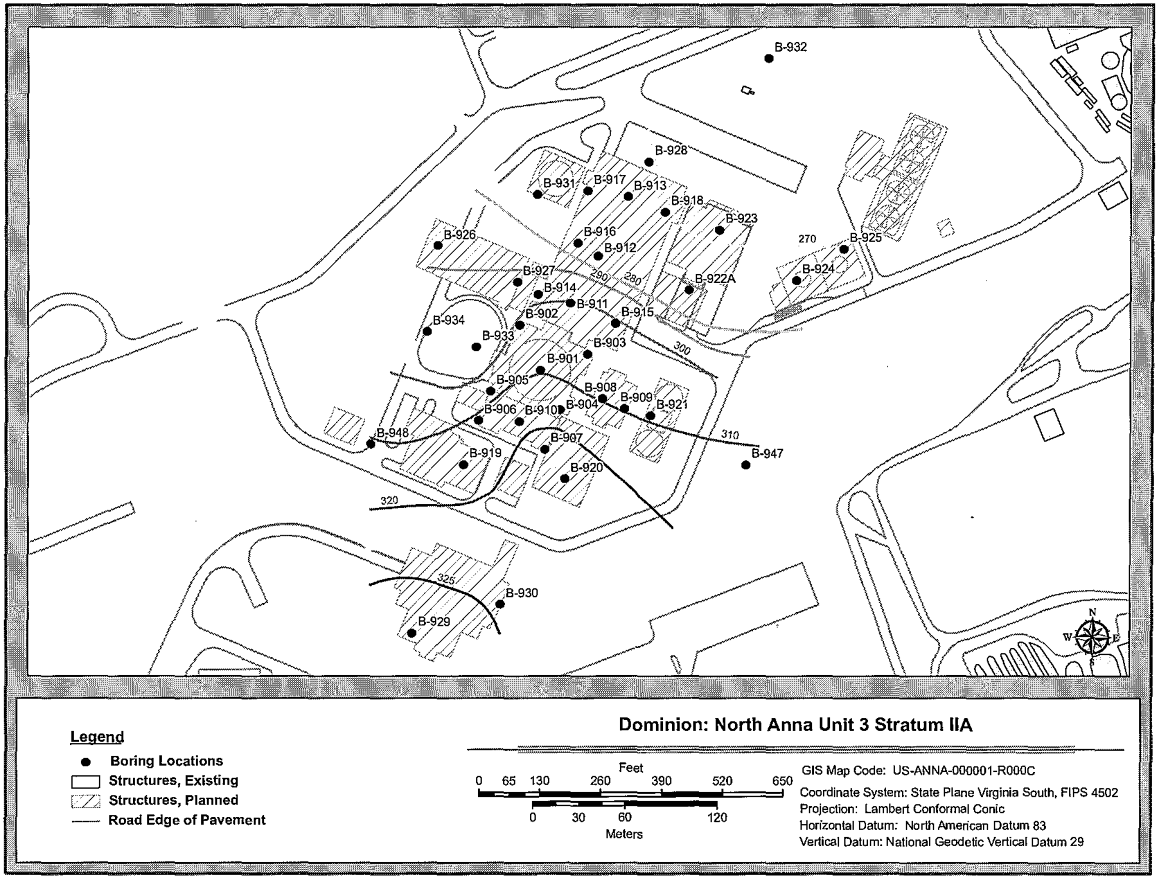
Projection: Lambert Conformal Conic

Horizontal Datum: North American Datum 83

Vertical Datum: National Geodetic Vertical Datum 29

NAPS COL 2.0-29-A Figure 2.5-213 Contours of Top of Zone IIA

N058b

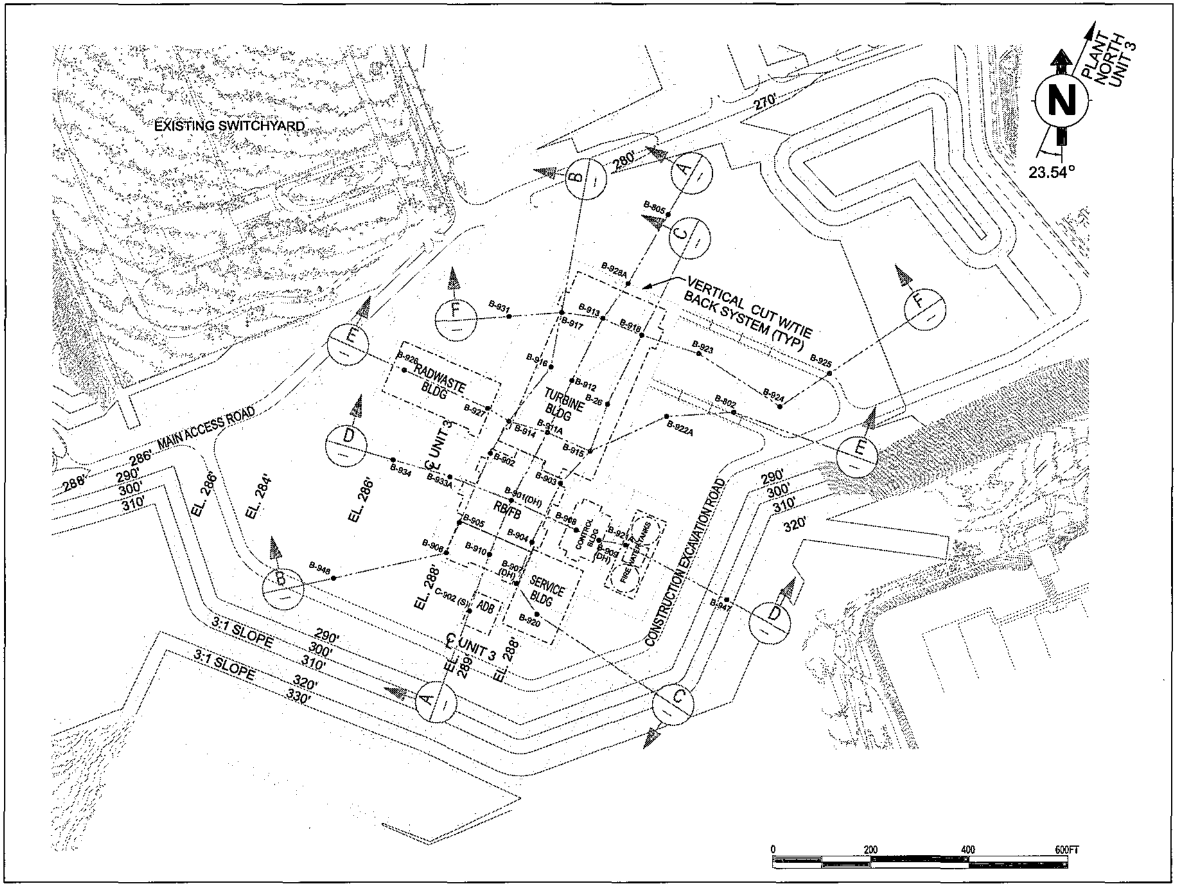


N095a

NAPS COL 2.0-29-A

N058b

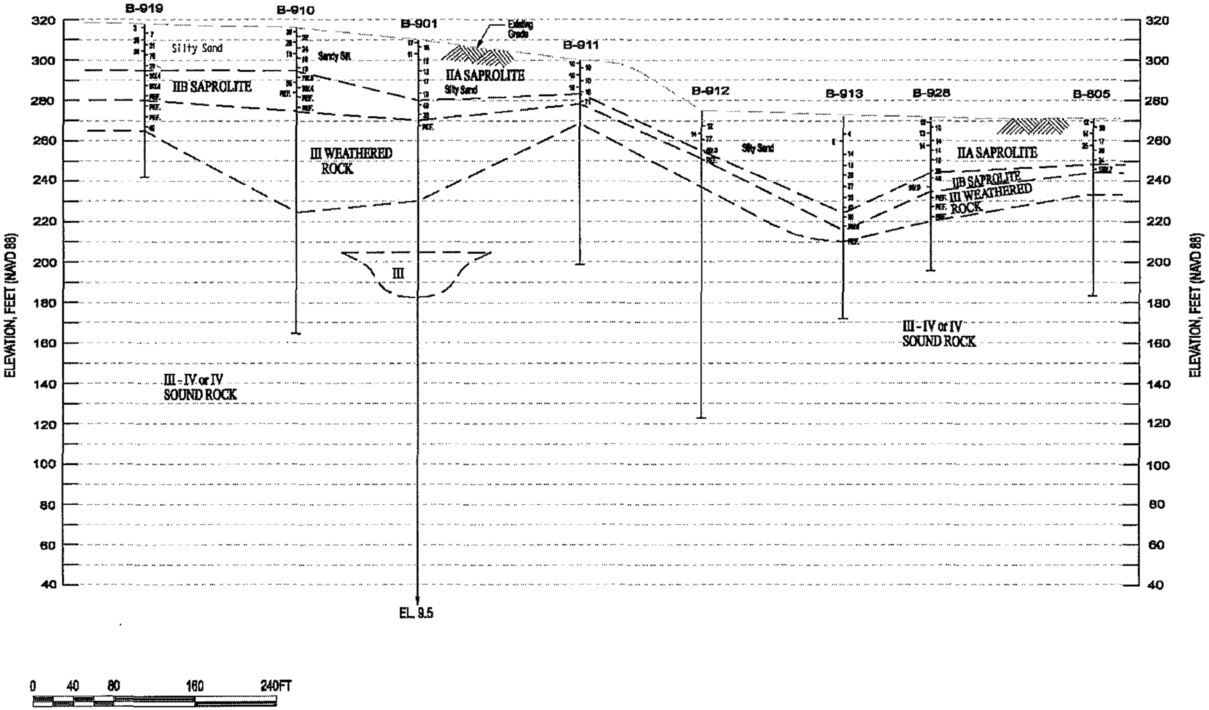
Figure 2.5-214 Plan Locations of Profiles



N095a

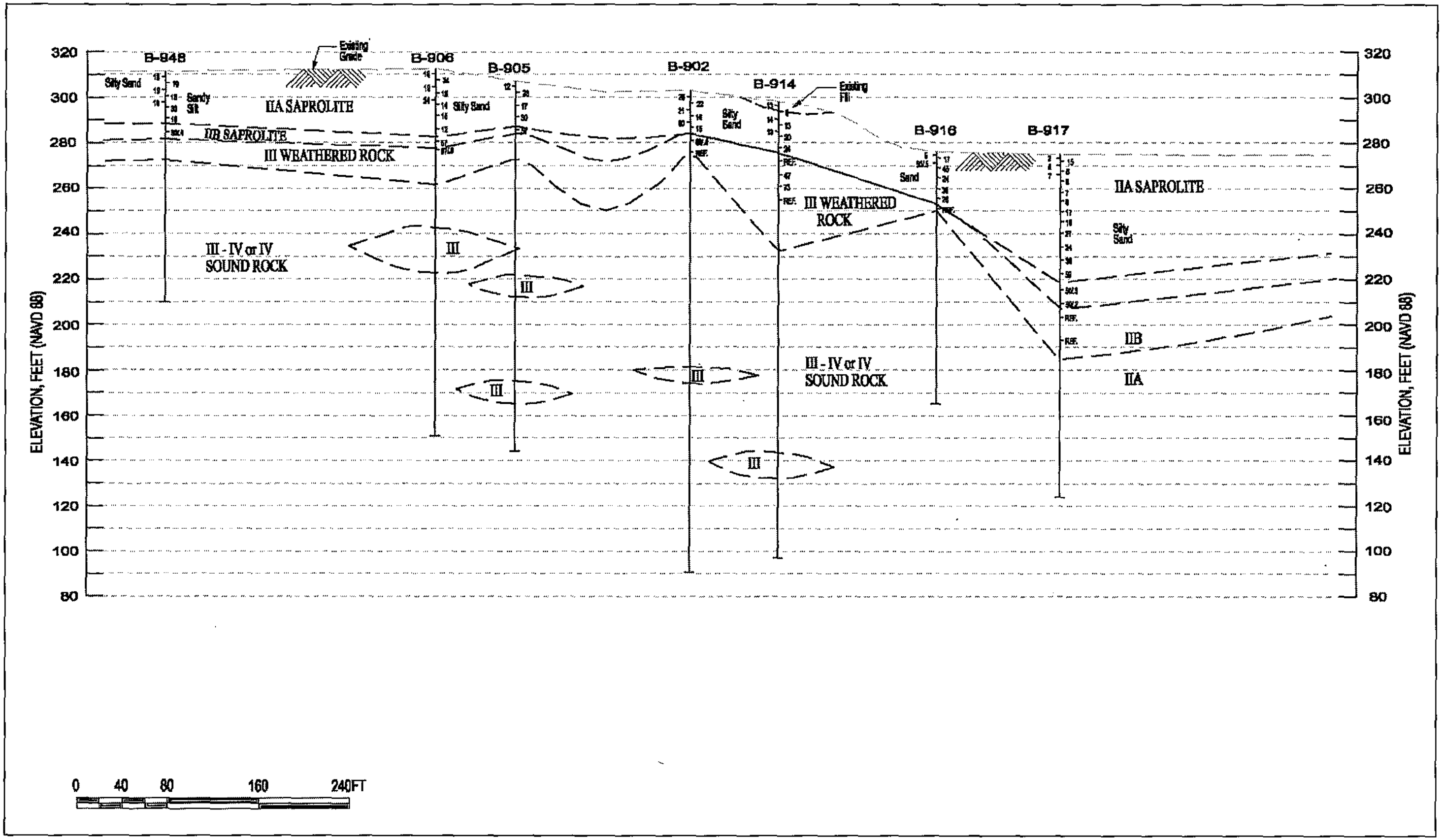
N058b
N095a

NAPS COL 2.0-29-A Figure 2.5-215 Subsurface Profile A-A'



NAPS COL 2.0-29-A Figure 2.5-216 Subsurface Profile B-B'

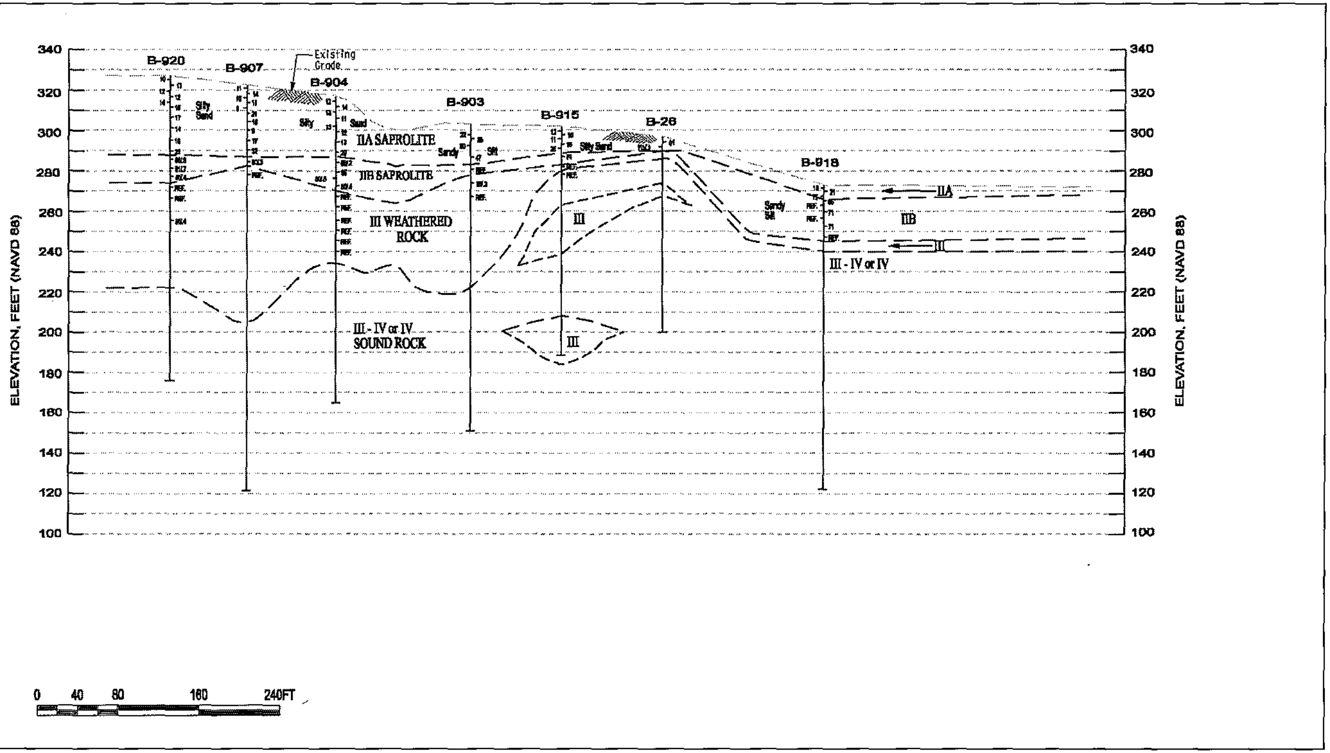
N058b



- For Information Only -

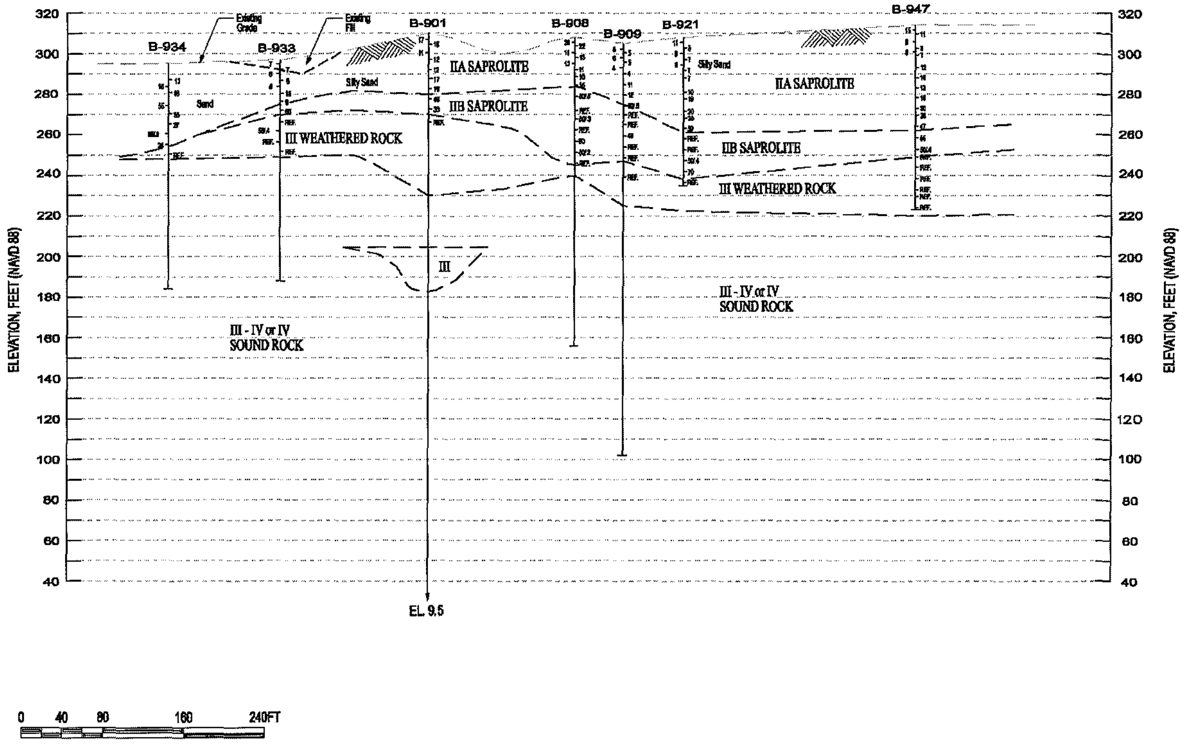
NAPS COL 2.0-29-A **Figure 2.5-217 Subsurface Profile C-C'**

N05861



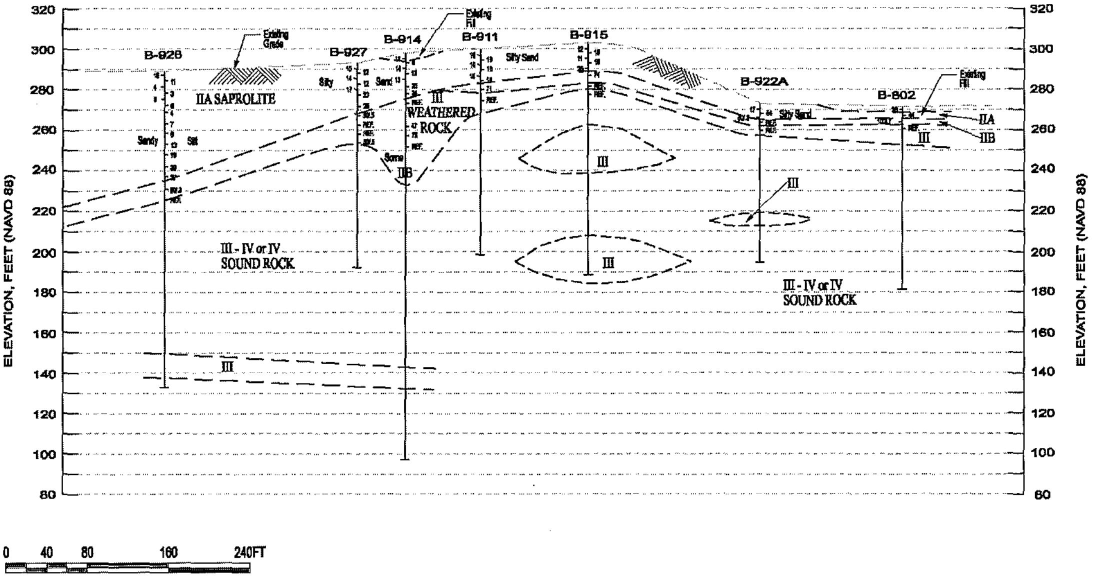
NAPS COL 2.0-29-A **Figure 2.5-218 Subsurface Profile D-D'**

N058b I



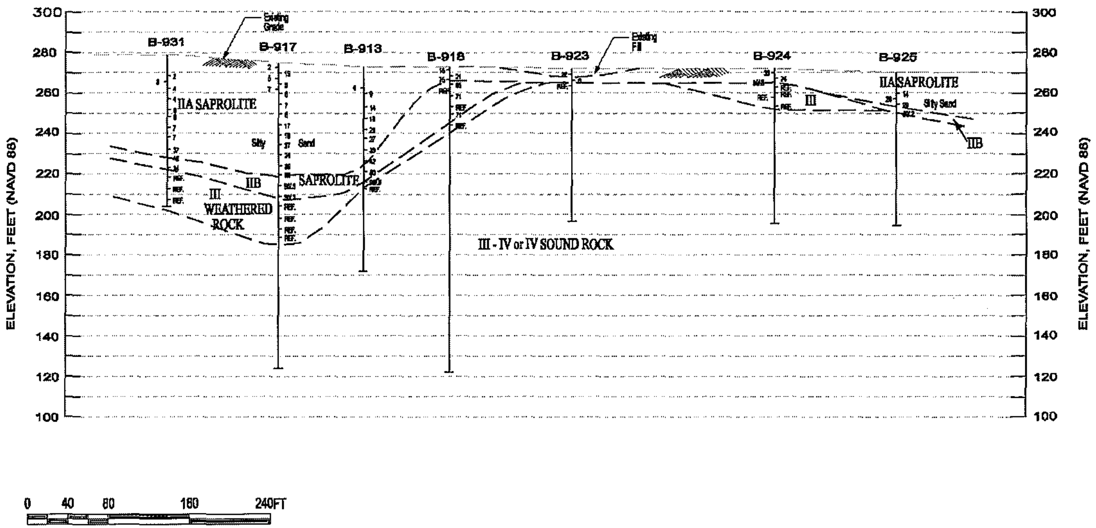
NAPS COL 2.0-29-A **Figure 2.5-219 Subsurface Profile E-E'**

N0584



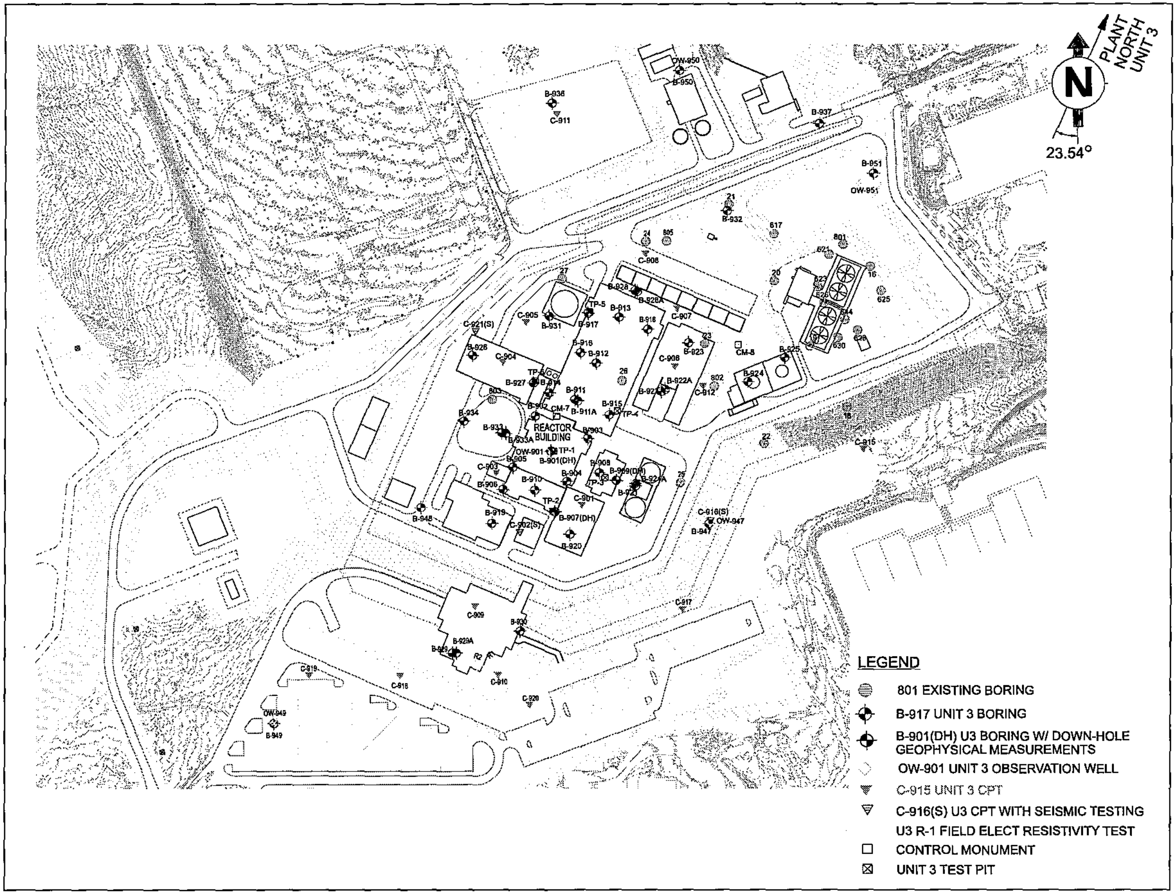
NAPS COL 2.0-29-A Figure 2.5-220 Subsurface Profile F-F'

N0586l



NAPS COL 2.0-29-A **Figure 2.5-221 Unit 3 Boring Locations – Power Block**

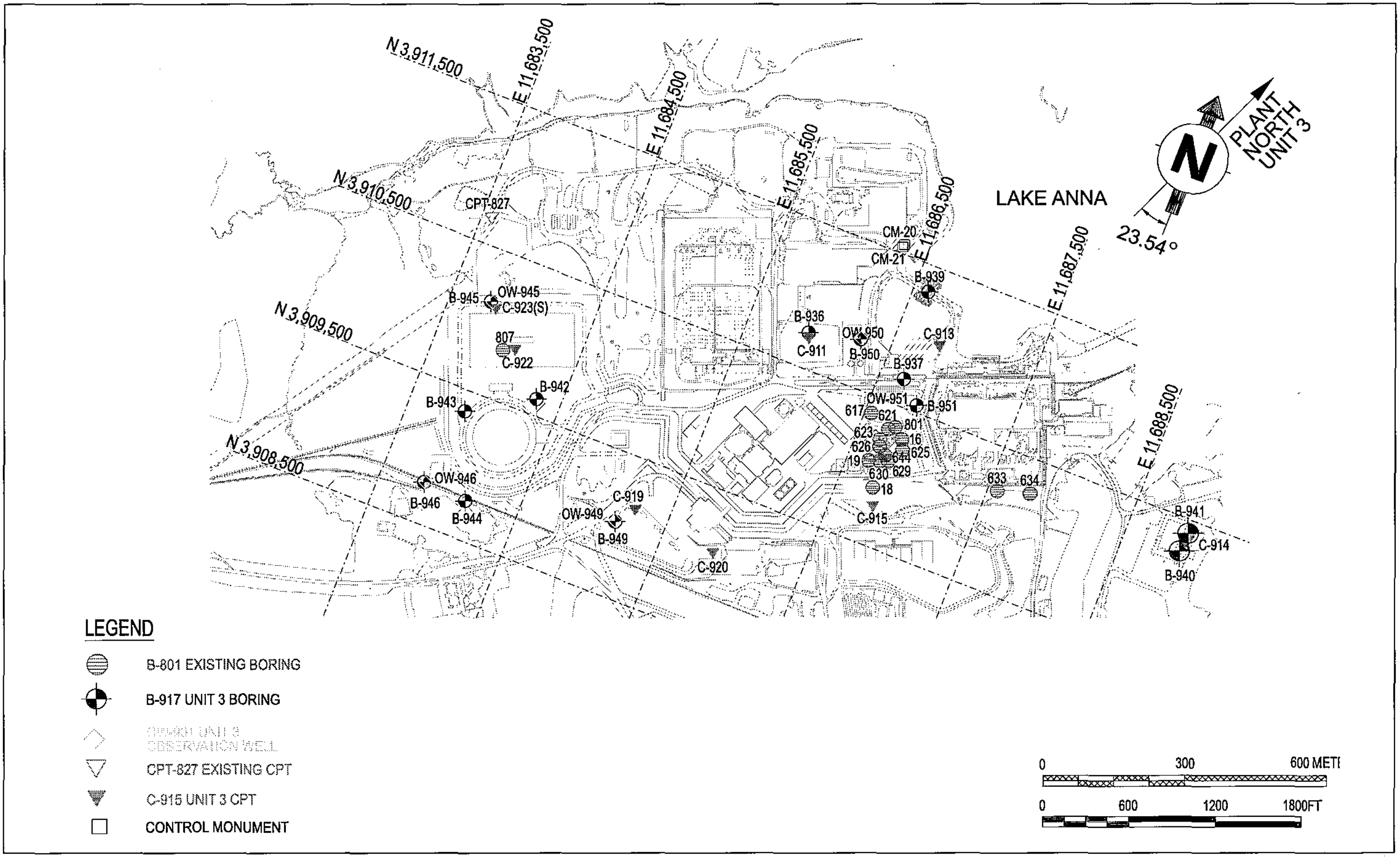
N058b



N095a

N058b
N095a

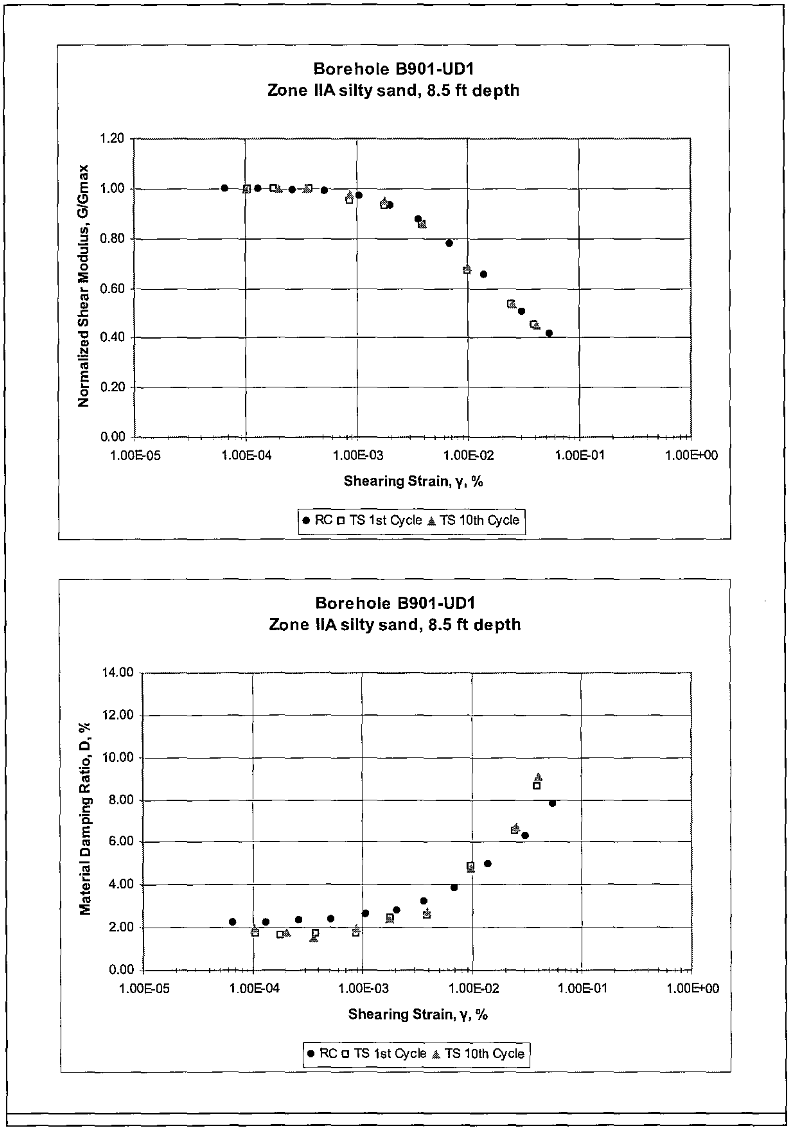
NAPS COL 2.0-29-A **Figure 2.5-222 Unit 3 Boring Locations – Site**



- For Information Only -

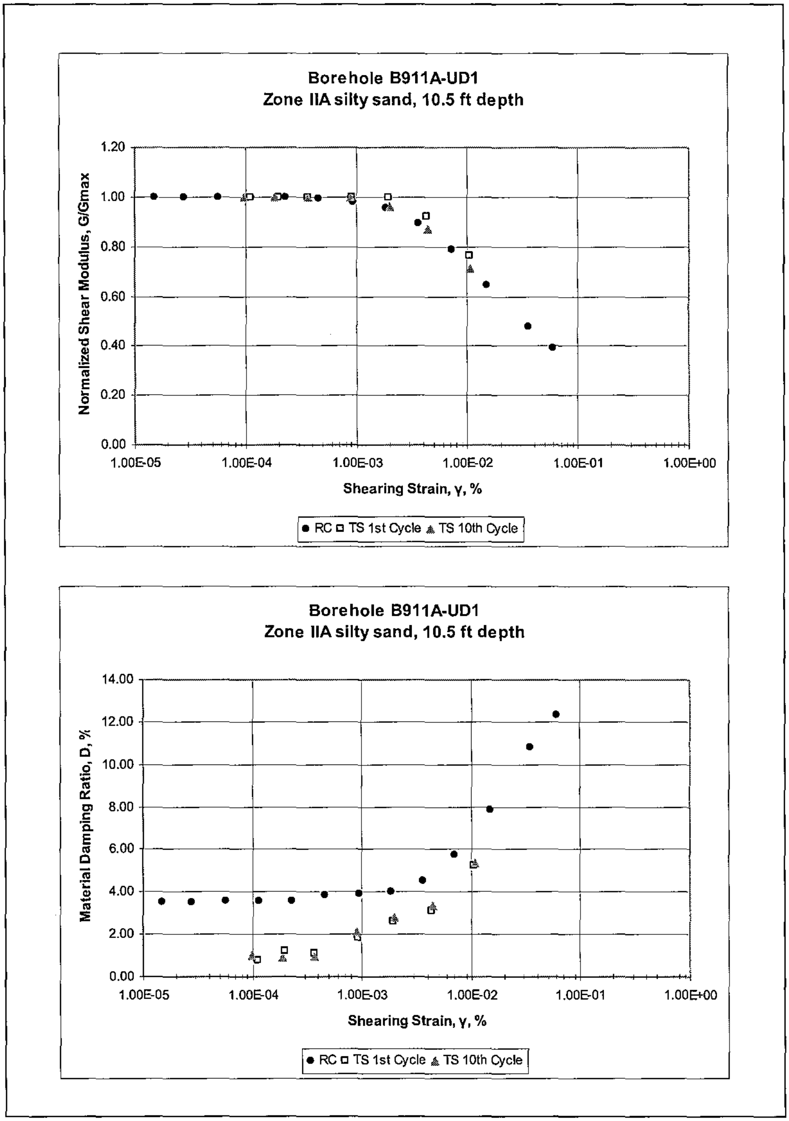
NAPS COL 2.0-29-A **Figure 2.5-223 RCTS Test Results (Sheet 1 of 3) G/G_{max} and D vs. Strain, B-901 UD-1: 4.3 psi Confining Pressure**

I N058b



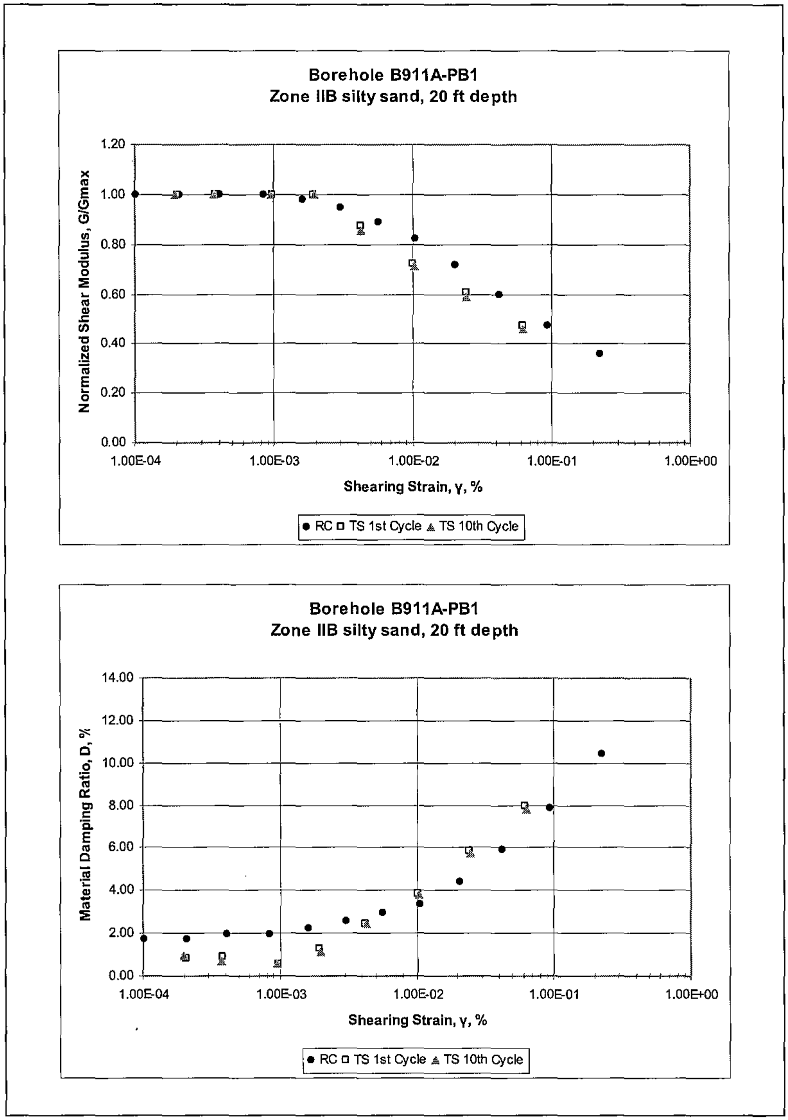
NAPS COL 2.0-29-A **Figure 2.5-223 RCTS Test Results (Sheet 2 of 3) G/G_{max} and D vs. Strain, B-911A UD-1: 5.6 psi Confining Pressure**

IN058
a, b



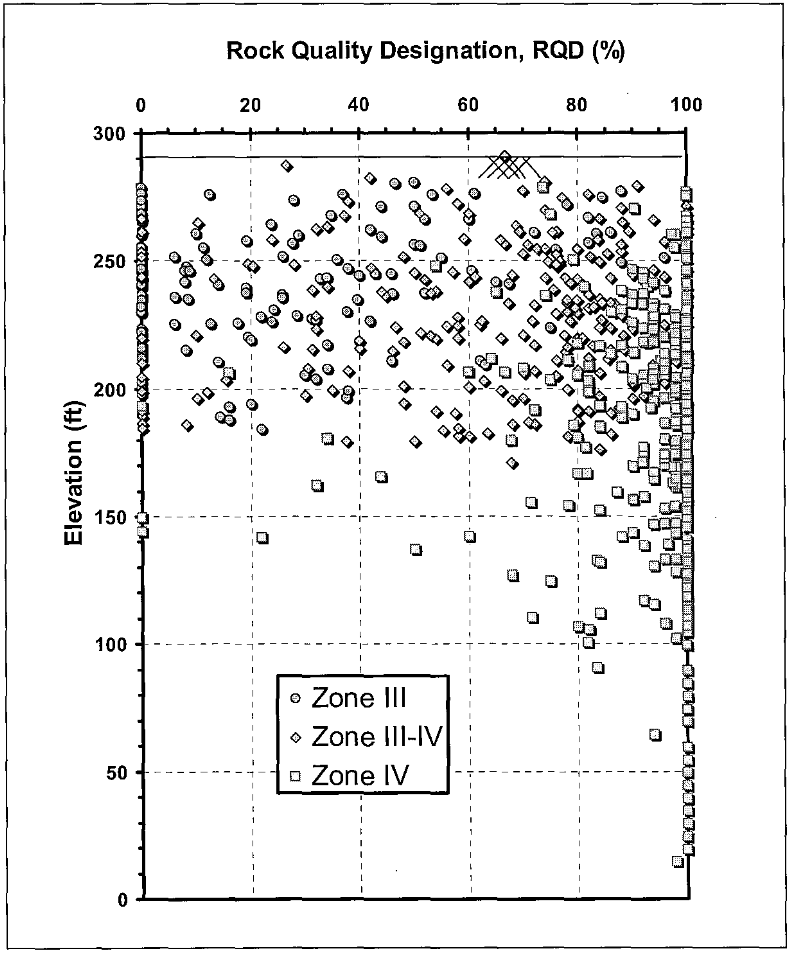
NAPS COL 2.0-29-A **Figure 2.5-223 RCTS Test Results (Sheet 3 of 3) G/G_{max} and D vs. Strain, B-911A PB-1: 11.4 psi Confining Pressure**

1 N058
a, b



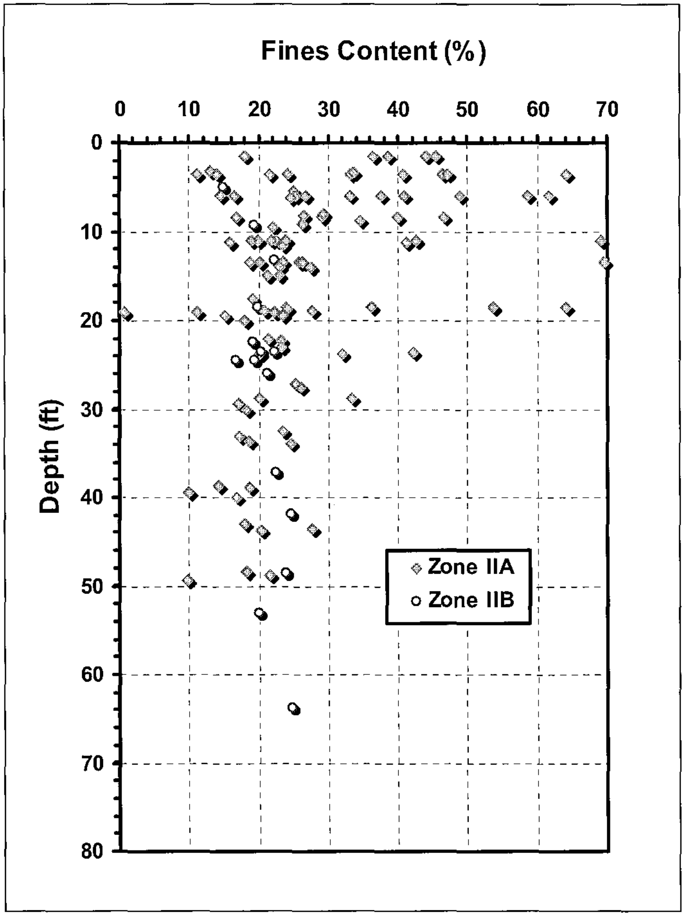
NAPS COL 2.0-29-A **Figure 2.5-224 Rock Quality Designation versus Elevation**

I N058b



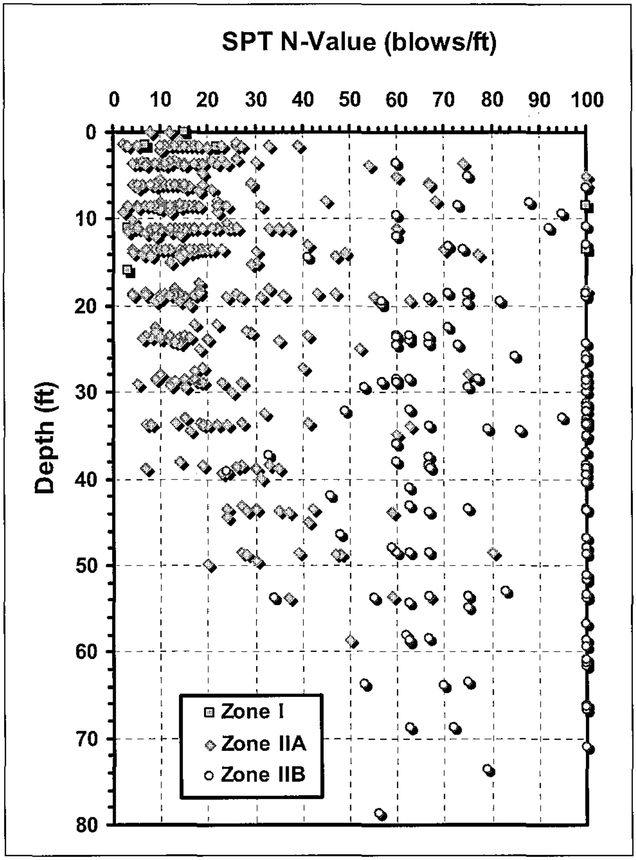
NAPS COL 2.0-29-A **Figure 2.5-225 Fines Content of Saprolite versus Depth**

I N0586

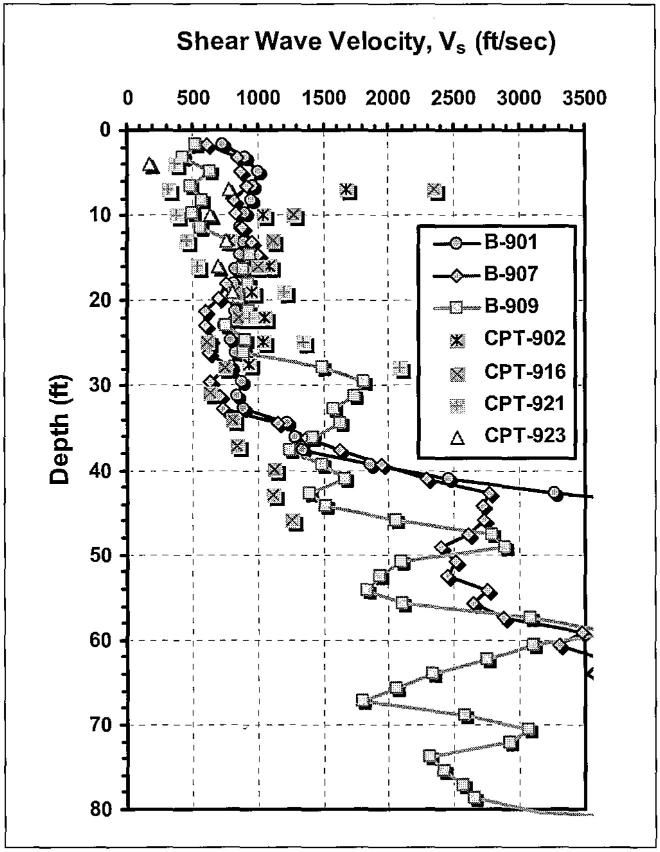


NAPS COL 2.0-29-A **Figure 2.5-226 Measured SPT N-Value versus Depth**

1N0586

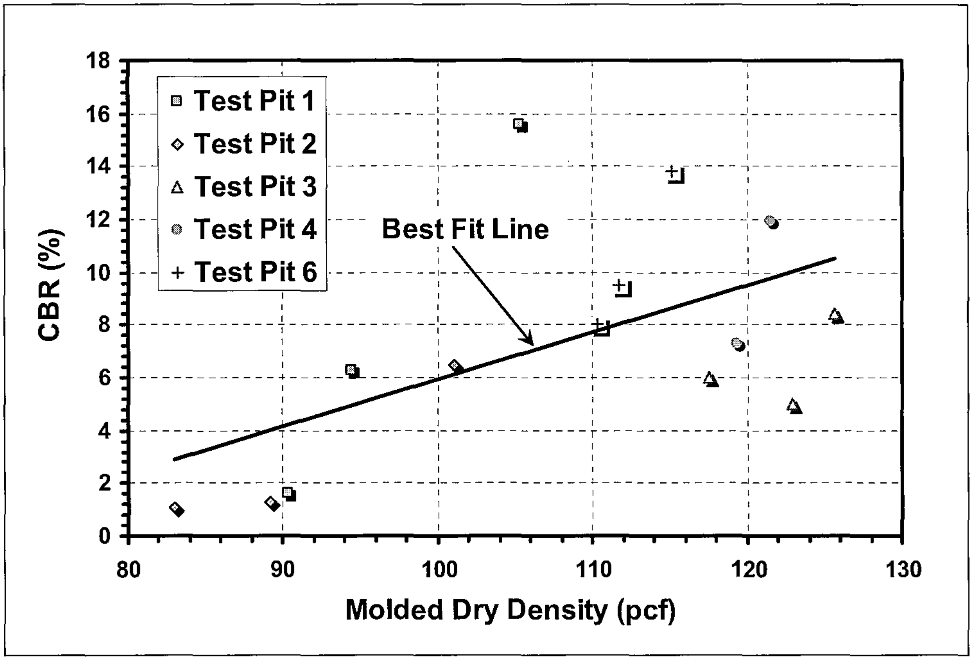


NAPS COL 2.0-29-A **Figure 2.5-227 Measured Soil Shear Wave Velocity versus Depth** I N058b



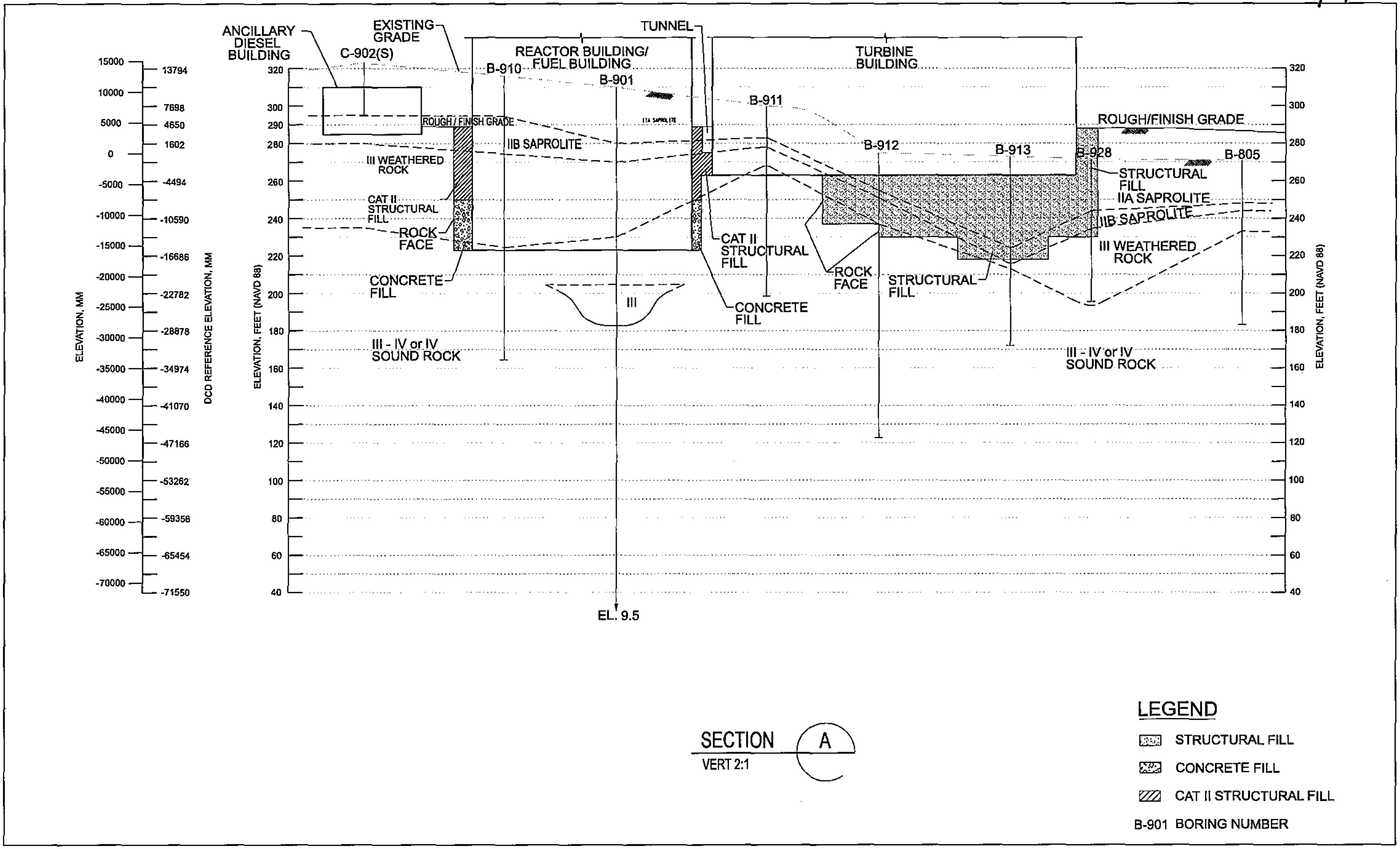
NAPS COL 2.0-29-A **Figure 2.5-228 Relationship between CBR and Molded Dry Density**

I N0586



N058b
N095
a,b,c

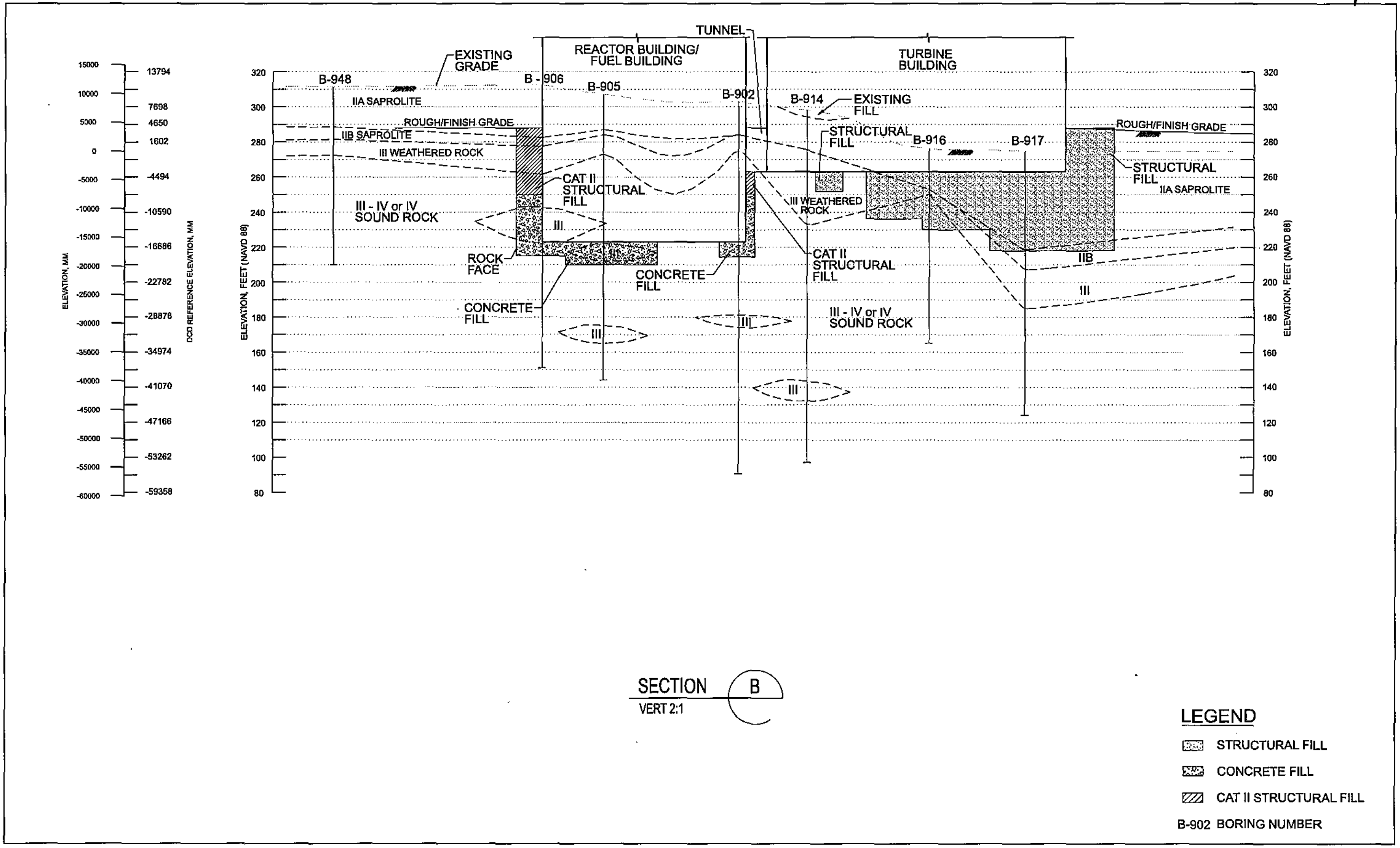
NAPS ESP COL 2.5-3 **Figure 2.5-229 Cross-Section A-A'**



- For Information Only -

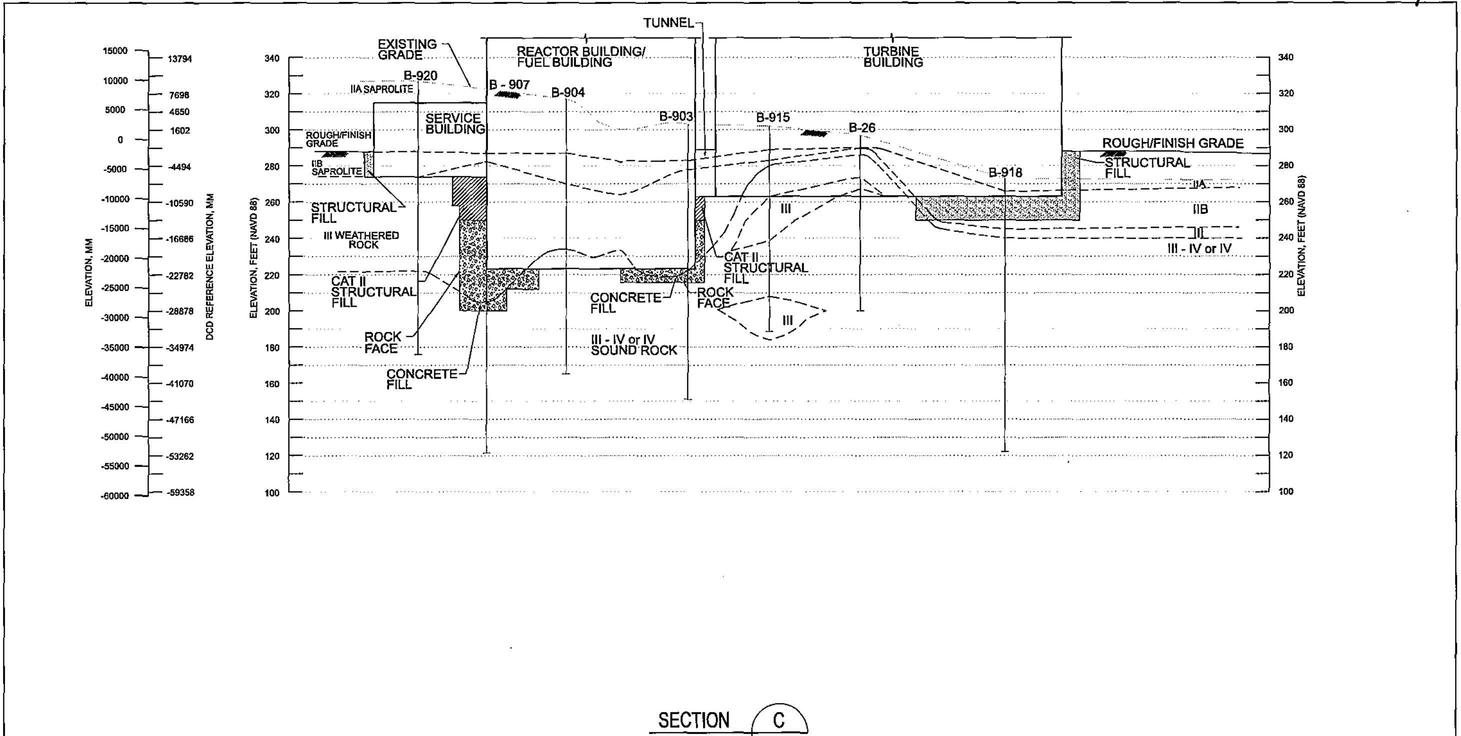
N058b
N095
b, c

NAPS ESP COL 2.5-3 **Figure 2.5-230 Cross-Section B-B'**



N058b
N095
b, c

NAPS ESP COL 2.5-3 **Figure 2.5-231 Cross-Section C-C'**

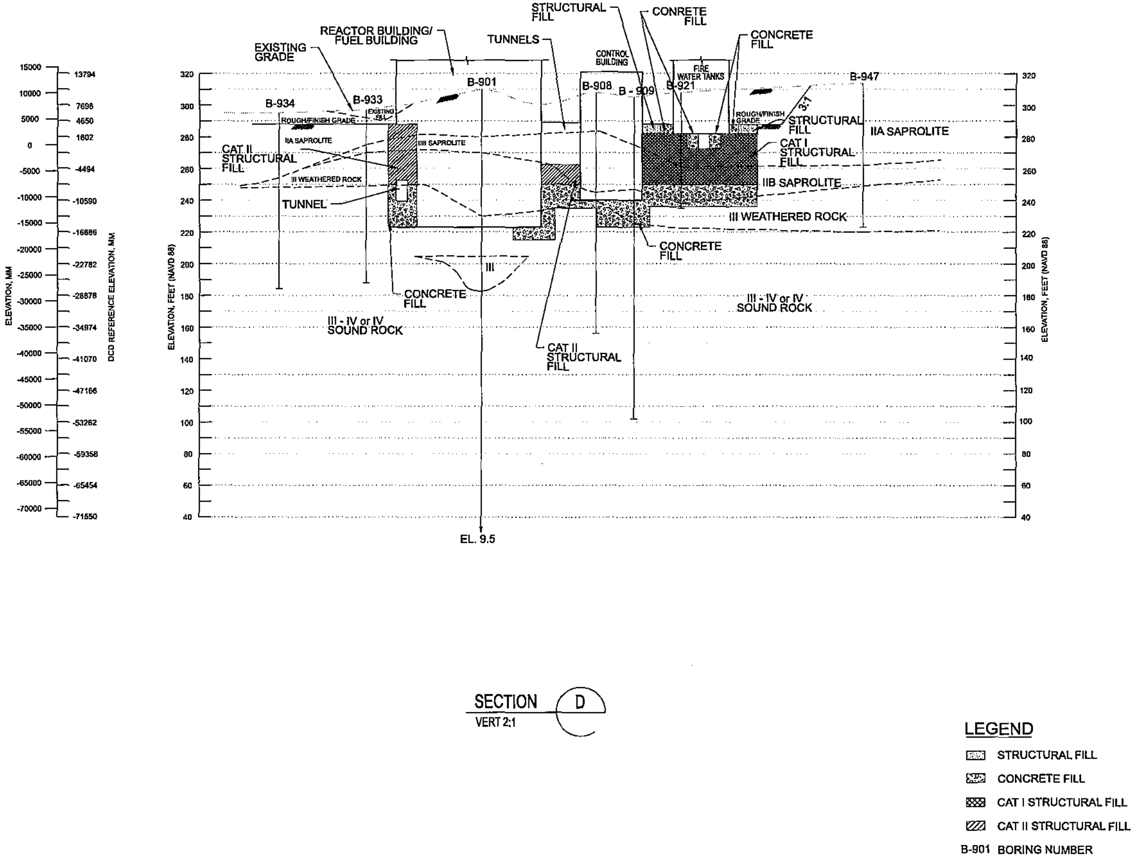


LEGEND

▨ STRUCTURAL FILL
▨ CONCRETE FILL
▨ CAT II STRUCTURAL FILL
B-903 BORING NUMBER

N058b
N095c

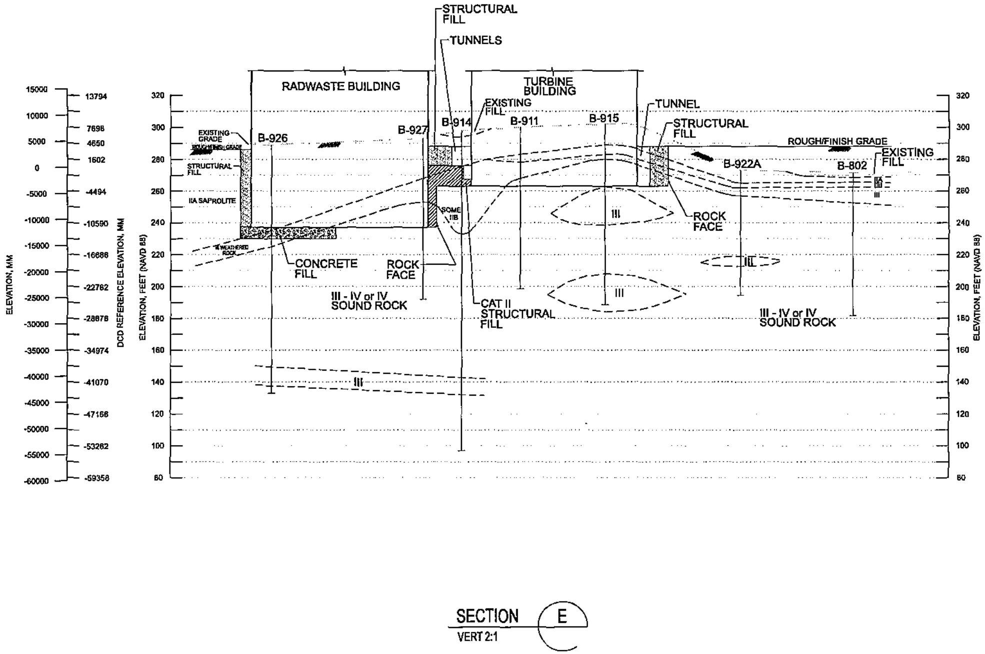
NAPS ESP COL 2.5-3 **Figure 2.5-232 Cross-Section D-D'**



- For Information Only -

N058b
N095
b,c

NAPS ESP COL 2.5-3 **Figure 2.5-233 Cross-Section E-E'**

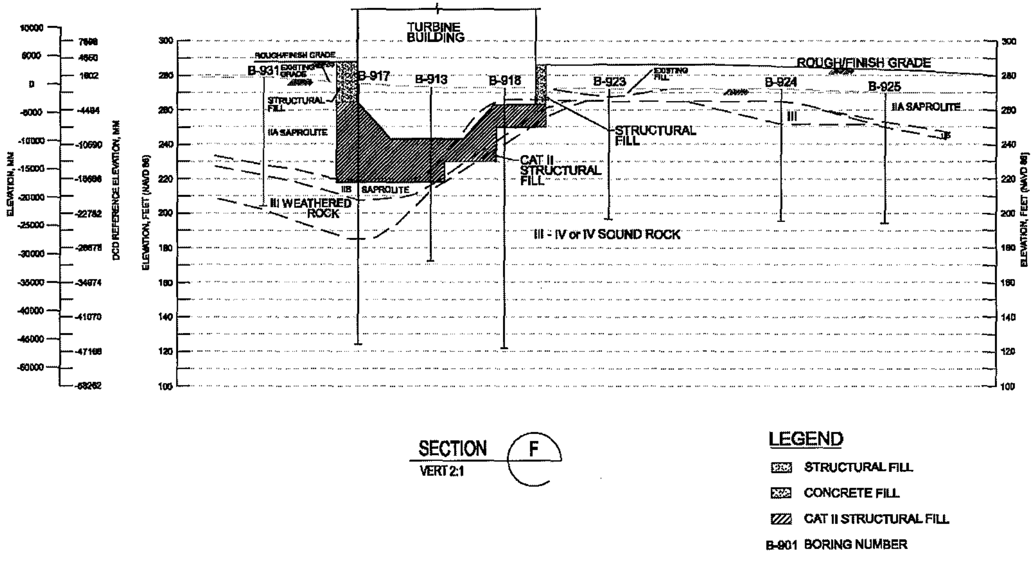


LEGEND

▨ STRUCTURAL FILL
▨ CONCRETE FILL
▨ CAT II STRUCTURAL FILL
B-901 BORING NUMBER

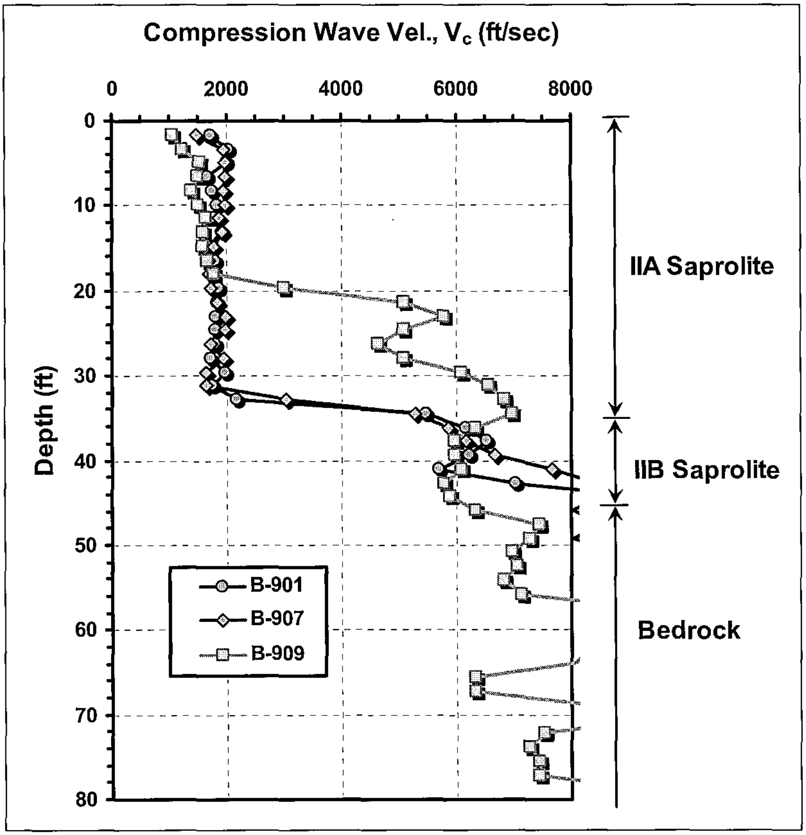
N058b
N095
b, c

NAPS ESP COL 2.5-3 **Figure 2.5-234 Cross-Section F-F'**



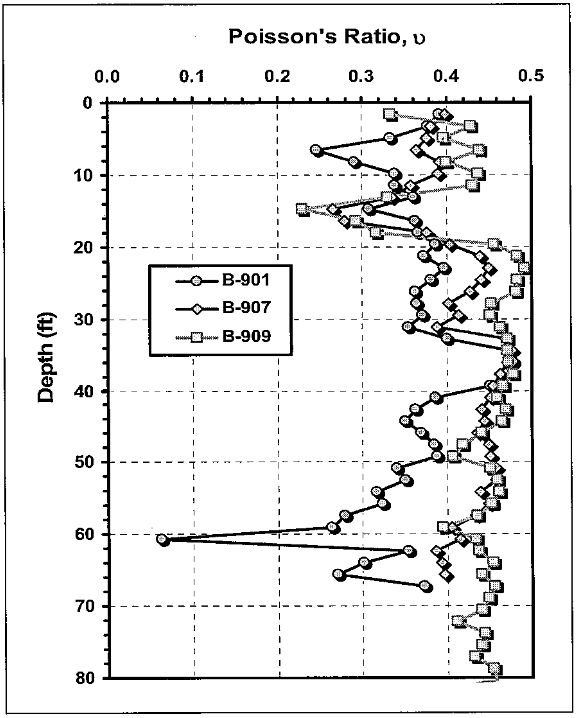
NAPS COL 2.0-29-A **Figure 2.5-235 Measured Compression Wave Velocity versus Depth**

I N058b

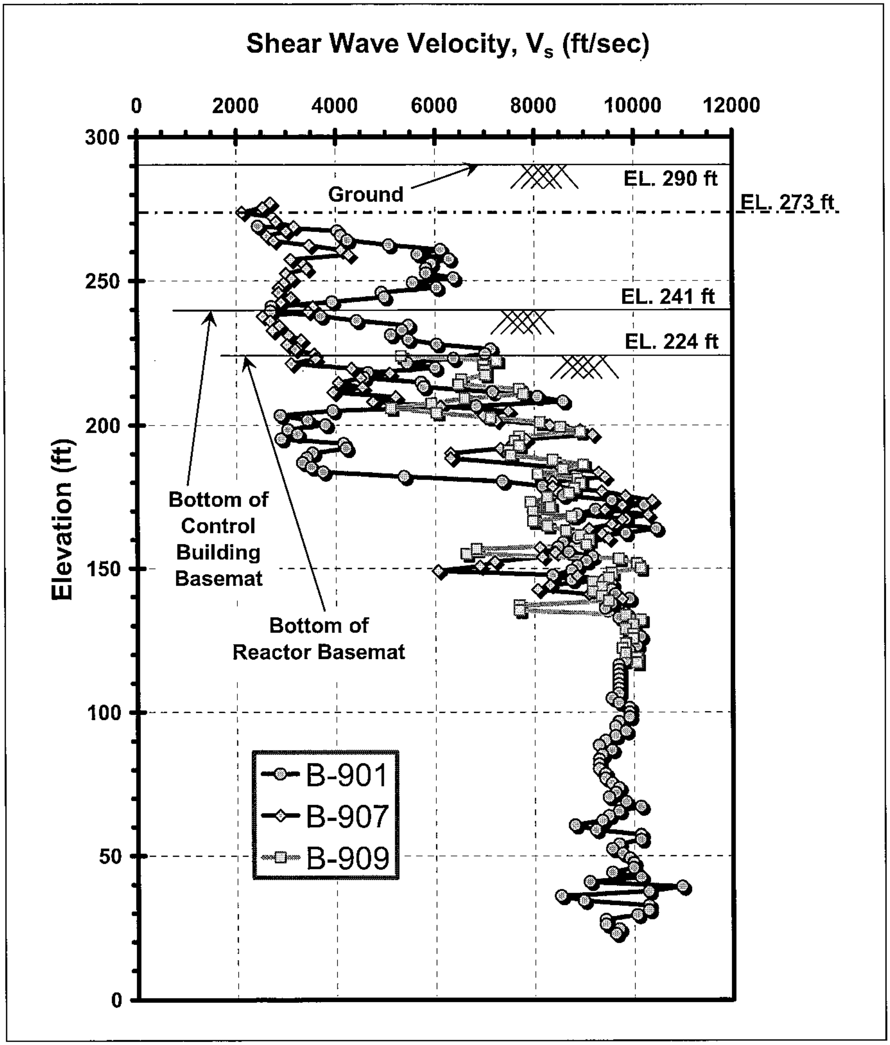


NAPS COL 2.0-29-A **Figure 2.5-236 Soil Poisson's Ratio versus Depth**

IN058b

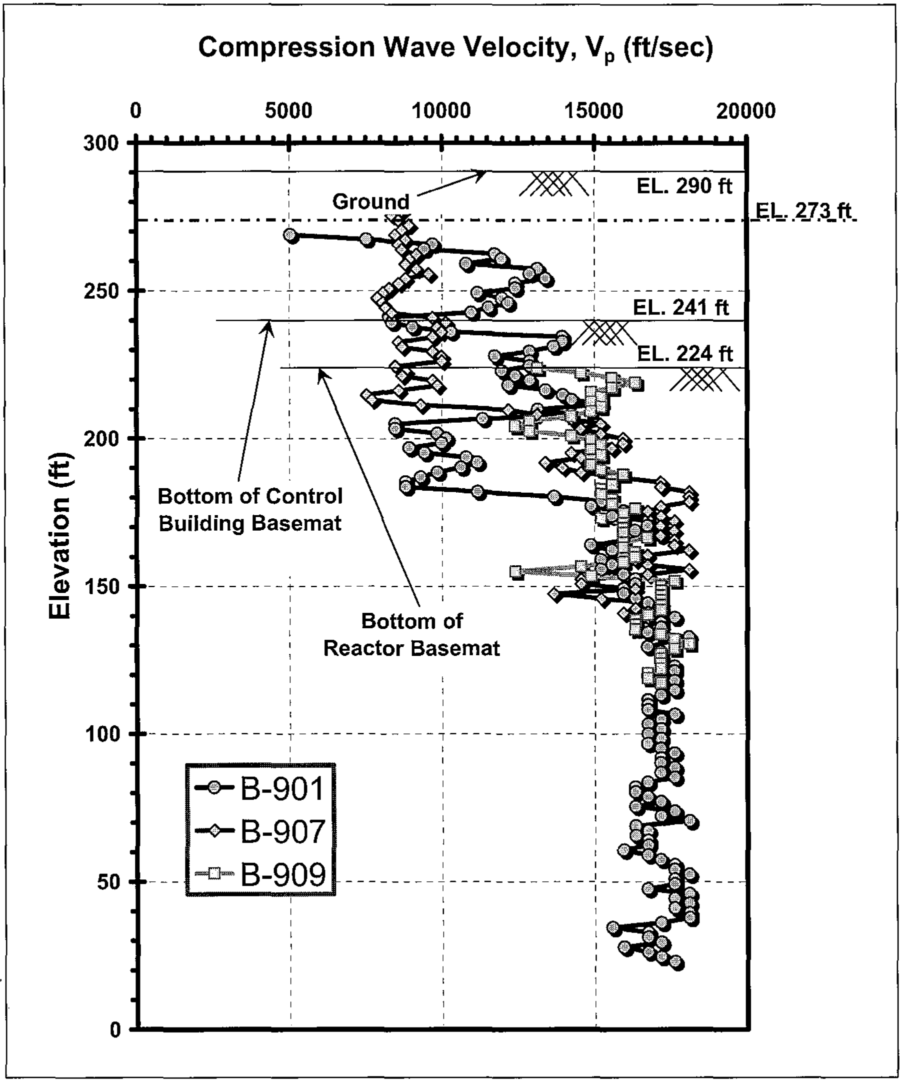


NAPS COL 2.0-29-A **Figure 2.5-237 Bedrock Shear Wave Velocity versus Elevation** | N0586



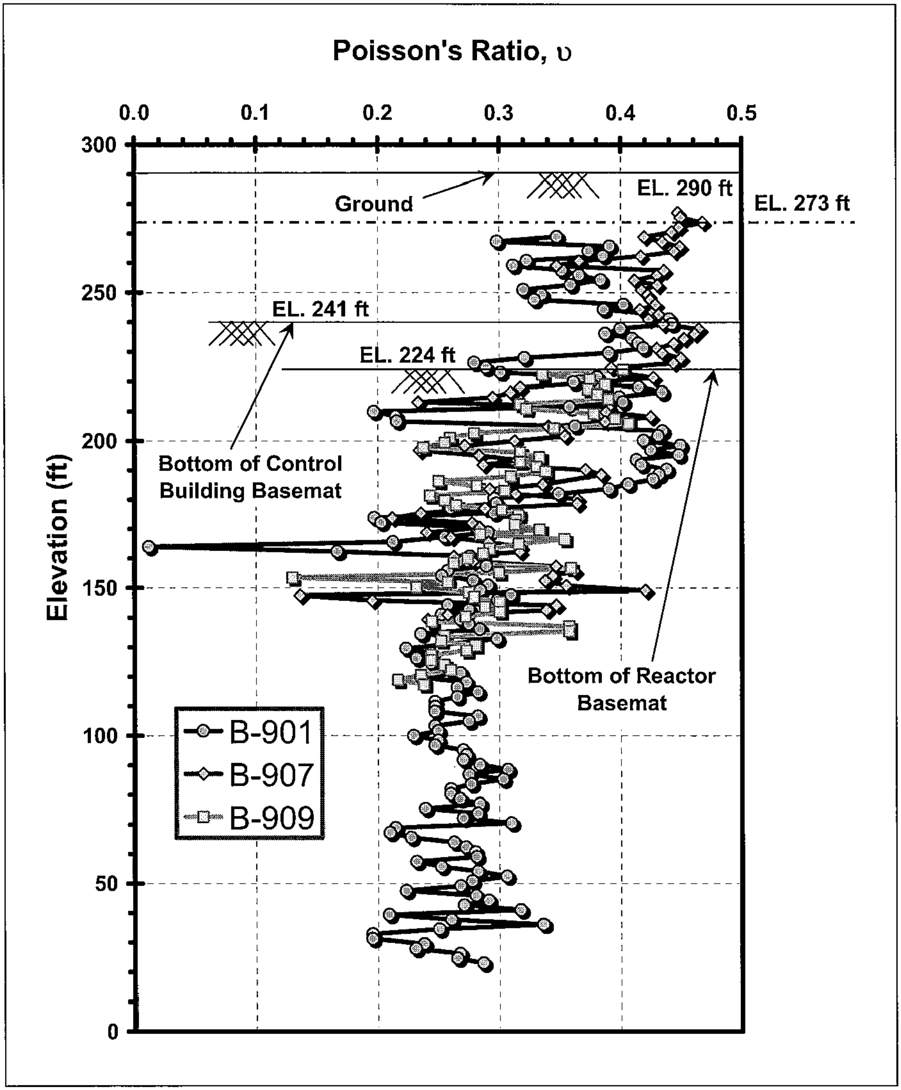
NAPS COL 2.0-29-A **Figure 2.5-238 Bedrock Compression Wave Velocity versus Elevation**

IN058b



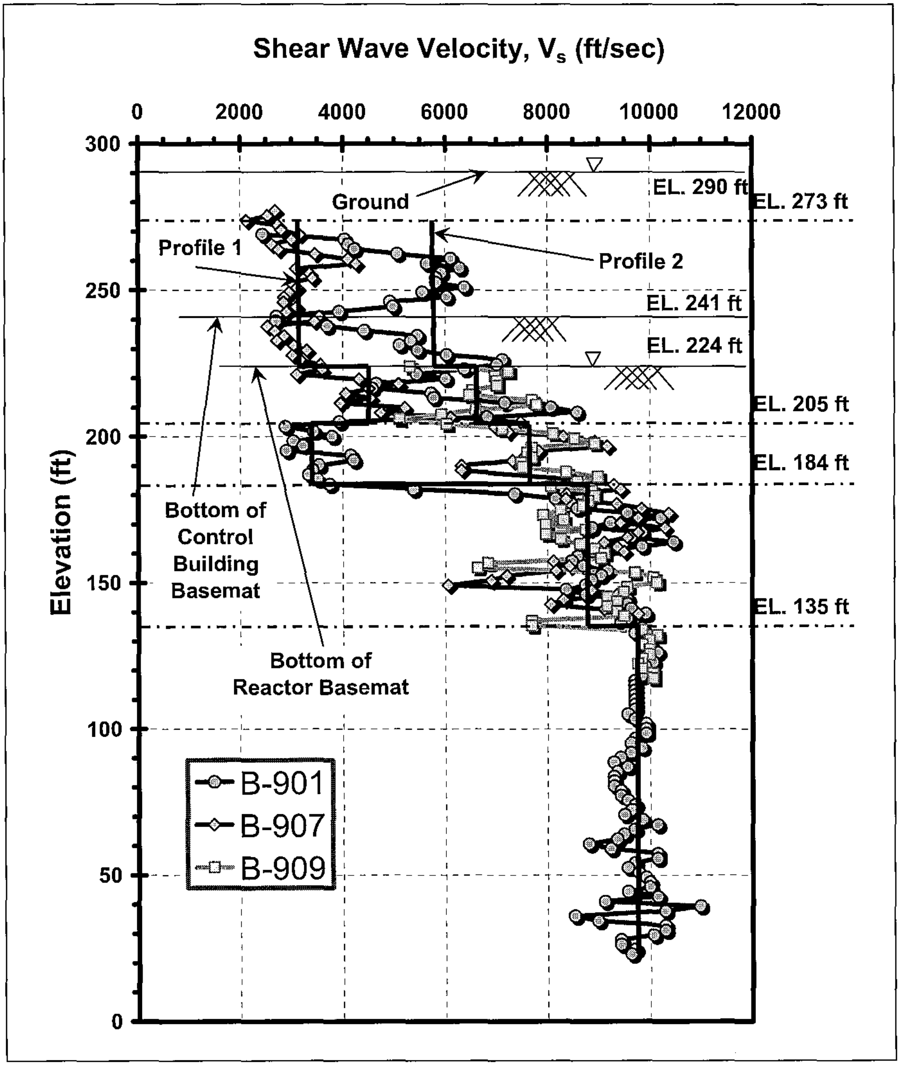
NAPS COL 2.0-29-A **Figure 2.5-239 Bedrock Poisson's Ratio versus Elevation**

I N0586



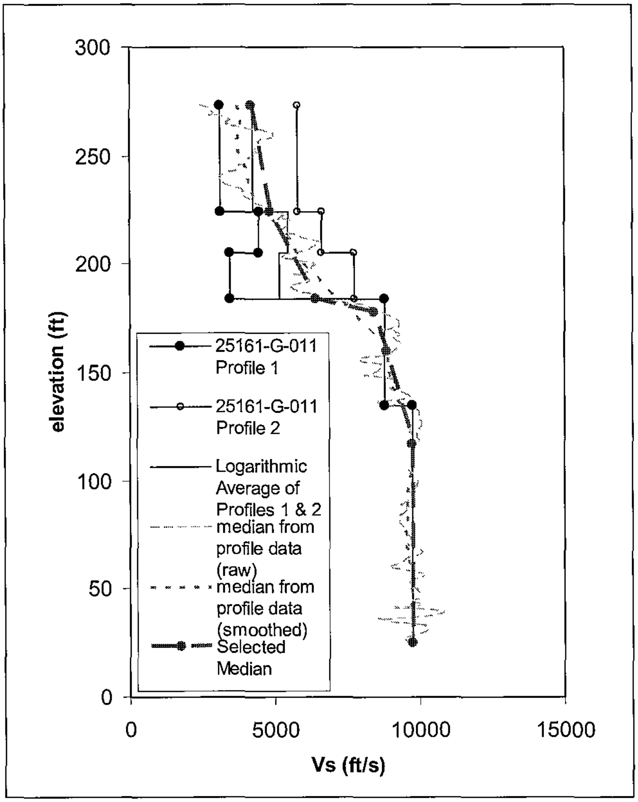
NAPS ESP COL 2.5-9 **Figure 2.5-240 Design Bedrock Shear Wave Velocity versus Elevation**

I No58b



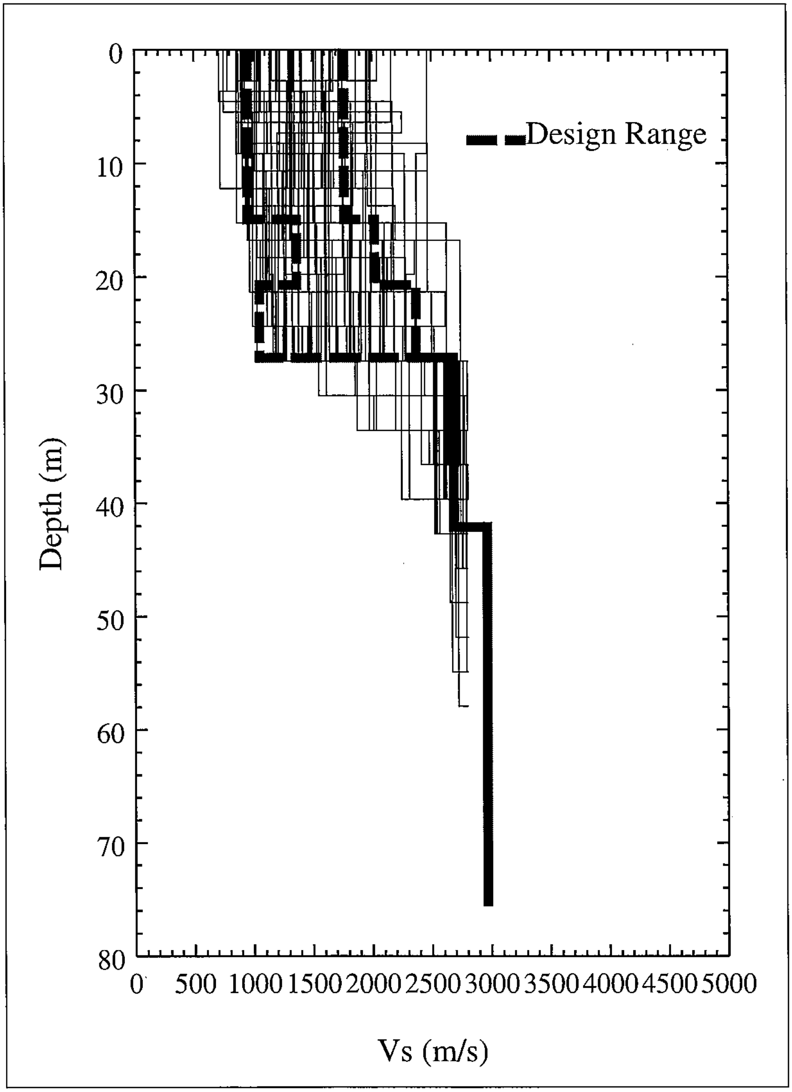
NAPS ESP COL 2.5-9 **Figure 2.5-241 Median Shear Wave Velocity versus Depth**

1N0586



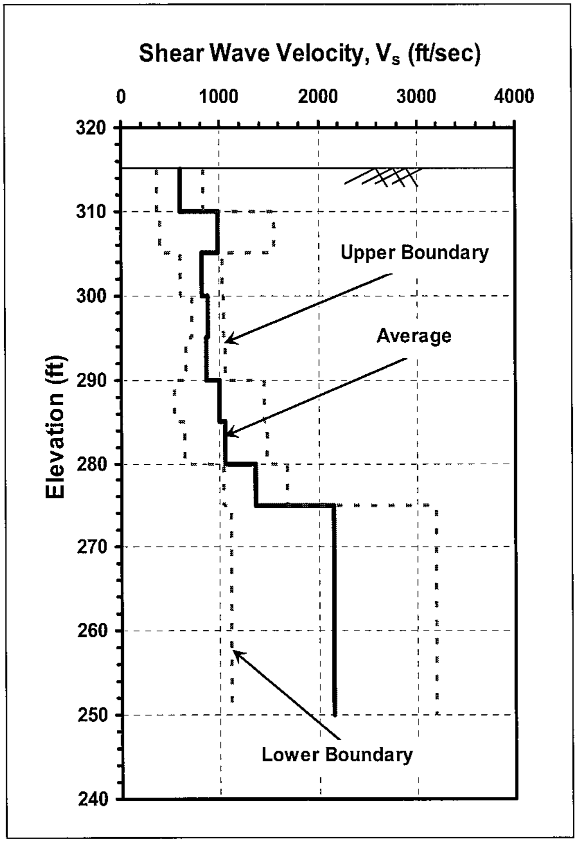
NAPS ESP COL 2.5-9 **Figure 2.5-242 Randomized Rock Shear Wave Velocity Profiles**

IN0586



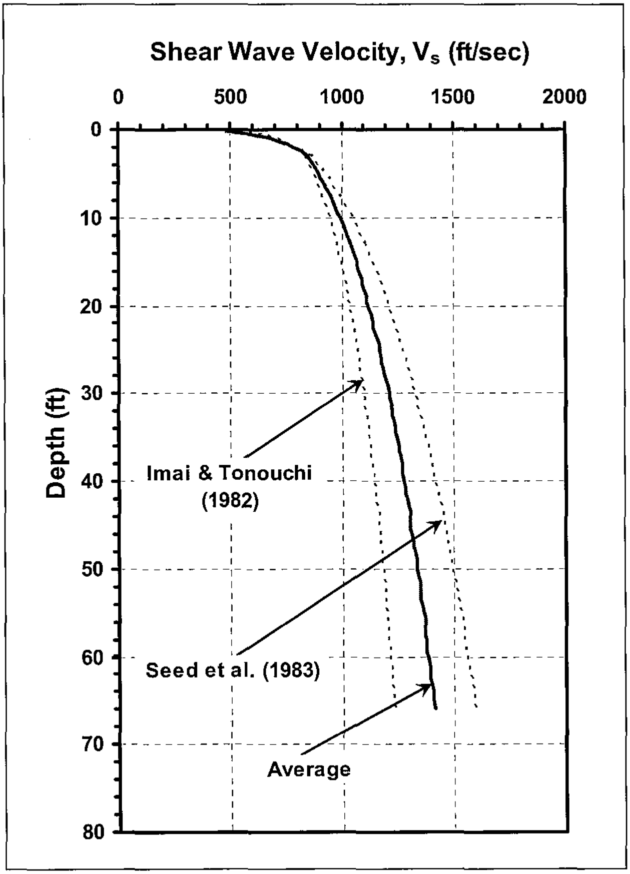
NAPS ESP COL 2.5-9 **Figure 2.5-243 Shear Wave Velocity versus Elevation for In-Situ Soils Averaged Over 5-Foot Intervals**

I N0586



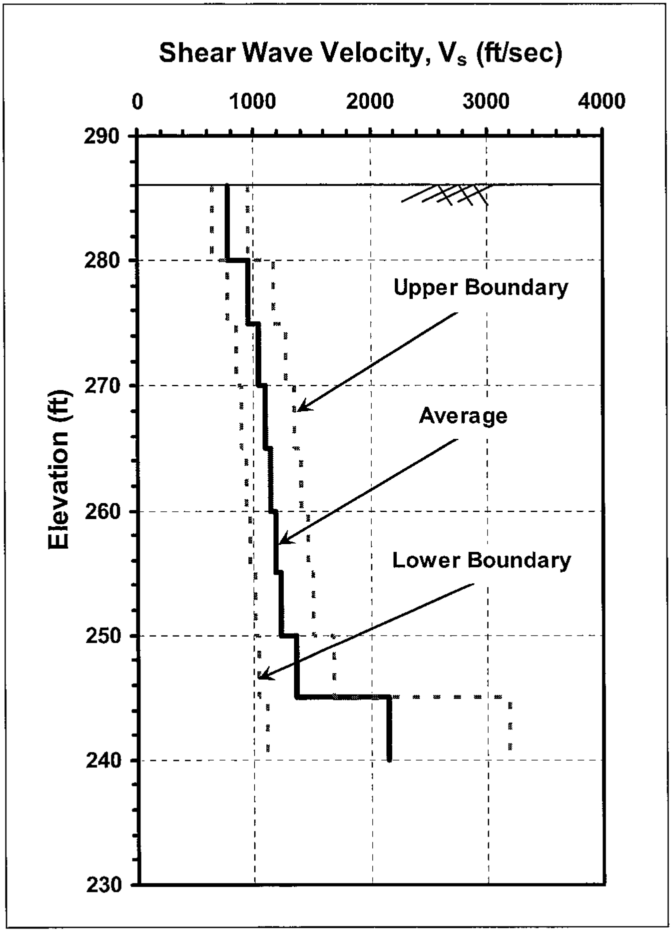
NAPS ESP COL 2.5-9 **Figure 2.5-244 Estimated Shear Wave Velocity versus Depth for Structural Fill**

1N058b



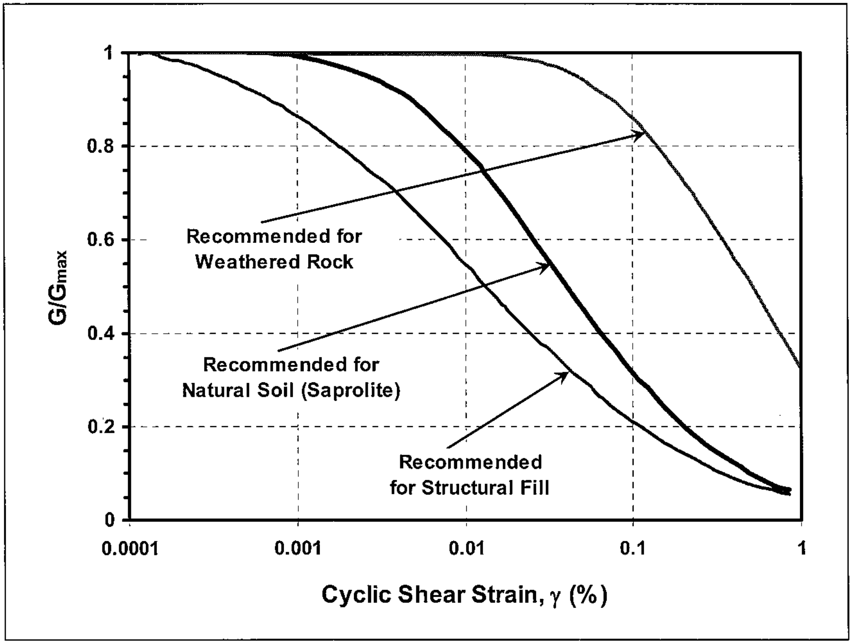
NAPS ESP COL 2.5-9 **Figure 2.5-245 Shear Wave Velocity versus Elevation for Structural Fill Averaged Over 5-Foot Intervals**

I N058b



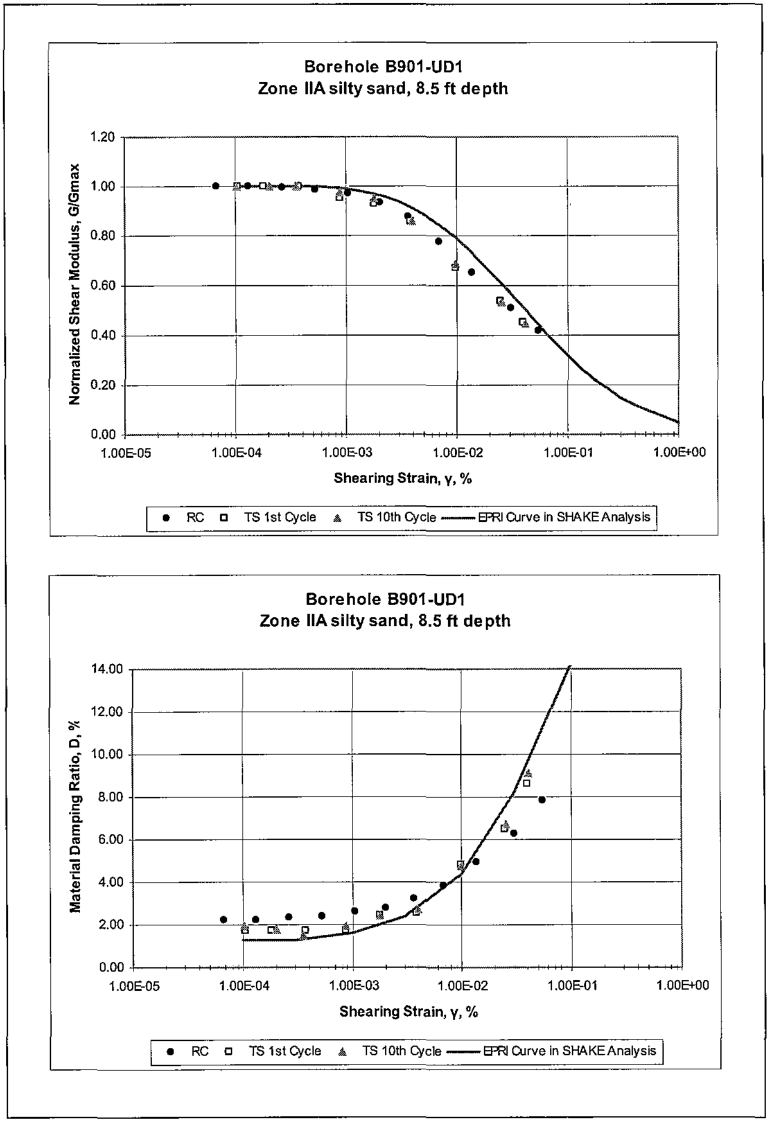
NAPS COL 2.0-29-A **Figure 2.5-246 Shear Modulus Reduction Design Curves**

IN0586



NAPS COL 2.0-29-A **Figure 2.5-247 RCTS Results with G/G_{max} and D Curve G/G_{max} vs. Strain, B-901 UD-1: 4.3 psi Confining Pressure (Sheet 1 of 3)**

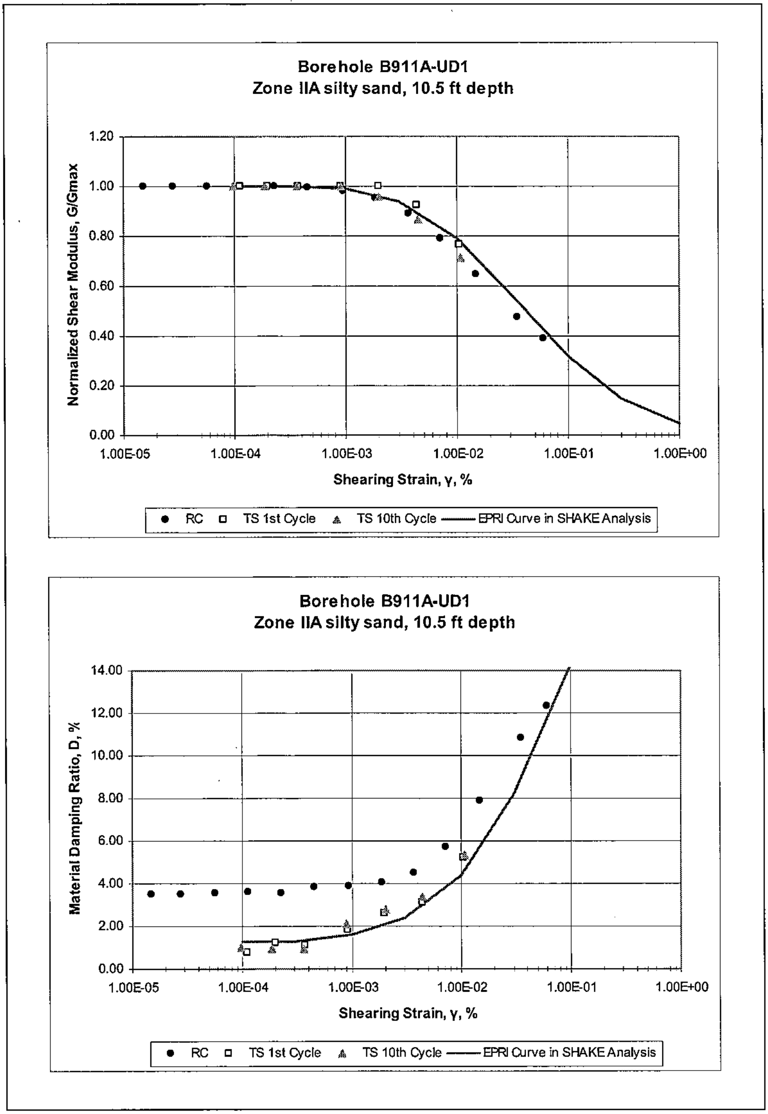
1N0586



NAPS COL 2.0-29-A

Figure 2.5-247 RCTS Results with G/G_{max} and D Curve G/G_{max} vs. Strain, B-911A UD-1: 5.6 psi Confining Pressure (Sheet 2 of 3)

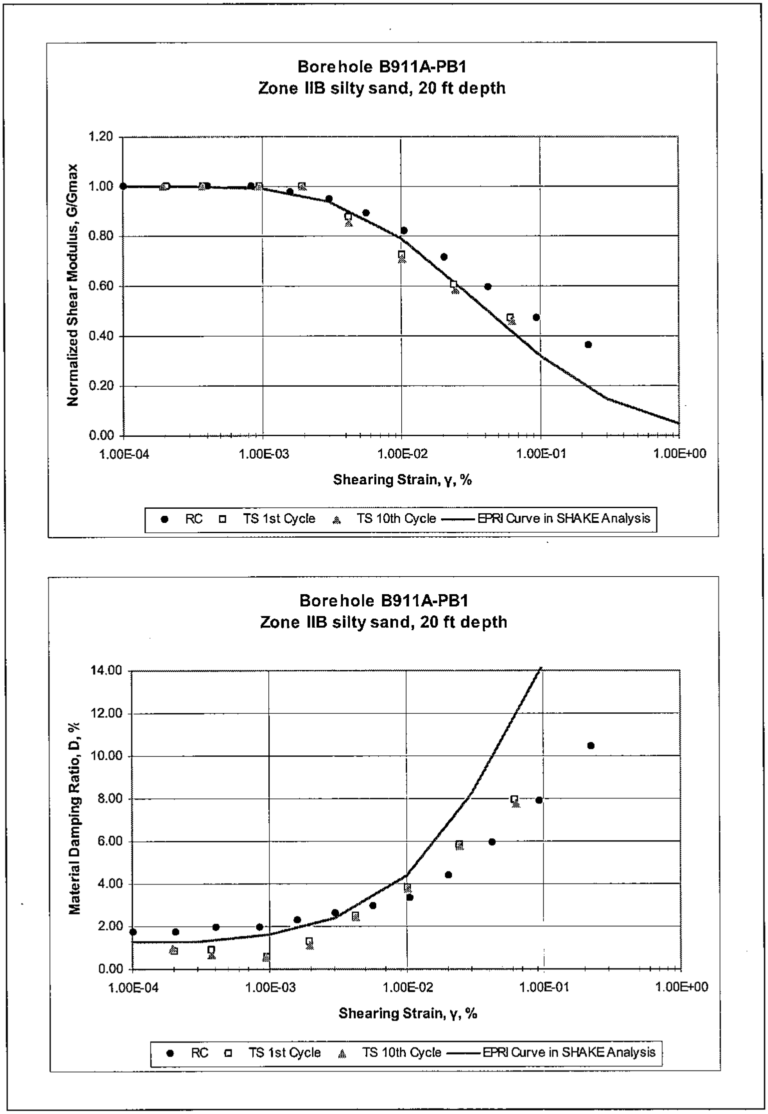
1N058b



INO58b

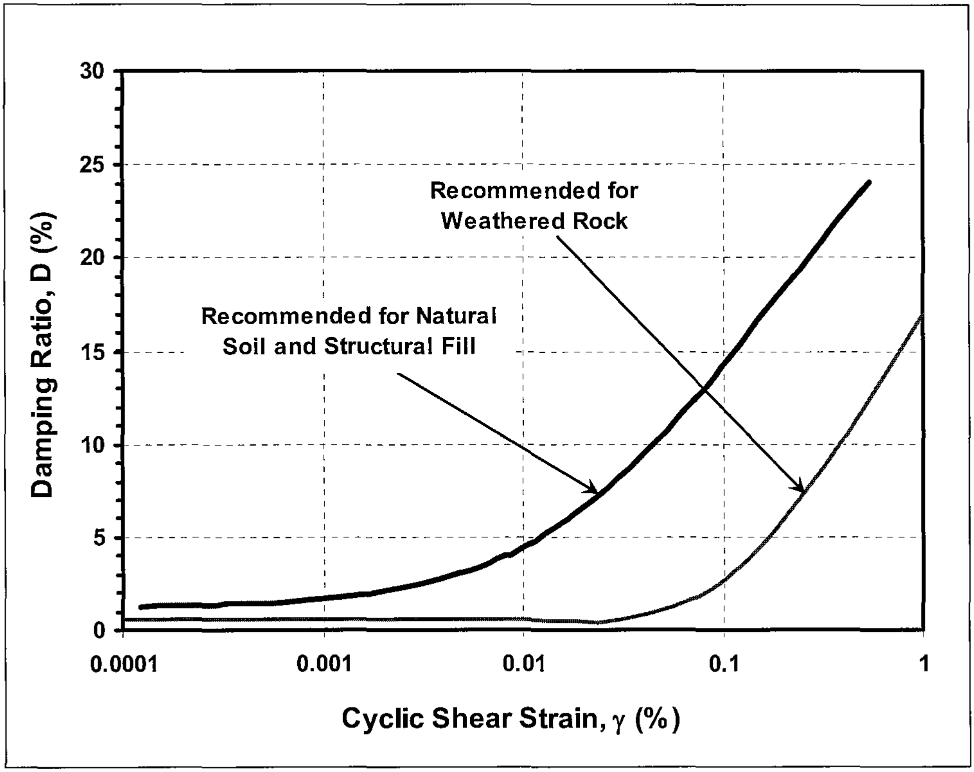
NAPS COL 2.0-29-A

Figure 2.5-247 RCTS Results with G/G_{max} and D Curve G/G_{max} vs. Strain, B-911A PB-1: 11.4 psi Confining Pressure (Sheet 3 of 3)



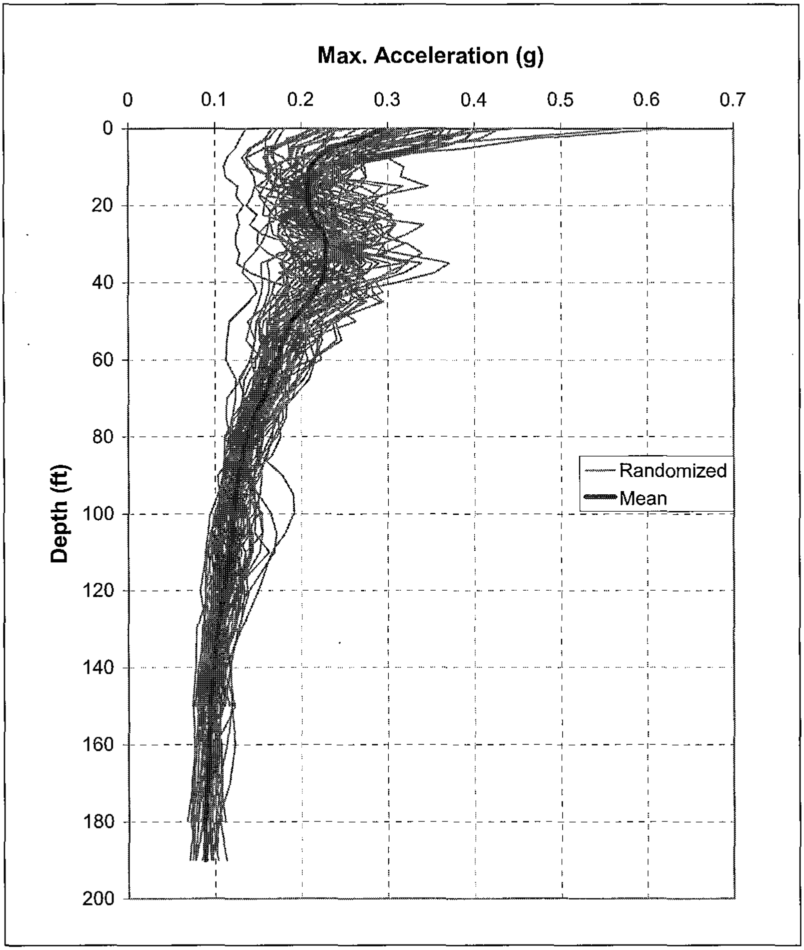
NAPS COL 2.0-29-A **Figure 2.5-248 Damping Ratio versus Cyclic Shear Strain**

I N0586



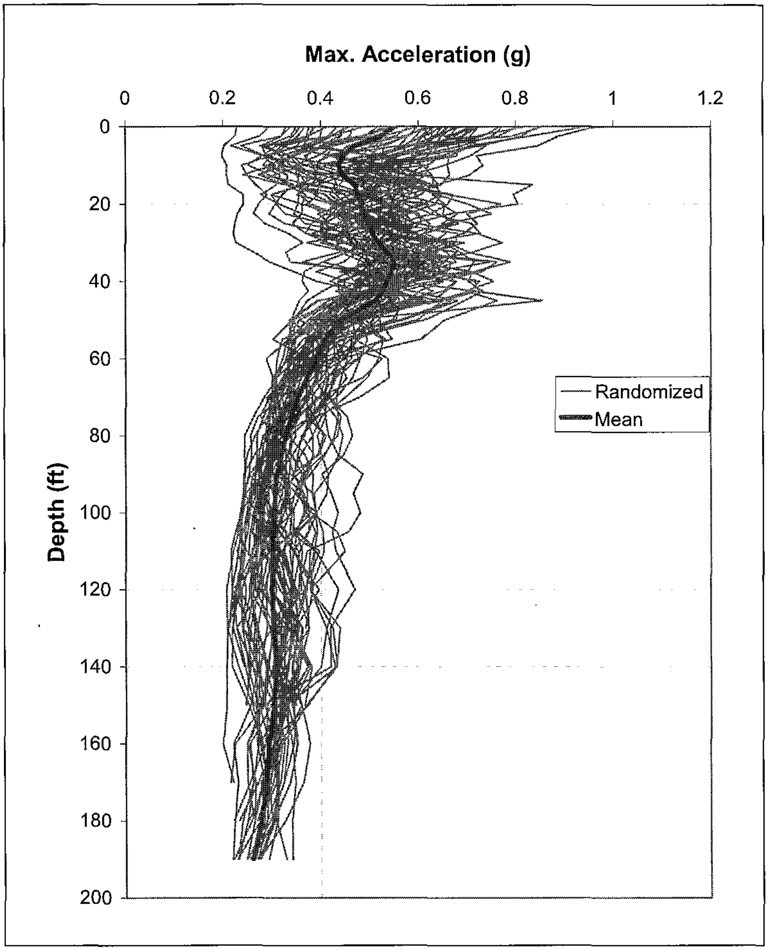
NAPS ESP COL 2.5-5 **Figure 2.5-249 Maximum Acceleration versus Depth, Natural Soil Profile, Low Frequency Input**

IN058b



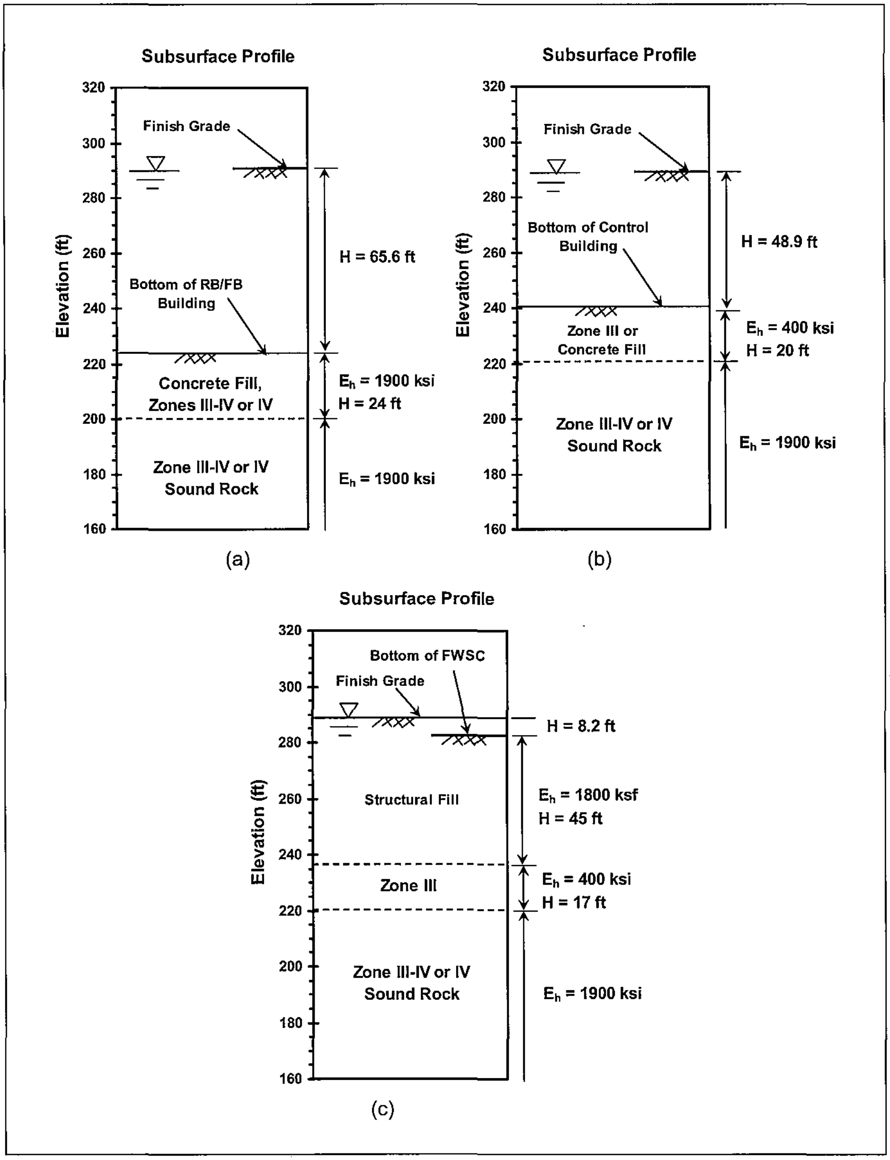
NAPS ESP COL 2.5-5 **Figure 2.5-250** Maximum Acceleration versus Depth, Natural Soil Profile, High Frequency Input

IN058b



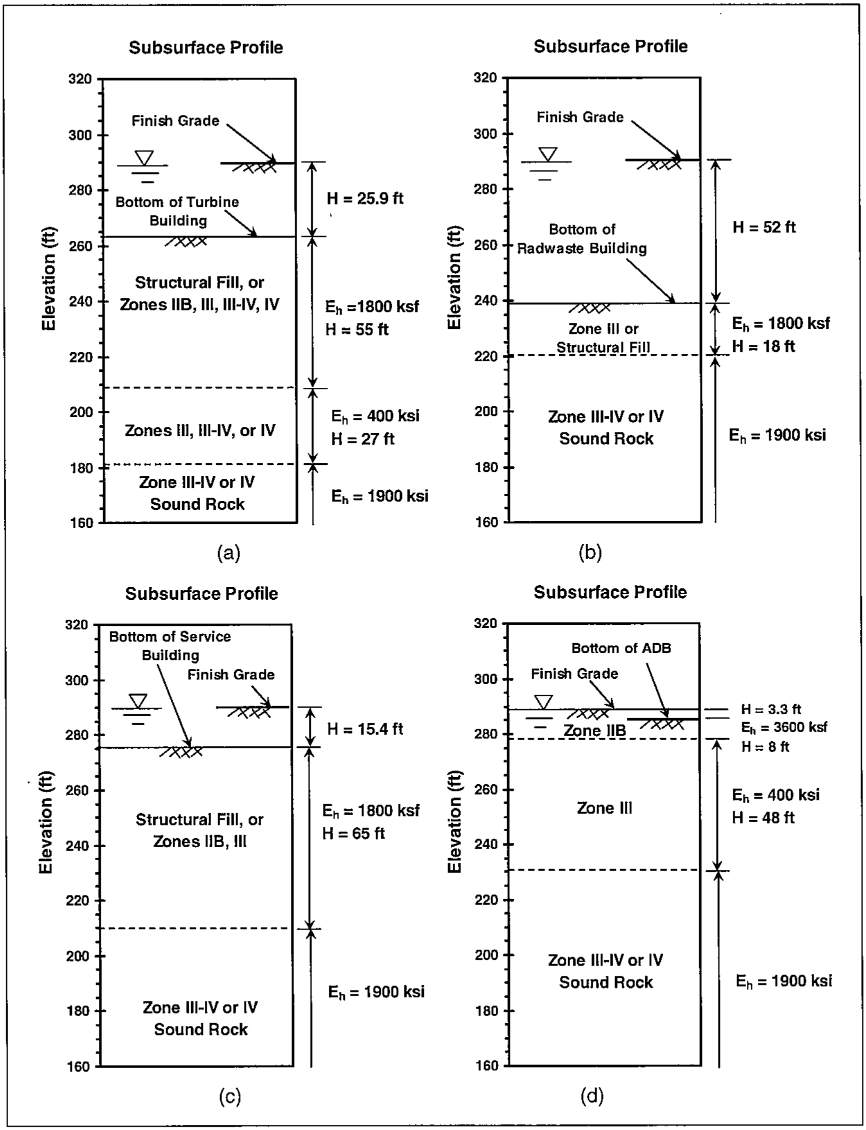
I N058b

NAPS ESP COL 2.5-6 **Figure 2.5-251 Subsurface Profiles Below the Seismic Category I Structures: (a) Reactor/Fuel Building; (b) Control Building; (c) FWSC**



N058b

NAPS ESP COL 2.5-6 **Figure 2.5-252 Subsurface Profiles below the non-Seismic Category I Structures: (a) Turbine Building; (b) Radwaste Building; (c) Service Building; (d) Ancillary Diesel Building**

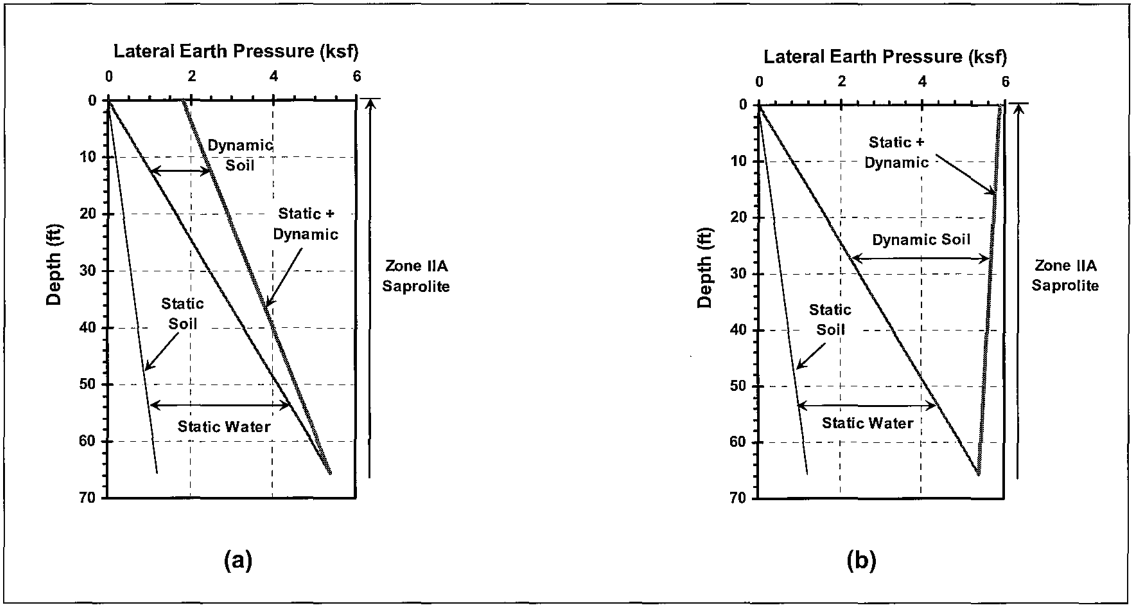


N095a

N058b

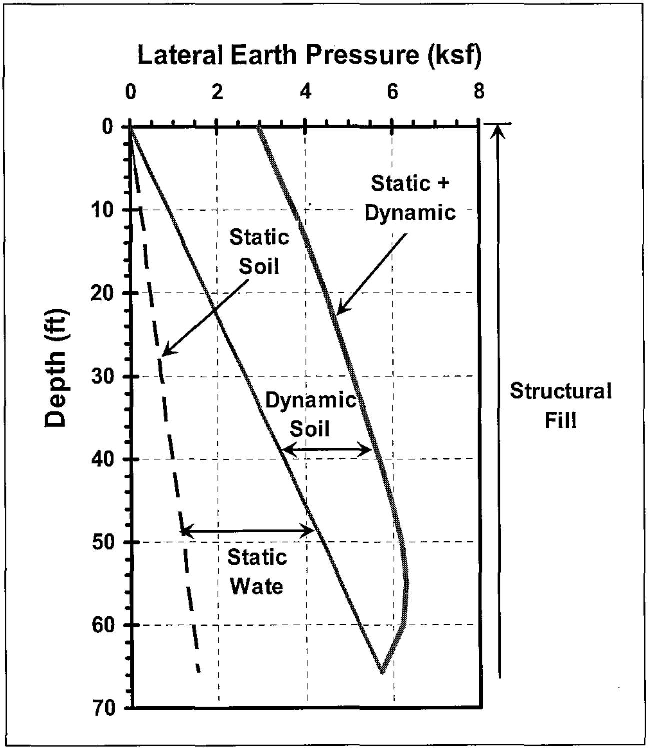
NAPS ESP COL 2.5-6 **Figure 2.5-253 Active Earth Pressure on Yielding Walls: (a) From In-Situ Zone IIA Saprolite - Peak Ground Acceleration, a_{max} = 0.31g; (b) From In-Situ Zone IIA Saprolite - Peak Ground Acceleration, a_{max} = 0.56g**

N025g



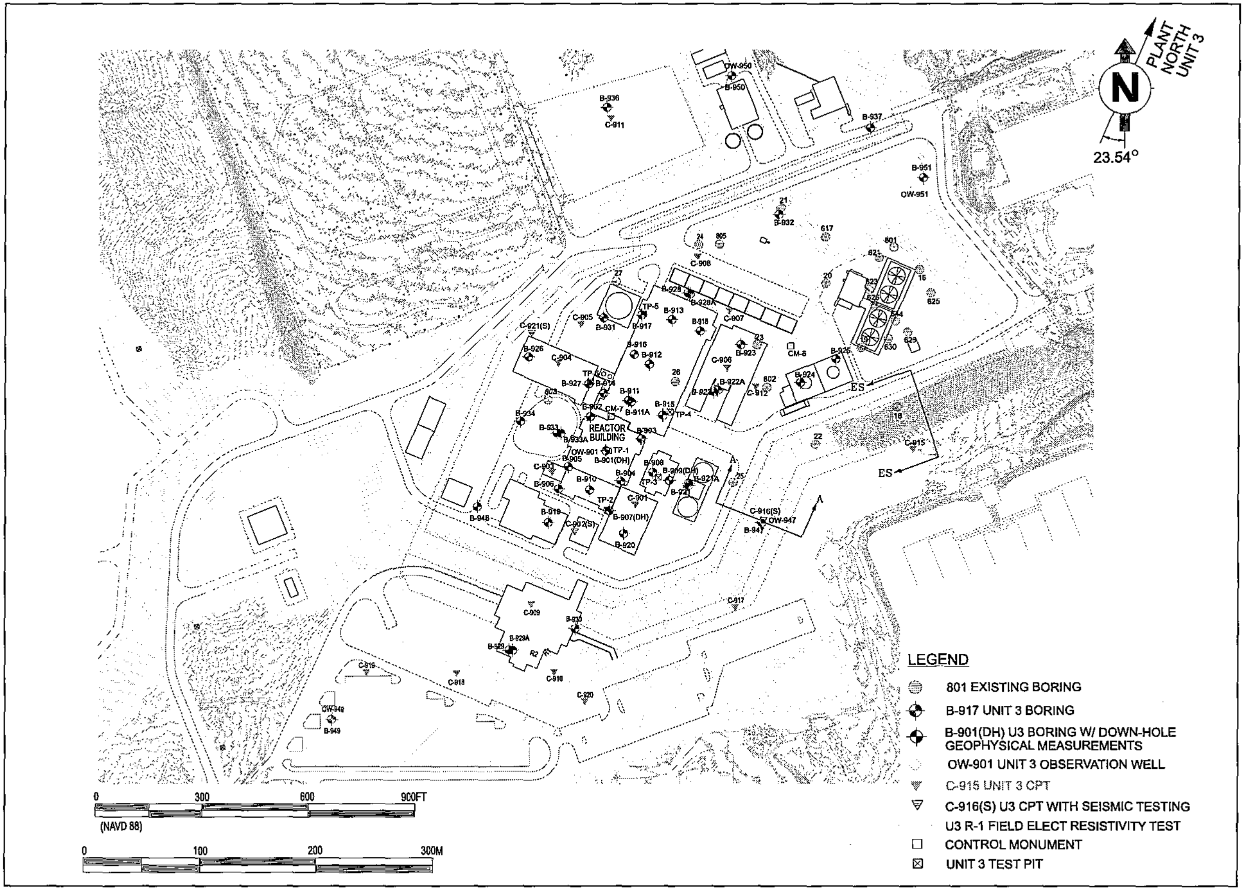
NAPS ESP COL 2.5-6 **Figure 2.5-254 Lateral Earth Pressure on Permanent Non-Yielding Walls (Reactor Building Case)**

IN058b



N058b

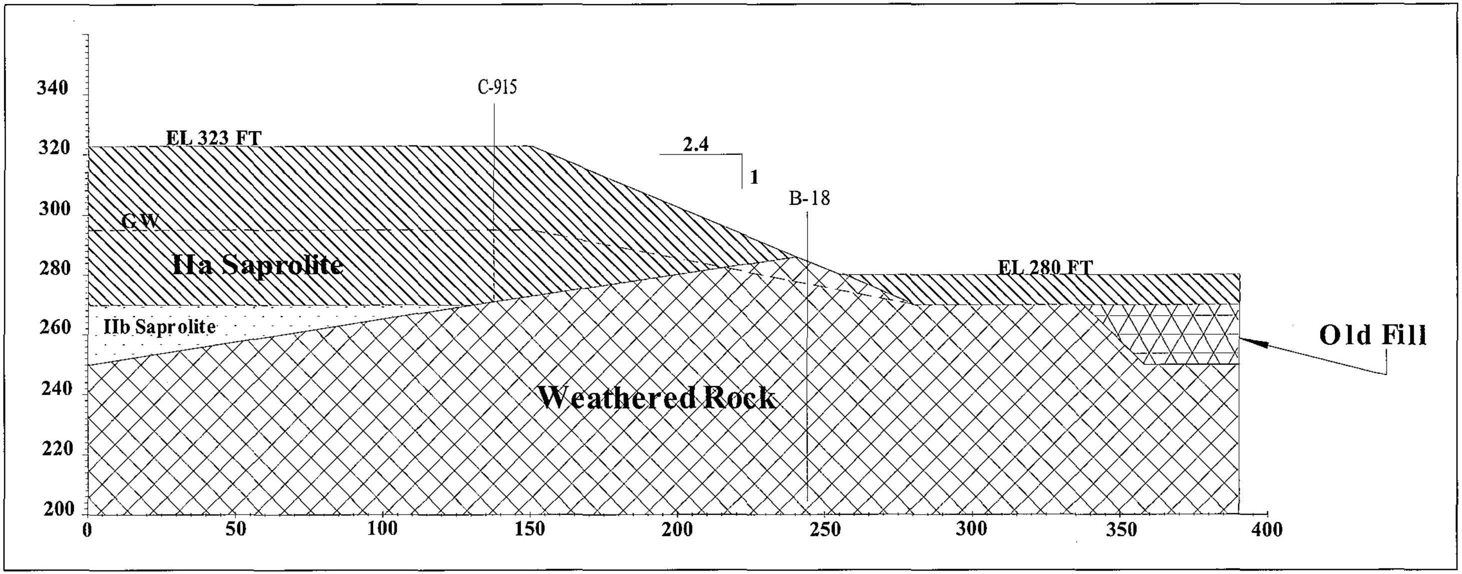
Figure 2.5-255 Grading Plan with Boring Locations



N095a

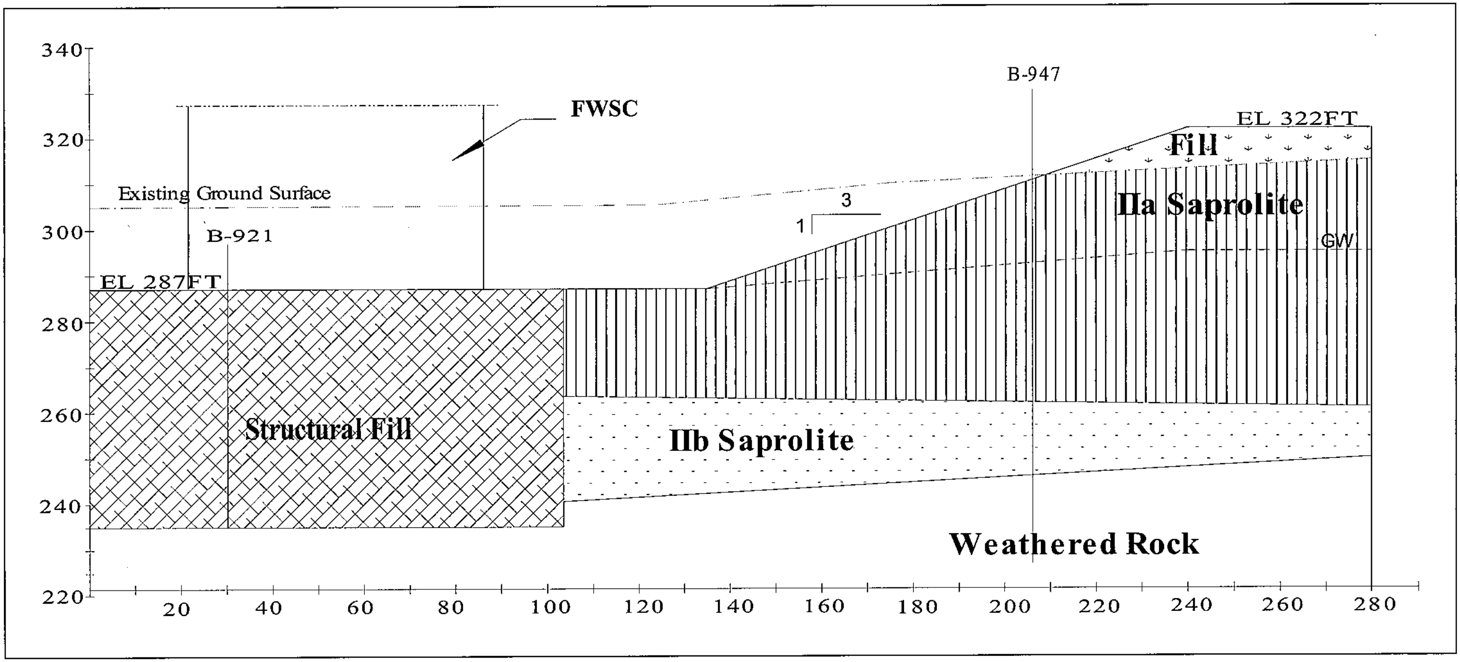
Figure 2.5-256 Cross-Section of Existing Slope (ES)

N05861



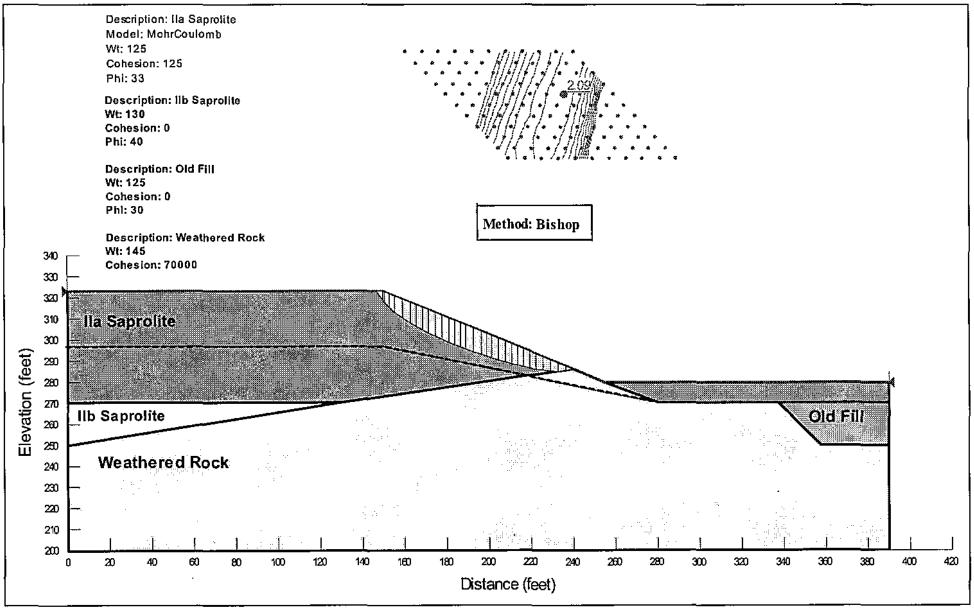
NAPS ESP COL 2.5-11 **Figure 2.5-257 Cross-Section of New Slope (A-A)**

N058b1



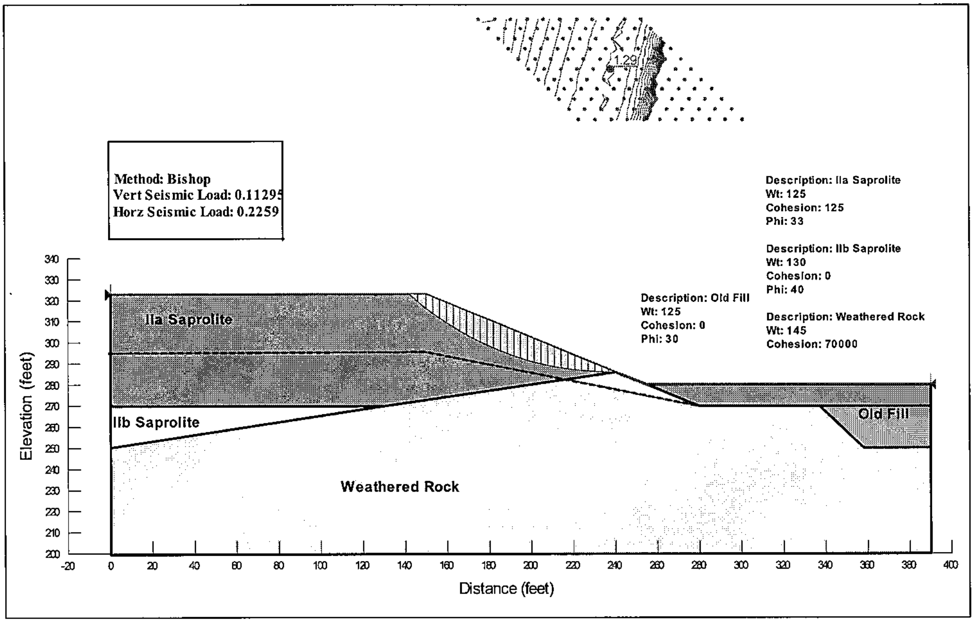
NAPS COL 2.0-30-A Figure 2.5-258 Slope Stability Analysis; Existing Slope; Long-Term

IN0586



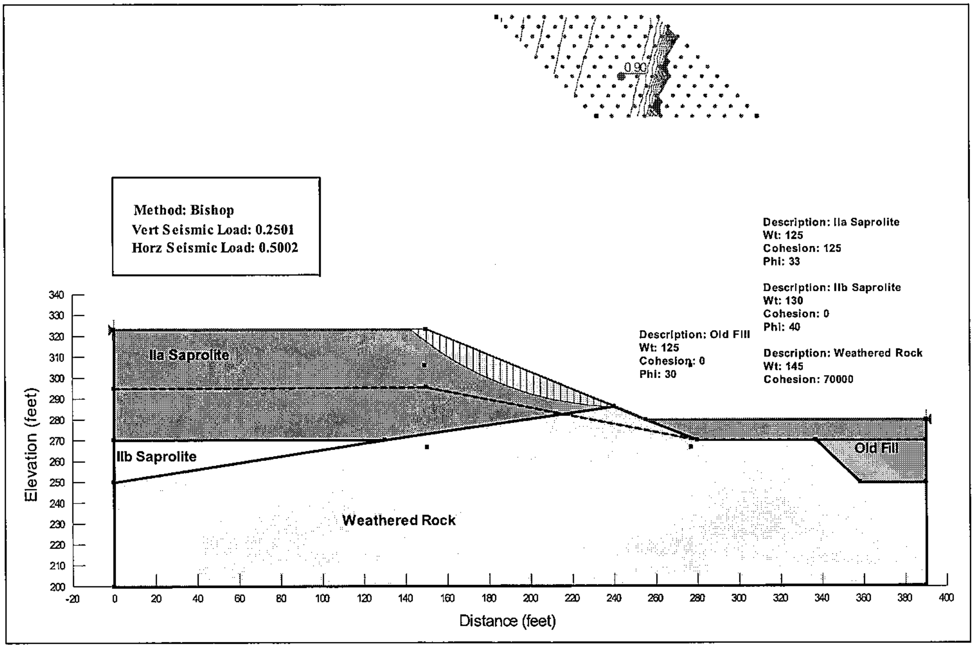
NAPS ESP COL 2.5-10 **Figure 2.5-259 Slope Stability Analysis; Existing Slope; Pseudo-Static; LF**

I N0586



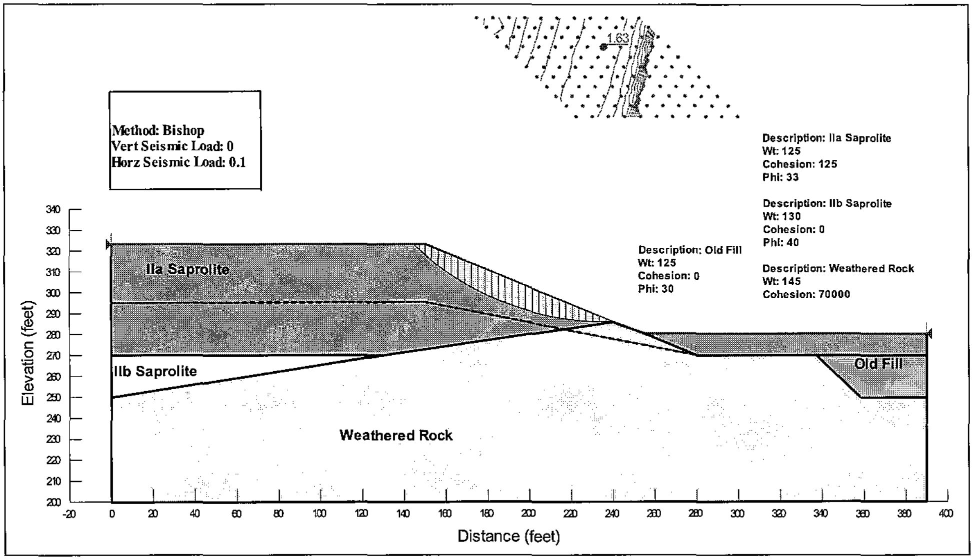
NAPS ESP COL 2.5-10 **Figure 2.5-260 Slope Stability Analysis; Existing Slope; Pseudo-Static; HF**

I N058b



NAPS ESP COL 2.5-10 Figure 2.5-261 Slope Stability Analysis; Existing Slope; Seed Approach; Acceleration of 0.1g

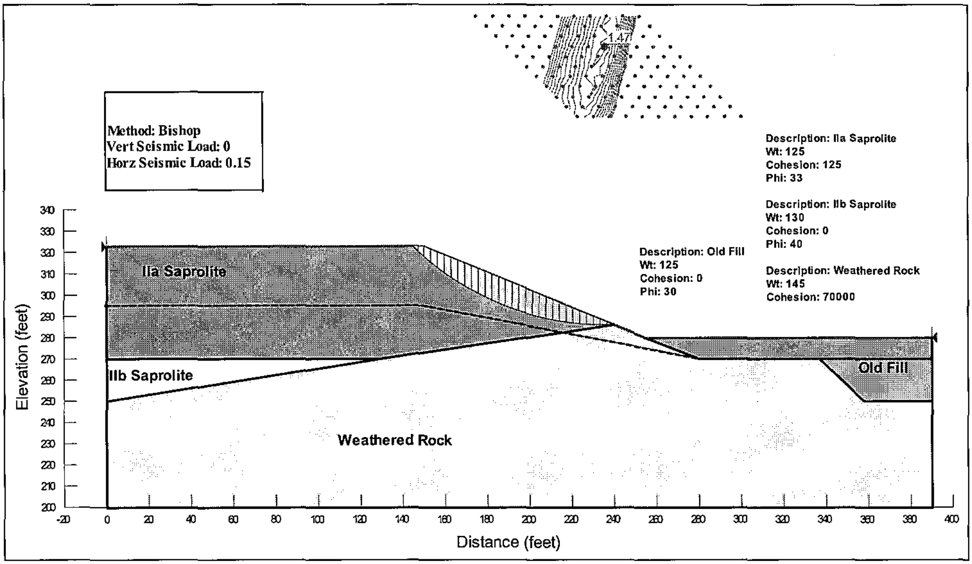
| N0586



- For Information Only -

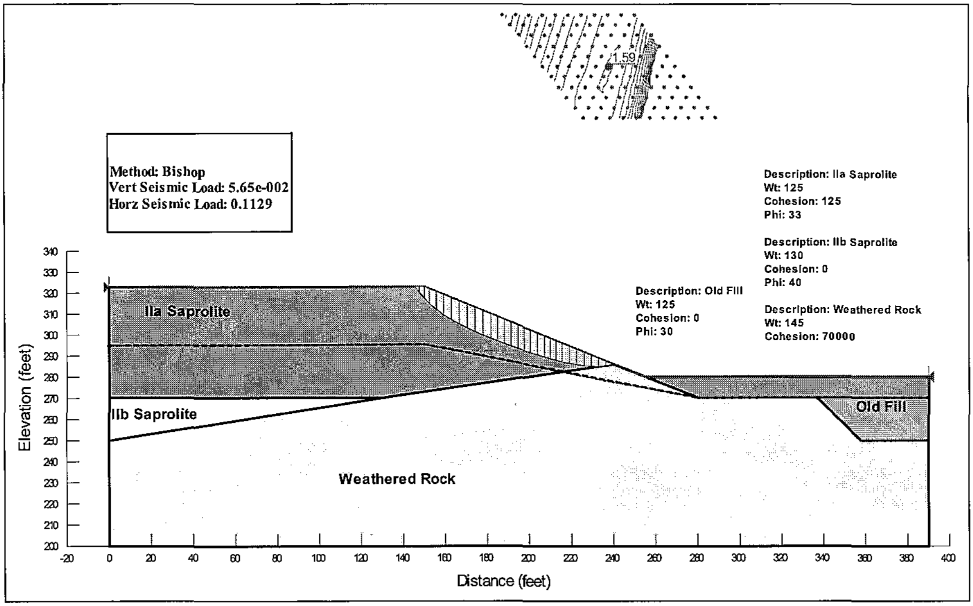
NAPS ESP COL 2.5-10 **Figure 2.5-262 Slope Stability Analysis; Existing Slope; Seed Approach; Acceleration of 0.15g**

I N058b



NAPS ESP COL 2.5-10 **Figure 2.5-263 Slope Stability Analysis; Existing Slope; Kramer Approach; LF**

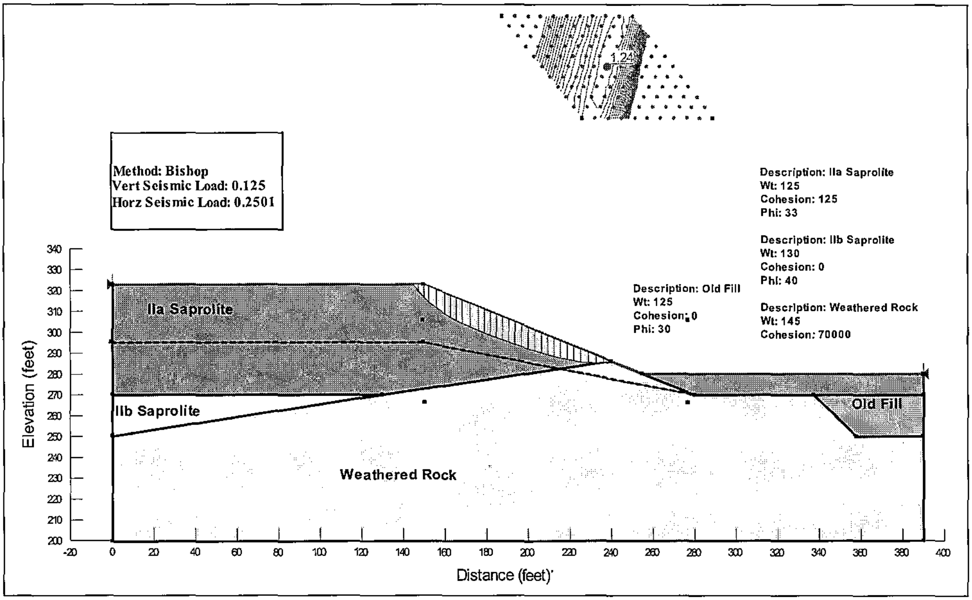
IN058b



- For Information Only -

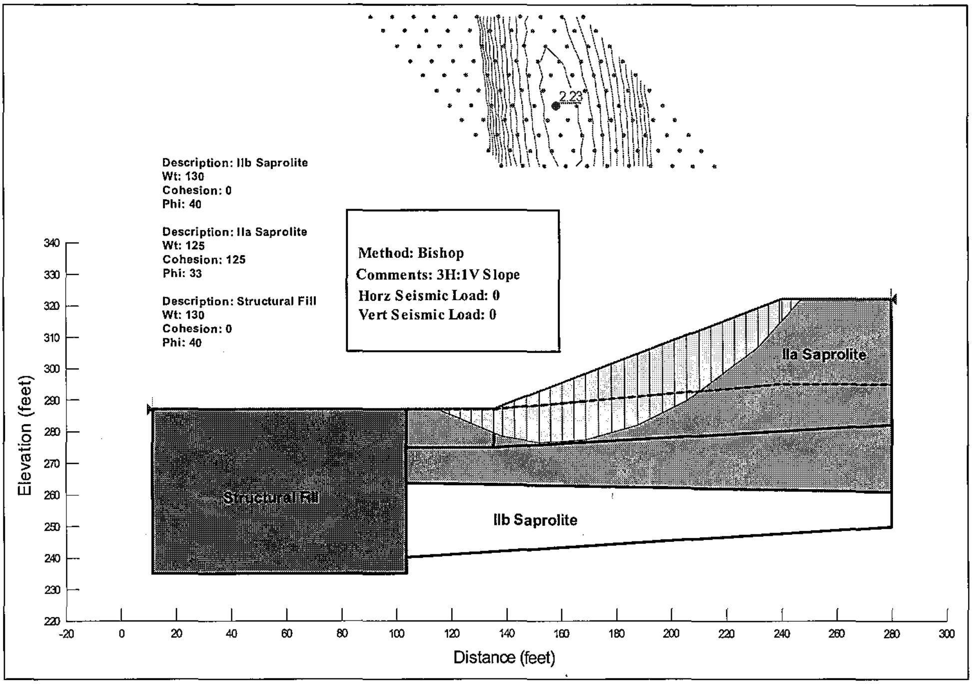
NAPS ESP COL 2.5-10 **Figure 2.5-264 Slope Stability Analysis; Existing Slope; Kramer Approach; HF**

1N058b



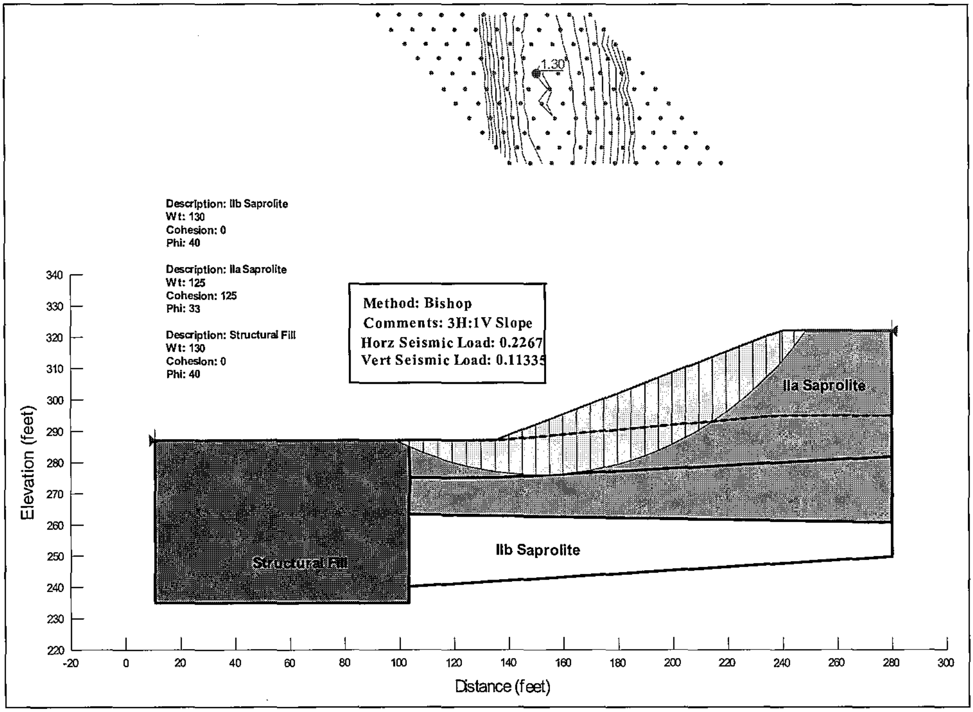
NAPS COL 2.0-30-A **Figure 2.5-265 Slope Stability Analysis; New Slope; Long-Term**

| No58b



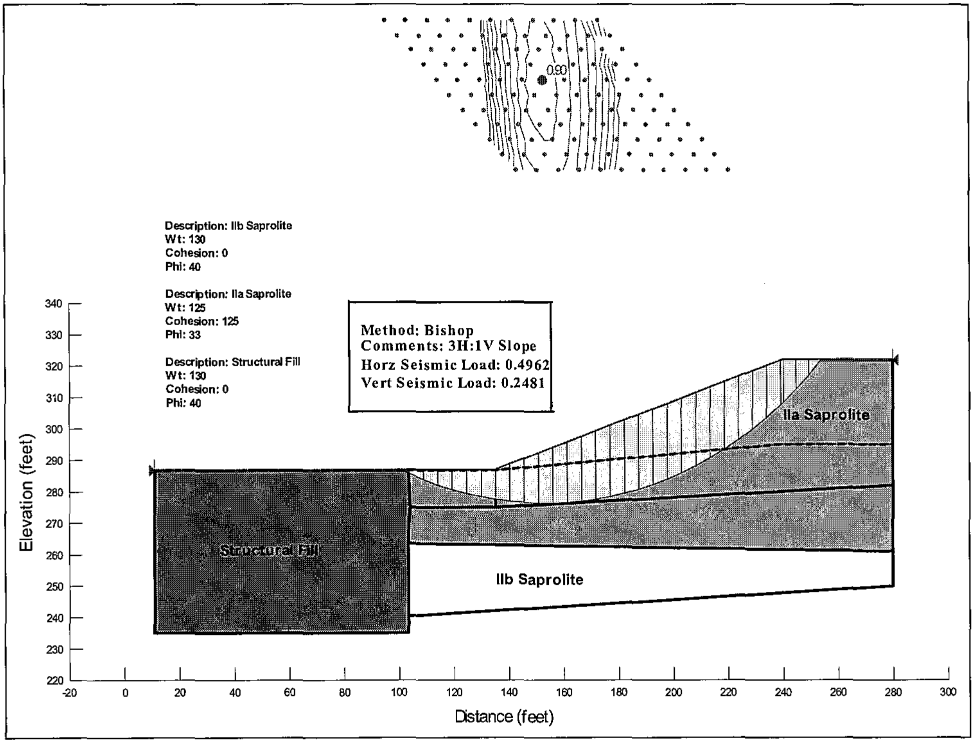
NAPS ESP COL 2.5-10 **Figure 2.5-266 Slope Stability Analysis; New Slope; Pseudo-Static; LF**

IN058b



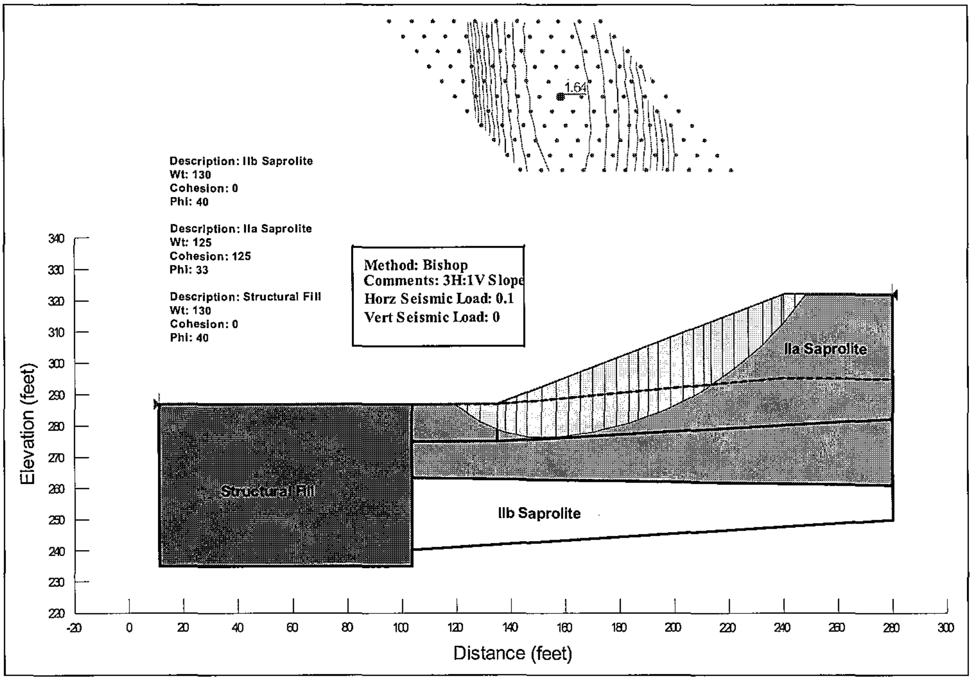
NAPS ESP COL 2.5-10 **Figure 2.5-267 Slope Stability Analysis; New Slope; Pseudo-Static; HF**

IN0586



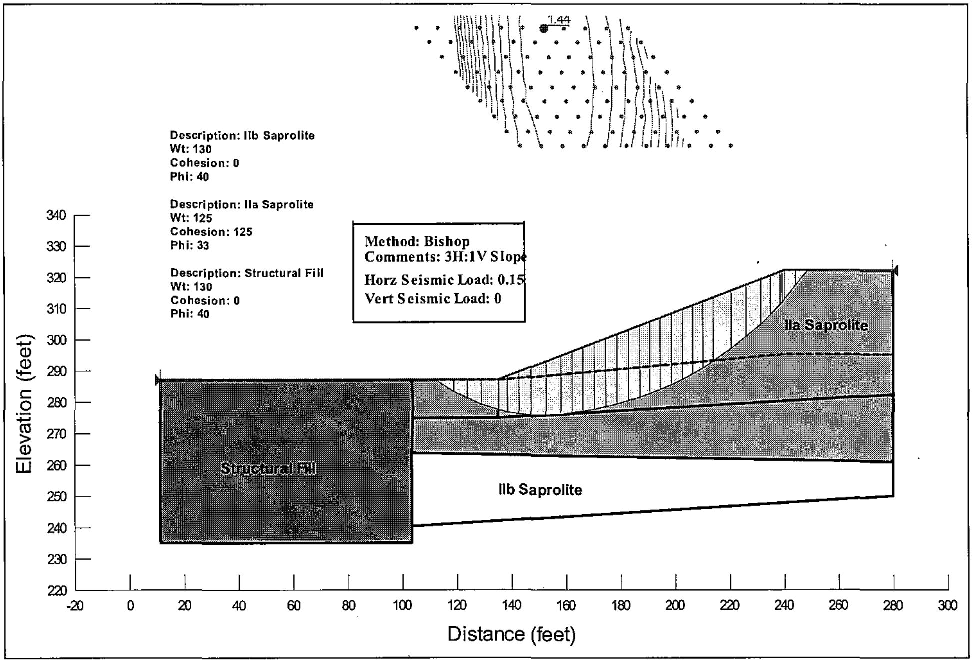
IN058b

NAPS ESP COL 2.5-10 Figure 2.5-268 Slope Stability Analysis; New Slope; Seed Approach; Acceleration of 0.1g



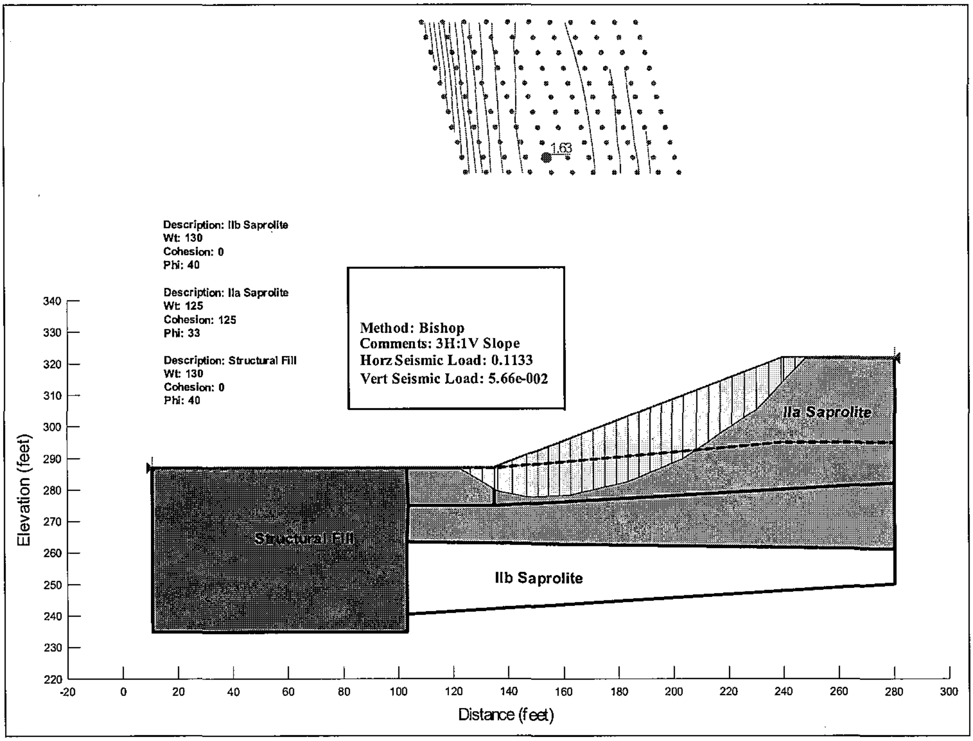
NAPS ESP COL 2.5-10 **Figure 2.5-269 Slope Stability Analysis; New Slope; Seed Approach; Acceleration of 0.15g**

IN058b



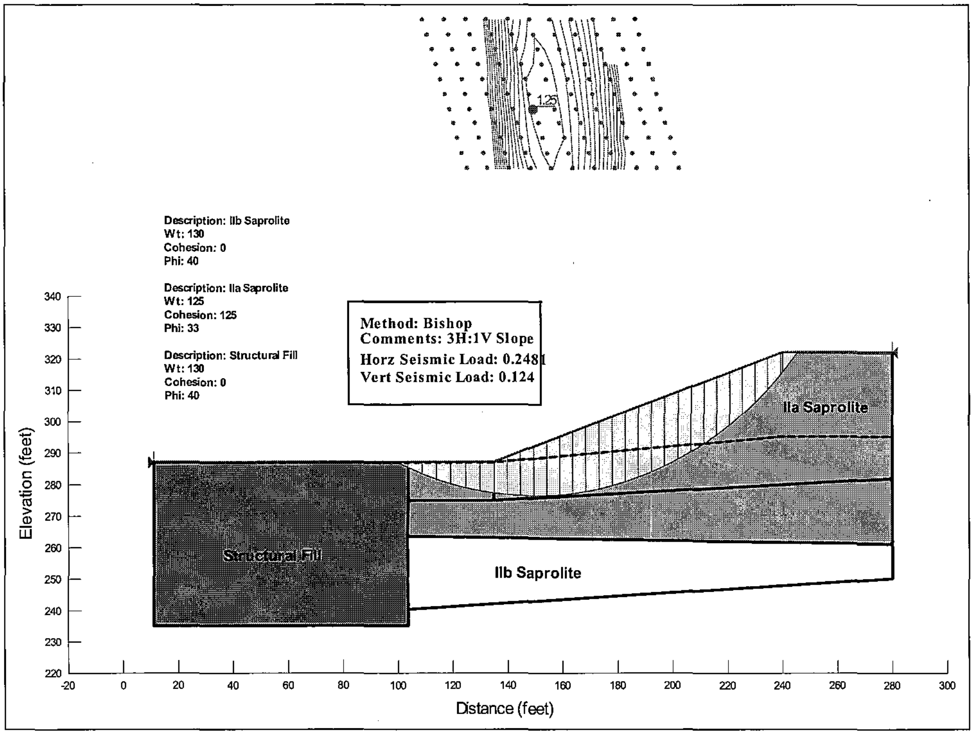
NAPS ESP COL 2.5-10 **Figure 2.5-270 Slope Stability Analysis; New Slope; Kramer Approach; LF**

I N058b



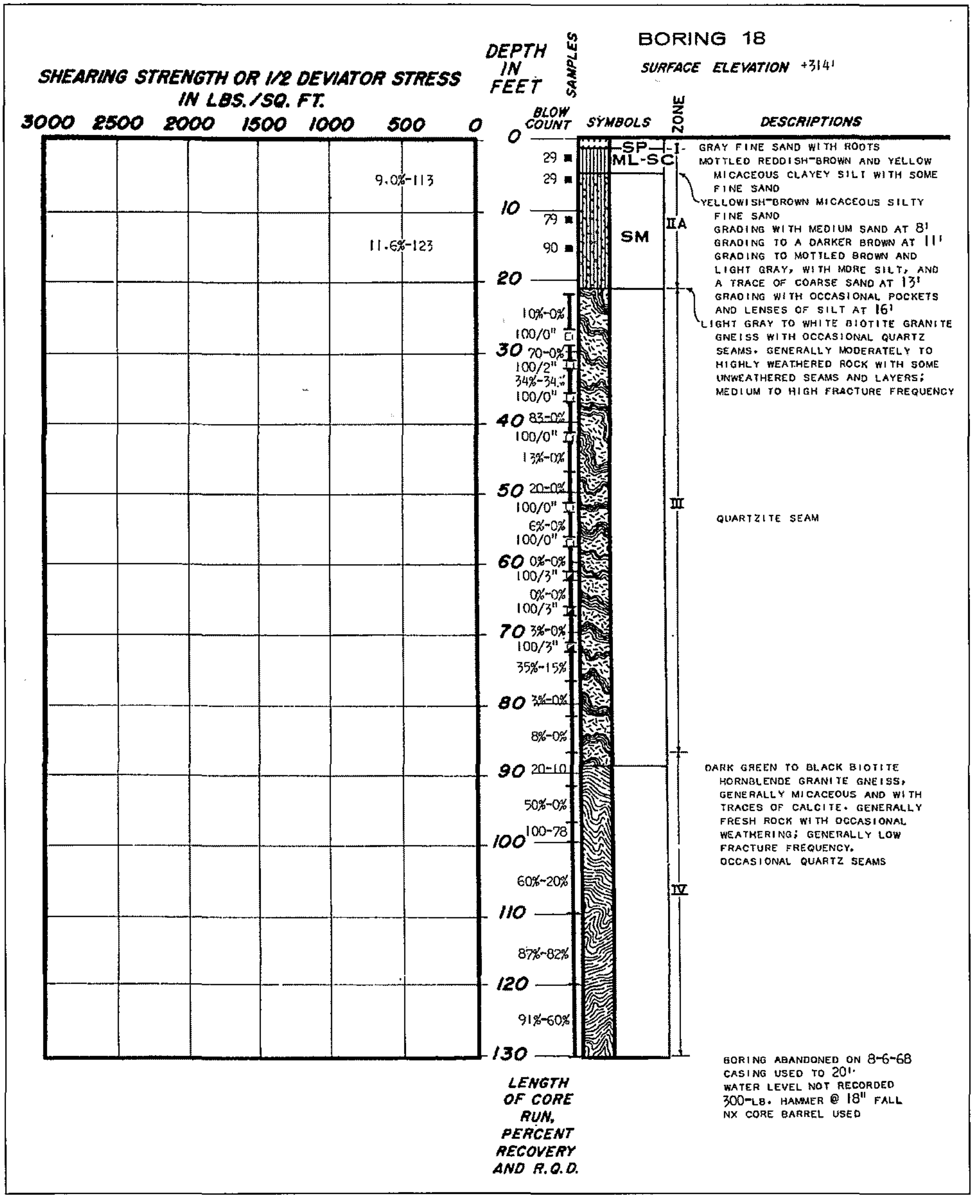
NAPS ESP COL 2.5-10 **Figure 2.5-271 Slope Stability Analysis; New Slope; Kramer Approach; HF**

I N058b



NAPS COL 2.0-30-A **Figure 2.5-272 Log of Boring B-18**

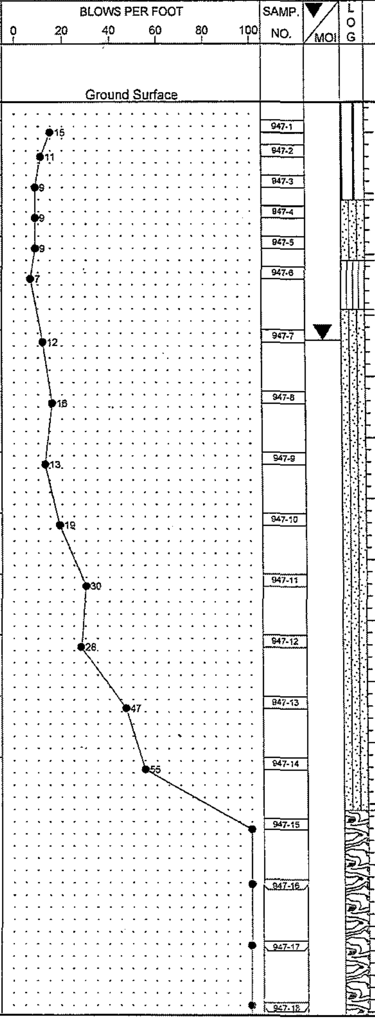
IN0586



NAPS COL 2.0-30-A **Figure 2.5-273 Log of Boring B-947**

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST S.Lehman
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-947	DRILL METHOD: Mud Rotary SAMPLE METHODS: SPT	0 HR. ND
COLLAR ELEV. 312.5 ft (NAVD88)	NORTHING 3,909,575 US ft (NAD83) EASTING 11,686,367 US ft (NAD83)	24 HR. 19.5
TOTAL DEPTH 88.8 ft	DRILL MACHINE CME 55LC Track DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 9/27/06	COMPLETED 9/28/06	CORE BARREL TYPE: NA

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.
312.5					
311.0	1.5	4	6	9	947-1
309.0	3.5	6	5	6	947-2
306.5	6.0	4	3	6	947-3
304.0	8.5	4	4	5	947-4
301.5	11.0	2	4	5	947-5
299.0	13.5	2	3	4	947-6
293.8	18.7	5	6	6	947-7
288.8	23.7	5	6	10	947-8
283.8	28.7	4	3	10	947-9
278.8	33.7	3	7	12	947-10
273.8	38.7	12	14	16	947-11
268.8	43.7	9	11	17	947-12
263.8	48.7	13	23	24	947-13
258.8	53.7	23	27	28	947-14
253.8	58.7	36	50/0.4		947-15
248.8	63.7	50/0.4			947-16
243.8	68.7	50/0.4			947-17
238.8	73.7	50/0.3			947-18



		SOIL AND ROCK DESCRIPTION
312.5	0.0	Elastic SILT (MH) light gray (2.5Y 7/2) and light greenish gray (GLEY1 8/5GY), dry to moist, stiff (Residual Soil)
304.5	8.0	Silty, SAND (SM) strong brown (7.5YR 4/6), moist, loose (Residual Soil)
299.5	13.0	Sandy SILT (ML) light gray (2.5Y 7/2), moist, medium stiff (Residual Soil)
295.5	17.0	Silty, fine to medium SAND (SM) reddish yellow (7.5YR 6/6), yellowish brown (2.5 Y 6/4), white (2.5Y 8/1), light yellow (2.5Y 7/3), and light olive brown (2.5Y 5/4&5/3), wet, medium dense to very dense, relict rock fabric (Residual Soil)
254.5	58.0	Weathered Rock: Light yellowish brown (2.5Y 6/4) and light brownish gray (2.5Y 6/2), moist, very dense, severely weathered, soft, QUARTZ GNEISS

NORTH ANNA COL RE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

NAPS COL 2.0-30-A **Figure 2.5-273 Log of Boring B-947** *(continued)*

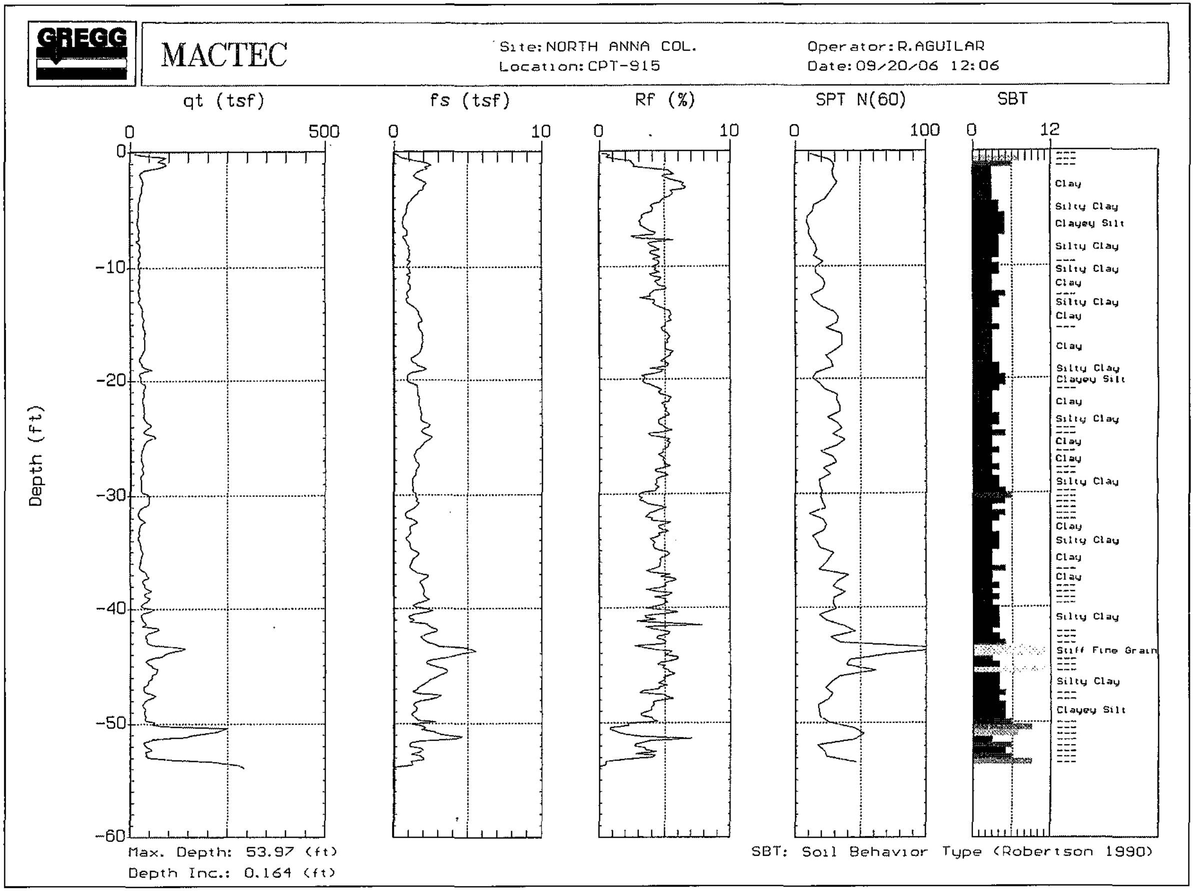
MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S.Lehman	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-947	**DRILL METHOD:** Mud Rotary	**SAMPLE METHODS:** SPT	**0 HR.** ND
COLLAR ELEV. 312.5 ft (NAVD88)	**NORTHING** 3,909,575 US ft (NAD83)	**EASTING** 11,686,367 US ft (NAD83)	**24 HR.** 19.5
TOTAL DEPTH 88.8 ft	**DRILL MACHINE** CME 55LC Track	**DRILLER:** D. White	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 9/27/06	**COMPLETED** 9/28/06	**CORE BARREL TYPE:** NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	▼ MOI	LOG	SOIL AND ROCK DESCRIPTION
237.7					Continued from previous page				
233.8	78.7	50/0.2			●	947-19			Weathered Rock: Light yellowish brown (2.5Y 6/4) and light brownish gray (2.5Y 6/2), moist, very dense, severely weathered, soft, QUARTZ GNEISS *(continued)*
228.8	83.7	50/0.1			●	947-20			
223.8	88.7	50/0.1			●	947-21			223.7 88.8
									Boring terminated at 88.8 ft in Weathered Rock: Very dense, severely weathered, soft, QUARTZ GNEISS

NORTH ANNA COL ORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

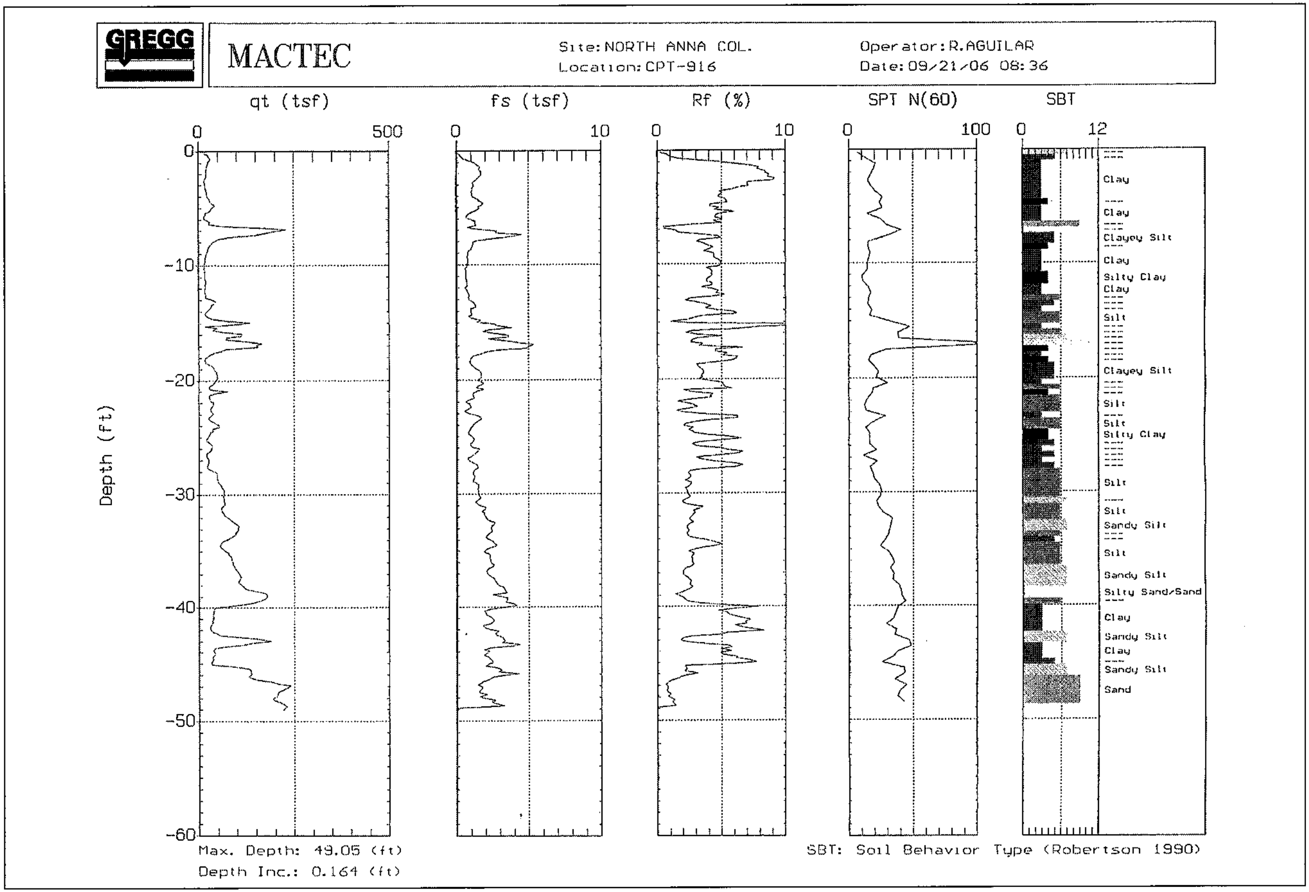
N058b1

Figure 2.5-274 Log of CPT C-915



NAPS COL 2.0-30-A **Figure 2.5-275 Log of CPT C-916**

N0584



1N058b

NAPS COL 2.0-30-A **Figure 2.5-276 Log of Well OW-947**

OBSERVATION WELL INSTALLATION RECORD

JOB NAME **NORTH ANNA COL**

JOB NUMBER **6468-06-1472**

WELL NUMBER **OW-947**

INSTALLATION DATE **11-06-06**

LOCATION (NAD83) **N = 3,909,579.58 E = 11,686,371.84**

GROUND SURFACE ELEVATION* (NAVD88) **313.30**

REFERENCE POINT ELEVATION** (NAVD88) **315.08**

GRANULAR BACKFILL MATERIAL **Southern Silica #1 & #3 Sand***

SLOT SIZE **.010**

SCREEN MATERIAL **PVC Schd. 40-Standard**

SCREEN DIAMETER **2 in.**

RISER MATERIAL **PVC Schd. 40-Standard**

RISER DIAMETER **2 in.**

DRILLING TECHNIQUE **Hollow-stem auger 4.25" I.D.**

DRILLING CONTRACTOR **MACTEC**

BOREHOLE DIAMETER **Approximately 8"**

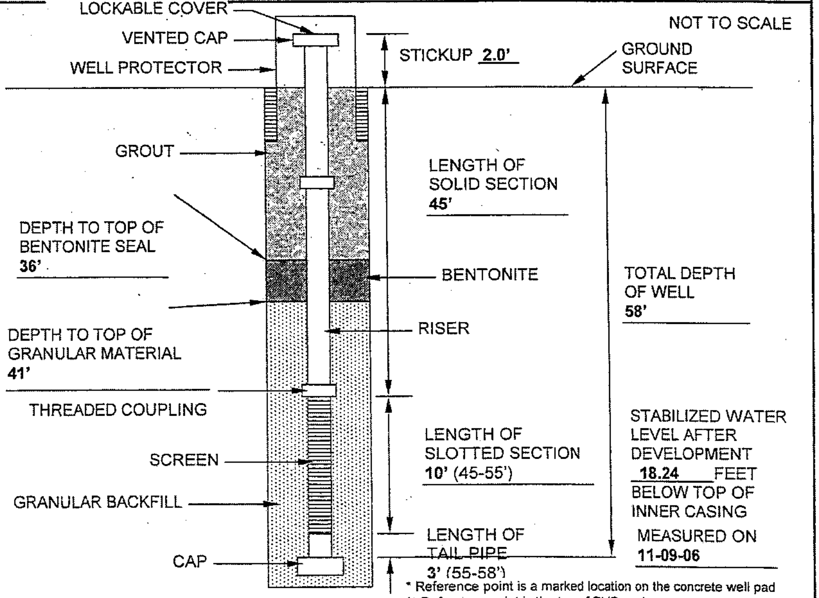
MACTEC FIELD REPRESENTATIVE **Kim Charles-Smith**

LOCK BRAND **Master**

SIZE/MODEL **N/A**

KEY CODE/COMBINATION **#3206**

* Both #1 and #3 sand met the technical specifications for use as granular backfill material. MACTEC used #3 sand to backfill the sump portion of observation well OW-947, and #1 sand for the remaining portion of the well boring.



* Reference point is a marked location on the concrete well pad

** Reference point is the top of PVC casing

NORTH ANNA POWER STATION
MINERAL, VIRGINA
COL PROJECT
Dominion Purchase Order 7015798

MACTEC
MACTEC Engineering and Consulting, Inc.
3301 Atlantic Avenue
Raleigh, North Carolina 27604

OBSERVATION WELL
INSTALLATION RECORD
1-18-07

Appendix 2A ARCON96 Source/Receptor Inputs

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

2A.2.1 Meteorological Data

No29c

Add the following as the last sentence of this section.

No29c

NAPS COL 2A.2-1-A Instrumentation heights used in the analysis are described in SSAR Section 2.3.3.1. Meteorological data from 1996 to 1998 as described in SSAR Section 2.3 is used in the analysis.

No29c

2A.2.3 ARCON96 ESBWR Inputs

No29c

Replace the last sentence of the first paragraph with the following.

No29c

NAPS COL 2A.2-1-A These directions are adjusted by the difference in angle (approximately 24 degrees counterclockwise) between the ESBWR plant north and the Unit 3 plant north; Unit 3 receptor to source directions are shown in Table 2A-4R.

No29c

2A.2.4 Confirmation of the ESBWR χ/Q Values

No29c

Replace this section with the following.

No29c

NAPS COL 2A.2-1-A DCD Figure 2A-1 shows the locations of the sources and receptors for ESBWR control room determinations, also used in the Unit 3 evaluations. The dimensions of the diffuse source planes provided in DCD Table 2A-3 are determined as directed by RG 1.194, Regulatory Position 3.2.4.5, for the nearest receptor locations. ARCON96 calculations are performed for source/receptor pairs listed in DCD Table 2A-3 and Table 2A-4R using site-specific meteorological data. Results of the site-specific analysis are provided in Tables 2.3-202 through 2.3-207.

No29
b, c

2A.2.5 Confirmation of the Reactor Building χ/Q Values

No29c

Replace this section with the following.

No29c

NAPS COL 2A.2-2-A During refueling, doors or personnel air locks on the east sides of the Reactor Building or Fuel Building could act as a point source that could result in control room χ/Q values that are higher than the ESBWR χ/Q values for a release in the Reactor Building. Therefore, the doors are administratively controlled prior to and during movement of irradiated fuel

No29
b, c

bundles. The administrative controls are such that the doors and personnel air locks on the East sides of the Reactor Building or Fuel Building are promptly closed under conditions indicative of a fuel handling accident.

N029 b, c

2A.3 COL Information

N029c

2A.2-1-A **Confirmation of the ESBWR χ/Q Values**

NAPS COL 2A.2-1-A This COL item is addressed in Section 2.3.4.3 and in Section 2A.2.4.

N029 b, c

2A.2-2-A **Confirmation of the Reactor Building χ/Q Values**

NAPS COL 2A.2-2-A This COL item is addressed in Section 2A.2.5.

N029 b, c

NAPS ESP COL 2.3-2
NAPS COL 2A.2-1-A

Table 2A-4R ARCON96 Input – Receptor to Source Direction

Source/Receptor	Receptor to Source Direction (deg.)
RB to CBL	294
RB to EN	284
RB to ES	304
RB to N	308
RB to TSCE	236
RB to TSCW	224
PCCS to CBL	333
PCCS to EN	309
PCCS to ES	328
PCCS to N	332
PCCS to TSCE	238
PCCS to TSCW	225
TB to CBL	7
TB to EN	348
TB to ES	355
TB to N	0
TB to TSCE	256
TB to TSCW	238
TB-TD to CBL	5
TB-TD to EN	355
TB-TD to TSCW	301
FB to CBL	252
FB to EN	258
FB to ES	272
FB to N	276
RW to N	328
RB-VS to CBL	271
RB-VS to ES	285
RB-VS to N	286
TB-VS to CBL	20
TB-VS to EN	5

N029
b, c

NAPS ESP COL 2.3-2
NAPS COL 2A.2-1-A

Table 2A-4R ARCON96 Input – Receptor to Source Direction

Source/Receptor	Receptor to Source Direction (deg.)
TB-VS to N	12
RW-VS to CBL	326
RW-VS to EN	314
RW-VS to N	328
BPN to CBL	346
BPN to EN	309
BPN to ES	330
BPN to N	339
BPS to CBL	243
BPS to EN	253
BPS to ES	279
BPS to N	283

N029
b,c

Chapter 3 Design of Structures, Components, Equipment, and Systems

3.1 Conformance with NRC General Design Criteria

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

3.2 Classification of Structures, Systems and Components

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

Table 3.2-1 Classification Summary

Replace the note for System P73 with the following.

STD CDI The site-specific plant design includes the HWCS. See Section 9.3.9 for further details. IS034a

Replace the note for System P74 with the following.

STD CDI The site-specific plant design does not include the Zinc Injection System.

Replace the note for System U78 with the following. IN098

NA3 CDI The site-specific plant design does not include the cold machine shop. IN098

3.3 Wind and Tornado Loadings

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

3.4 Water Level (Flood) Design

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

3.5 Missile Protection

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

3.5.1.5 Site Proximity Missiles (Except Aircraft)

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

STD SUP 3.5-1 Site-specific missile sources are addressed in Section 2.2.

3.5.1.6 Aircraft Hazards

Add the following at the end of the first paragraph.

STD SUP 3.5-2 Site-specific aircraft hazard analysis and the site-specific critical areas are addressed in Section 2.2.

3.6 Protection Against Dynamic Effects Associated with the Postulated Rupture of Piping

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

SD60

3.7 Seismic Design

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

3.7.1.1 Design Ground Motion

NAPS SUP 3.7-1

3.7.1.1.4 Site-Specific Design Ground Motion Response Spectra

The site-specific design Ground Motion Response Spectra (GMRS) and the FIRS are described in Section 2.5.2. The CSDRS are compared with the FIRS in Table 2.0-201.

NAPS SUP 3.7-2

3.7.1.1.5 Site-Specific Design Ground Motion Time History

The site-specific earthquake ground motion time history is described in Section 2.5.4.

3.7.1.3 Supporting Media for Seismic Category I Structures

Add the following at the end of the first paragraph.

NAPS SUP 3.7-3 Section 2.5.4 provides site-specific properties of subsurface materials.

3.7.2.4 Soil-Structure Interaction

Add the following at the end of the first paragraph.

NAPS SUP 3.7-4 Section 2.5.4 describes the site-specific properties of subsurface materials.

3.7.2.8 Interaction of Non-Category I Structures with Seismic Category I Structures

Add the following at the end of this section.

I 5037

NAPS SUP 3.7-5 The locations of structures are provided in Figure 2.1-201.

3.7.4 Seismic Instrumentation

Add the following at the end of the first paragraph.

NAPS SUP 3.7-6 The seismic monitoring program described in this subsection, including the necessary test and operating procedures, will be implemented prior to receipt of fuel on site.

3.8 Seismic Category I Structures

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

3.9 Mechanical Systems and Components

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

3.9.2.4 Initial Startup Flow-Induced Vibration Testing of Reactor Internals

Replace the last two paragraphs with the following.

NAPS COL 3.9.9-1-H A vibration assessment program as specified in RG 1.20 is provided in DCD Appendix 3L and the following referenced GEH Reports.

- NEDE-33259P, “ESBWR Reactor Internals Flow Induced Vibration Program”
- NEDE-33312P, “Steam Dryer Acoustic Load Definition”
- NEDE-33313P, “Steam Dryer Structural Evaluation”
- NEDC-33408P, “ESBWR Steam Dryer Plant Based Load Evaluation Methodology”

03.09.02-2

Information on a schedule in accordance with the five applicable scheduling portions of position C.3 of RG 1.20 (refer to Section C.2.5) for non-prototype internals is as follows.

- In response to C.2.5, Item (1), the reactor internals design has been classified by GEH in DCD Section 3L.1 as non-prototype Category II.

- In response to C.2.5, Items (2), (3) and (4), Unit 3 is committed to the comprehensive vibration assessment program including the scope, the vibration measurement and inspection phases and the summary as described in DCD Appendix 3L with no departures.
- In response to C.2.5, Item (5), Unit 3 will submit the preliminary and final reports which together summarize the results of the vibration analysis, measurement, and inspection programs to the NRC within 60 days and 180 days, respectively, following the completion of the vibration testing.

03.09.
02-2

3.9.3.1 Loading Combinations, Design Transients and Stress Limits

Replace the last sentence with the following.

STD COL 3.9.9-2-H

The piping stress reports identified in this DCD section will be completed within six months of completion of ITAAC Table 3.1-1. The FSAR will be revised as necessary in a subsequent update to address the results of this analysis.

3.9.3.7.1(3)e Snubber Preservice and Inservice Examination and Testing

S053

Preservice Examination and Testing

S053

Add the following at the end of this section.

S034a
S053

STD COL 3.9.9-4-A

A preservice thermal movement examination is also performed; during initial system heatup and cooldown, for systems whose design operating temperature exceeds 121°C (250°F), snubber thermal movement is verified.

S053

Additionally, preservice operational readiness testing is performed on all snubbers. The operational readiness test is performed to verify the parameters of ISTD-5120. Snubbers that fail the preservice operational readiness test are evaluated to determine the cause of failure, and are retested following completion of corrective action(s).

Snubbers that are installed incorrectly or otherwise fail preservice testing requirements are re-installed correctly, adjusted, modified, repaired or replaced, as required. Preservice examination and testing is re-performed on installation-corrected, adjusted, modified, repaired or replaced snubbers as required.

The preservice examination and testing programs for snubbers will be completed in accordance with milestones described in Section 13.4. S053

Inservice Examination and Testing S053

Add the following at the beginning of this section. S053

STD COL 3.9.9-4-A

Inservice examination and testing of all safety-related snubbers is conducted in accordance with the requirements of the ASME OM Code, Subsection ISTD. Inservice examination is initially performed not less than two months after attaining 5 percent reactor power operation and will be completed within 12 calendar months after attaining 5 percent reactor power. Subsequent examinations are performed at intervals defined by ISTD-4252 and Table ISTD-4252-1. Examination intervals, subsequent to the third interval, are adjusted based on the number of unacceptable snubbers identified in the then current interval.

An inservice visual examination is performed on all snubbers to identify physical damage, leakage, corrosion, degradation, indication of binding, misalignment or deformation and potential defects generic to a particular design. Snubbers that do not meet visual examination requirements are evaluated to determine the root cause of the unacceptability, and appropriate corrective actions (e.g., snubber is adjusted, repaired, modified, or replaced) are taken. Snubbers evaluated as unacceptable during visual examination may be accepted for continued service by successful completion of an operational readiness test. S053

Snubbers are tested inservice to determine operational readiness during each fuel cycle, beginning no sooner than 60 days before the scheduled start of the applicable refueling outage. Snubber operational readiness tests are conducted with the snubber in the as-found condition, to the extent practical, either in place or on a test bench, to verify the test parameters of ISTD-5210. When an in-place test or bench test cannot be performed, snubber subcomponents that control the parameters to be verified are examined and tested. Preservice examinations are performed on snubbers after reinstallation when bench testing is used (ISTD-5224), or on snubbers where individual subcomponents are reinstalled after examination (ISTD-5225).

Defined test plan groups (DTPG) are established and the snubbers of each DTPG are tested according to an established sampling plan each fuel cycle. Sample plan size and composition are determined as required for the selected sample plan, with additional sampling as may be required for that sample plan based on test failures and failure modes identified. Snubbers that do not meet test requirements are evaluated to determine root cause of the failure, and are assigned to failure mode groups (FMG) based on the evaluation, unless the failure is considered unexplained or isolated. The number of unexplained snubber failures not assigned to an FMG determines the additional testing sample. Isolated failures do not require additional testing. For unacceptable snubbers, additional testing is conducted for the DTPG or FMG until the appropriate sample plan completion criteria are satisfied.

Unacceptable snubbers are adjusted, repaired, modified, or replaced. Replacement snubbers meet the requirements of ISTD-1600. Post-maintenance examination and testing, and examination and testing of repaired snubbers, is done to ensure that test parameters that may have been affected by the repair or maintenance activity are verified acceptable. S053

Service life for snubbers is established, monitored and adjusted as required by ISTD-6000 and the guidance of ASME OM Code Nonmandatory Appendix F.

The inservice inspection and testing programs for snubbers will be completed in accordance with milestones described in Section 13.4.

Delete the last two sentences of the last paragraph. S034a

3.9.3.7.1(3)f Snubber Support Data

S053

Replace the first sentence with the following.

STD COL 3.9.9-4-A For the ASME Class 1, 2, and 3 systems listed in DCD Tier 1, Section 3.1, that contain snubbers, a plant-specific table will be prepared in conjunction with the closure of the system-specific ITAAC for piping and component design and will include the following specific snubber information.

03.09.03-2

Add the following at the end of this section.

STD COL 3.9.9-4-A This information will be included in the FSAR as part of a subsequent FSAR update.

3.9.6 Inservice Testing of Pumps and Valves ①

Replace the last sentence of the last paragraph with the following.

STD COL 3.9.9-3-A Milestones for implementation of the ASME OM Code preservice and inservice testing programs are defined in Section 13.4. ①

3.9.6.1 Inservice Testing of Valves ①

Add the following before the last paragraph. ①

STD COL 3.9.9-3-A Each valve subject to inservice testing is also tested during the preservice test (PST) period. Preservice tests are conducted under conditions as near as practicable to those expected during subsequent inservice testing. Valves (or the control system) that have undergone maintenance that could affect performance, or valves that are repaired or replaced, are re-tested to verify performance parameters that could have been affected are within acceptable limits. Safety and relief valves and nonreclosing pressure relief devices are preservice tested in accordance with the requirements of the ASME OM Code, Mandatory Appendix I. ①

3.9.6.1.4 Valve Testing ①

Add the following at the end of the introduction to this section. ①

STD COL 3.9.9-3-A Other specific testing requirements for power-operated valves include stroke-time testing and, as applicable, diagnostic testing to evaluate valve condition and to verify the valve will continue to function under design-basis conditions. ①

(1) Valve Exercise Tests ①

Add the following after the second sentence of the first paragraph. ①

STD COL 3.9.9-3-A Valves are tested by full-stroke exercising, during operation at power, to the positions required to fulfill their functions. ①

Add the following after the third sentence of the first paragraph. ①

STD COL 3.9.9-3-A If full-stroke exercising is not practicable, part-stroke exercising is performed during operation at power or during cold shutdown. ①

① 5053

Add the following new paragraph after the first paragraph. ①

STD COL 3.9.9-3-A During extended shutdowns, valves that are required to be operable must remain capable of performing their intended safety function. Exercising valves during cold shutdown commences within 48 hours of achieving cold shutdown and continues until testing is complete or the plant is ready to return to operation at power. Valve testing required to be performed during a refueling outage is completed before returning the plant to operation at power. ①

Add the following after the first sentence of the second paragraph. ①

STD COL 3.9.9-3-A Valve testing uses reference values determined from the results of PST or IST. These tests that establish reference values are performed under conditions as near as practicable to those expected during the IST. Stroke time is measured and compared to the reference value, except for valves classified as fast-acting (e.g., solenoid-operated valves (SOVs) with stroke time less than 2 seconds), for which a stroke time limit of 2 seconds is assigned. ①

Add the following after the third paragraph. ①

STD COL 3.9.9-3-A SOVs are tested to confirm the valves move to their energized positions and are maintained in those positions, and to confirm that the valves move to the appropriate failure mode positions when de-energized.

Pre-conditioning of valves or their associated actuators or controls prior to IST undermines the purpose of IST and is prohibited. Pre-conditioning includes manipulation, pre-testing, maintenance, lubrication, cleaning, exercising, stroking, operating, or disturbing the valve to be tested in any way, except as may occur in an unscheduled, unplanned, and unanticipated manner during normal operation. ①

3.9.6.1.5 Specific Valve Test Requirements

(1) Power-Operated Valve Tests ①

Replace the last paragraph with the following.

STD COL 3.9.9-3-A Section 3.9.6.8 describes additional (non-Code) testing of power-operated valves as discussed in Regulatory Issue Summary 2000-03. ①

① 5053

(3) Check Valve Exercise Tests ①

Add the following as the first sentence of the second paragraph. ①

STD COL 3.9.9-3-A Check valve testing requires verification that obturator movement is in the direction required for the valve to perform its safety function. ①

Add the following before the last paragraph. ①

STD COL 3.9.9-3-A Acceptance criteria for this testing consider the specific system design and valve application. For example, a valve's safety function may require obturator movement in both open and closed directions. A mechanical exerciser may be used to operate a check valve for testing. Where a mechanical exerciser is used, acceptance criteria are provided for the force or torque required to move the check valve's obturator. Exercise tests also detect missing, sticking, or binding obturators.

If these test methods are impractical for certain check valves, or if sufficient flow cannot be achieved or verified, a sample disassembly examination program verifies valve obturator movement. The sample disassembly examination program groups check valves by category of similar design, application, and service condition.

During the disassembly process, the full-stroke motion of the obturator is verified. Nondestructive examination is performed on the hinge pin to assess wear, and seat contact surfaces are examined to verify adequate contact. Full-stroke motion of the obturator is re-verified immediately prior to completing reassembly. At least one valve from each group is disassembled and examined at each refueling outage, and all the valves in each group are disassembled and examined at least once every eight years. Before being returned to service, valves disassembled for examination or valves that received maintenance that could affect their performance are exercised with a full- or part-stroke. Details and bases of the sampling program are documented and recorded in the test plan. ①

When operating conditions, valve design, valve location, or other considerations prevent direct observation or measurements by use of conventional methods to determine adequate check valve function, diagnostic equipment and nonintrusive techniques are used to monitor internal conditions. Nonintrusive tests used are dependent on system and valve configuration, valve design and materials, and include methods such as ultrasonic (acoustic), magnetic, radiography, and use of

① S053

accelerometers to measure system and valve operating parameters (e.g., fluid flow, disk position, disk movement, disk impact, and the presence or absence of cavitation and back-tapping). Nonintrusive techniques also detect valve degradation. Diagnostic equipment and techniques used for valve operability determinations are verified as effective and accurate under the PST program.

Testing is performed, to the extent practical, under normal operation, cold shutdown, or refueling conditions applicable to each check valve. Testing includes effects created by sudden starting and stopping of pumps, if applicable, or other conditions, such as flow reversal. When maintenance that could affect valve performance is performed on a valve in the IST program, post-maintenance testing is conducted prior to returning the valve to service.

Preoperational testing is performed during the initial test program (refer to Section 14.2) to verify that valves are installed in a configuration that allows correct operation, testing, and maintenance. Preoperational testing verifies that piping design features accommodate check valve testing requirements. Tests also verify disk movement to and from the seat and determine, without disassembly, that the valve disk positions correctly, fully opens or fully closes as expected, and remains stable in the open position under the full spectrum of system design-basis fluid flow conditions. 5053

Data acquired during check valve testing and inspections, and the maintenance history of a valve or group of valves is collected and maintained in order to establish the basis for specifying inservice testing, examination, and preventive maintenance activities that will identify and/or mitigate the failure of the check valves or groups of check valves tested. This data is also used to determine if certain check valve condition monitoring tests, such as nonintrusive tests, are feasible and effective in monitoring for these identified failure mechanisms, whether periodic disassembly and examination activities would be effective in monitoring for these failure mechanisms, as well as to determine possible valve groupings to implement in a future check valve condition monitoring program as allowed by ISTC-5222, the requirements of which are described in ASME OM Code, Appendix II.

3.9.6.5 Valve Replacement, Repair and Maintenance ①

Add the following to the end of the paragraph. ①

STD COL 3.9.9-3-A When a valve or its control system has been replaced, repaired, or has undergone maintenance that could affect valve performance, a new reference value is determined, or the previous value is reconfirmed by an inservice test. This test is performed before the valve is returned to service, or immediately if the valve is not removed from service. Deviations between the previous and new reference values are identified and analyzed. Verification that the new values represent acceptable operation is documented. ①

3.9.6.6 10 CFR 50.55a Relief Requests and Code Cases

Add the following at the end of the first paragraph.

STD SUP 3.9-1 No relief from or alternative to the ASME OM Code is being requested. ①

3.9.6.7 Inservice Testing Program Implementation ①

Delete the last paragraph. ①

3.9.6.8 Non-Code Testing of Power-Operated Valves ①

Replace the second sentence of the first paragraph with the following. ①

STD COL 3.9.9-3-A These tests, which are typically performed under static (no flow or pressure) conditions, also document the "baseline" performance of the valves to support maintenance and trending programs. ①

Replace the fifth sentence of the first paragraph with the following. ①

STD COL 3.9.9-3-A Uncertainties associated with performance of these tests and use of the test results (including those associated with measurement equipment and potential degradation mechanisms) are addressed appropriately. ①

Replace the last sentence of the first paragraph with the following. ①

STD COL 3.9.9-3-A Uncertainties affecting both valve function and structural limits are addressed. ①

① 5053

Replace the second paragraph with the following. 1S053

STD COL 3.9.9-3-A Additional testing is performed as part of the air-operated valve (AOV) program, which includes the key elements for an AOV Program as identified in the JOG AOV program document, Joint Owners Group Air Operated Valve Program Document, Revision 1, December 13, 2000 (References 3.9.201 and 3.9.202). The AOV program incorporates the attributes for a successful power-operated valve long-term periodic verification program, as discussed in RIS 2000-03, Resolution of Generic Safety Issue 158: Performance of Safety-related Power-Operated Valves Under Design Basis Conditions, (Reference 3.9.203) by incorporating lessons learned from previous nuclear power plant operations and research programs as they apply to the periodic testing of air- and other power-operated valves included in the IST program. For example, key lessons learned addressed in the AOV program include: S053

- Valves are categorized according to their safety significance and risk ranking.
- Setpoints for AOVs are defined based on current vendor information or valve qualification diagnostic testing, such that the valve is capable of performing its design-basis function(s).
- Periodic static testing is performed, at a minimum on high risk (high safety significance) valves, to identify potential degradation, unless those valves are periodically cycled during normal plant operation under conditions that meet or exceed the worst case operating conditions within the licensing basis of the plant for the valve, which would provide adequate periodic demonstration of AOV capability. If required based on valve qualification or operating experience, periodic dynamic testing is performed to re-verify the capability of the valve to perform its required functions. S126
- Sufficient diagnostics are used to collect relevant data (e.g., valve stem thrust and torque, fluid pressure and temperature, stroke time, operating and/or control air pressure, etc.) to verify the valve meets the functional requirements of the qualification specification.
- Test frequency is specified, and is evaluated each refueling outage based on data trends as a result of testing. Frequency for periodic testing is in accordance with References 3.9.201 and 3.9.202, with a minimum of 5 years (or 3 refueling cycles) of data collected and evaluated before extending test intervals.

- Post-maintenance procedures include appropriate instructions and criteria to ensure baseline testing is re-performed as necessary when maintenance on the valve, valve repair or replacement, have the potential to affect valve functional performance. 03.09.06-3
- Guidance is included to address lessons learned from other valve programs in procedures and training specific to the AOV program. S053
- Documentation from AOV testing, including maintenance records and records from the corrective action program are retained and periodically evaluated as a part of the AOV program.

The attributes of the AOV testing program described above, to the extent that they apply to and can be implemented on other safety-related power-operated valves, such as electro-hydraulic valves, are applied to those other power-operated valves. S126

3.9.7 Risk-Informed Inservice Testing

Replace this section with the following.

STD SUP 3.9-2 Risk informed inservice testing is not being utilized.

3.9.8 Risk-Informed Inservice Inspection of Piping

Replace this section with the following.

STD SUP 3.9-3 Risk informed inservice inspection is not being utilized. S053

3.9.9 COL Information

3.9.9-1-H Reactor Internals Vibration Analysis, Measurement and Inspection Program

NAPS COL 3.9.9-1-H This COL item is addressed in Section 3.9.2.4.

3.9.9-2-H ASME Class 2 or 3 or Quality Group D Components with 60 Year Design Life

STD COL 3.9.9-2-H This COL item is addressed in Section 3.9.3.1.

3.9.9-3-A Inservice Testing Programs

STD COL 3.9.9-3-A This COL item is addressed in Section 3.9.6.

3.9.9-4-A Snubber Inspection and Test Program

STD COL 3.9.9-4-A This COL item is addressed in Section 3.9.3.7.1(3)e and Section 3.9.3.7.1(3)f.

3.9.10 References S053

3.9.201 Joint Owners Group Air Operated Valve Program Document, Revision 1, December 13, 2000. S053

3.9.202 USNRC, Eugene V. Imbro, letter to Mr. David J. Modeen, Nuclear Energy Institute, Comments On Joint Owners' Group Air Operated Valve Program Document, October 8, 1999. S053

3.9.203 Regulatory Issue Summary 2000-03, Resolution of Generic Safety Issue 158: Performance of Safety-related Power-Operated Valves Under Design Basis Conditions, March 15, 2000. S053

3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment

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

3.10.1.4 Dynamic Qualification Report

Replace the last paragraph with the following.

STD COL 3.10.4-1-A

A schedule will be provided within 12 months after issuance of the COL that supports planning for and conducting of NRC inspections of seismic and dynamic qualification of mechanical and electrical equipment. The schedule will be updated every 6 months until 12 months before scheduled fuel loading. S048

The Dynamic Qualification Report will be completed prior to fuel load. FSAR information will be revised, as necessary, as part of a subsequent FSAR update.

STD SUP 3.10-1

Section 17.5 defines the Quality Assurance Program requirements that are applied to equipment qualification files, including requirements for handling safety-related quality records, control of purchased material, equipment and services, test control, and other quality related processes. S001

3.10.4 COL Information S048

3.10.4-1-A Dynamic Qualification Report

STD COL 3.10.4-1-A

This COL item is addressed in Section 3.10.1.4.

3.11 Environmental Qualification of Mechanical and Electrical Equipment

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

3.11.4.4 Environmental Qualification Documentation S013b

Replace the last paragraph with the following. S013a

STD COL 3.11-1-A A description of the environmental qualification program is provided in DCD Section 3.11. S013a S001

Implementation of the environmental qualification program, including development of the plant specific Environmental Qualification Document (EQD), will be in accordance with the milestone defined in Section 13.4. S001

3.11.7 COL Information S013b

3.11-1-A Environmental Qualification Document S001

STD COL 3.11-1-A This COL item is addressed in Section 3.11.4.4. S013b

3.12 Piping Design Review

STD SUP 3.12-1 Information on seismic Category I and II, and nonseismic piping analysis and their associated supports is presented in DCD Sections 3.7, 3.9, 3D, 3K, 5.2 and 5.4.

STD SUP 3.12-2 The location and distance between piping systems will be established as part of the completion of ITAAC Table 3.1-1. The FSAR will be revised as necessary, in a subsequent update to include this information.

3.13 Threaded Fasteners - ASME Code Class 1, 2, and 3

STD SUP 3.13-1 Criteria applied to the selection of materials, design, inspection and testing of threaded fasteners (i.e., threaded bolts, studs, etc.) are presented in DCD Section 3.9.3.9, with supporting information in DCD Sections 4.5.1, 5.2.3, and 6.1.1.

Appendix 3A Seismic Soil-Structure Interaction Analysis

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

3A.1 Introduction

Replace the last sentence in the second paragraph with the following.

NAPS CDI

Site-specific geotechnical data is described in Chapter 2. This data is compatible with the site enveloping parameters considered in the standard design.

3A.2 ESBWR Standard Plant Site Plan

Replace the first two sentences of the first paragraph with the following.

NAPS CDI

The site plan is shown in Figure 2.1-201. The plan orientation is denoted on the figure.

Appendix 3B Containment Hydrodynamic Load Definitions

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

Appendix 3C Computer Programs Used in the Design and Analysis of Seismic Category I Structures

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

Appendix 3D Computer Programs Used in the Design of Components, Equipment, and Structures

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

Appendix 3E [Deleted]

IN127a

Appendix 3F Response of Structures to Containment Loads

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

Appendix 3G Design Details and Evaluation Results of Seismic Category I Structures

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

Appendix 3H Equipment Qualification Design Environmental Conditions

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

Appendix 3I Designated NEDE-24326-1-P Material Which May Not Change Without Prior NRC Approval

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

Appendix 3J Evaluation of Postulated Ruptures in High Energy Pipes

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

Appendix 3K Resolution of Intersystem Loss of Coolant Accident

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

Appendix 3L Reactor Internals Flow Induced Vibration Program

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

Chapter 4 Reactor

4.1 Summary Description

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

4.2 Fuel System Design

This section of the referenced DCD is incorporated by reference with no departures or supplements. S034b

4.3 Nuclear Design

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements. S070b

4.3.3.1 Nuclear Design Description

Replace the last paragraph with the following. S070b

STD COL 4.3-1-A There are no changes to the fuel, control rod, or core design from that described in the referenced certified design. S070a

4.3.5 COL Information

4.3-1-A Variances from Certified Design

STD COL 4.3-1-A This COL Item is addressed in Section 4.3.3.1. S070b

4.4 Thermal and Hydraulic Design

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

4.5 Reactor Materials

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

4.6 Functional Design of Reactivity Control System

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

Appendix 4A Typical Control Rod Patterns and Associated Power Distribution for ESBWR

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements. | N004

4A.1 Introduction

Replace the third paragraph with the following. | S070c

STD COL 4A-1-A There are no changes to the fuel, control rod, or core design from that described in the referenced certified design. | S070a

4A.3 COL Information

4A-1-A Variances from Certified Design

STD COL 4A-1-A This COL item is addressed in Section 4A.1. | S070d

Appendix 4B Fuel Licensing Acceptance Criteria

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

Appendix 4C Control Rod Licensing Acceptance Criteria

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

Appendix 4D Stability Evaluation

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

Chapter 5 Reactor Coolant System and Connected Systems

5.1 Summary Description

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

5.2 Integrity of Reactor Coolant Pressure Boundary

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

5.2.1 Compliance with Codes and Code Cases ①

5.2.1.1 Compliance with 10 CFR 50.55a

Add the following at the end of this section. ①

STD SUP 5.2-2

As described in Section 5.2.4, preservice and inservice inspection of the reactor coolant pressure boundary is conducted in accordance with the applicable edition and addenda of the ASME Boiler and Pressure Vessel Code, Section XI, required by 10 CFR 50.55a. As described in DCD Section 3.9.6 for pumps and valves, and in DCD Section 3.9.3.7.1 for dynamic restraints, preservice and inservice testing of the reactor coolant pressure boundary components is in accordance with the edition and addenda of the ASME OM Code required by 10 CFR 50.55a. ①

5.2.1.2 Applicable Code Cases ③

Add the following as the third sub-bulleted paragraph after the second sub-bullet of the third bullet in the first paragraph. ③

STD SUP 5.2-3

— Regulatory Guide 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code." This guide lists those ASME OM Code cases that are acceptable to the staff for use in the preservice and inservice testing of pumps, valves, and dynamic restraints in light-water-cooled nuclear power plants. ③

5.2.4 Preservice and Inservice Inspection and Testing of Reactor Coolant Pressure Boundary

Replace the second sentence in the second paragraph with the following. ②

STD COL 5.2-3-A

All Class 1 austenitic or dissimilar metal welds are included in the referenced certified design. ②

① 05.02.01.01-1
② 05.02.04-3
③ 05.02.01.02-1

Replace the second sentence and subsequent parenthetical sentence in the fourth paragraph with the following. 5063

STD COL 5.2-1-A The initial inservice inspection program incorporates the latest edition and addenda of the ASME Boiler and Pressure Vessel Code approved in 10 CFR 50.55a(b) on the date 12 months before initial fuel load. 5063

5.2.4.2 Accessibility

05.02.04-3

Replace the last sentence in the second paragraph with the following. 05.02.04-3

STD COL 5.2-3-A During the construction phase of the project, anomalies and construction issues are addressed using change control procedures. Procedures require that changes to approved design documents, including field changes and modifications, are subject to the same review and approval process as the original design. Accessibility and inspectability are key components of the design process. Control of accessibility for inspectability and testing during licensee design activities affecting Class I components is provided via procedures for design control and plant modifications.

05.02.04-3

Ultrasonic techniques (UT) will be the preferred NDE method for all PSI and ISI volumetric examinations; radiographic techniques (RT) will be used as a last resort only if UT cannot achieve the necessary coverage. The same NDE method used during PSI will be used for ISI to the extent possible to assure a baseline point of reference. If a different NDE method is used for ISI than was used for PSI, equivalent coverage will be achieved as required by code.

5.2.4.3.4 Qualification of Personnel and Examination Systems for Ultrasonic Examination

05.02.04-4

Add the following at the end of the paragraph. 05.02.04-4

STD COL 5.2-1-A Certification of NDE personnel shall be in accordance with ASME Section XI, IWA-2300, as modified by 10 CFR 50.55a(b)(2)(xviii). 05.02.04-4

5.2.4.6 System Leakage and Hydrostatic Pressure Tests

Revise the second sentence of the first paragraph as follows. 05.02.04-4

STD COL 5.2-1-A Regardless of which test method is chosen, system leakage and hydrostatic pressure tests will meet all requirements of ASME Code 05.02.04-4

Section XI, IWA-5000 and IWB-5000 for Class I components, including the limitation of 10 CFR 50.55a(b)(2)(xxvi). 05.02.04-4

Add the following paragraph at the end of this section.

STD SUP 5.2-1 System pressure tests and correlated technical specification requirements are provided in the plant Technical Specifications 3.4.4, "RCS Pressure and Temperature (P/T) Limits," and 3.10.1, "Inservice Leak and Hydrostatic Testing Operation."

5.2.4.11 COL Information for Preservice and Inservice Inspection and Testing of Reactor Coolant Pressure Boundary

5063

Replace the first sentence of the first paragraph with the following and delete the last sentence. 5063

STD COL 5.2-1-A DCD Section 5.2.4 fully describes the Preservice and Inservice Inspection and Testing Programs for the RCPB. The implementation milestones for the Preservice and Inservice Inspection and Testing Programs are provided in Section 13.4. 5063

5.2.5 Reactor Coolant Pressure Boundary Leakage Detection

5063

STD COL 5.2-2-H Delete the parenthetical statement in the first sentence of the first paragraph. 5063

Replace DCD Section 5.2.5.9 with the following.

STD COL 5.2-2-H

5.2.5.9 Leak Detection Monitoring

Operators are provided with procedures for detecting, monitoring, recording, trending, and determining the sources of reactor coolant pressure boundary leakage. Examples of parameters that are monitored are sump pump run time, sump level, condensate transfer rate, and process chemistry/radioactivity.

The procedures are used for converting different parameter indications for identified and unidentified leakage into common leak rate equivalents (volumetric or mass flow) and leak rate rate-of-change values, including indications from: 1) the drywell floor drain high conductivity water sump monitoring system, 2) the drywell air coolers condensate flow monitoring system, and 3) the drywell fission product monitoring system. 05.02.05-1

The procedures are used to monitor leakage at levels well below Technical Specifications limits and provide guidance for evaluating potential corrective action plans to prevent the plant from exceeding a Technical Specifications limit.

An unidentified leakage rate-of-change alarm provides an early alert to the operators to initiate corrective actions prior to reaching a Technical Specifications limit. 05.02.05-1

A description of the plant procedures program and implementation milestones are provided in Section 13.5.

5.2.6 COL Information

5.2-1-A Preservice and Inservice Inspection Program Description 5063

STD COL 5.2-1-A This COL Item is addressed in Sections 5.2.4, 5.2.4.3.4, 5.2.4.6, 5.2.4.11, and 6.6. 5063

5.2-2-H Leak Detection Monitoring

STD COL 5.2-2-H This COL Item is addressed in Sections 5.2.5 and 5.2.5.9. 5063

5.2-3-A Preservice and Inservice Inspection NDE Accessibility Plan Description 5063

STD COL 5.2-3-A This COL Item is addressed in Section 5.2.4 and 5.2.4.2. 5063

5.3 Reactor Vessel

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

5.3.1.5 Fracture Toughness

Compliance with 10 CFR 50, Appendix G 5073

Replace the last sentence in the first paragraph with the following. 5073

STD COL 16.0-2-H
5.6.4-1
The pressure-temperature limit curves are developed in accordance with the Pressure and Temperature Limits Report, as discussed in the Technical Specifications Section 5.6.4. 5067

5.3.1.8 COL Information for Reactor Vessel Material Surveillance Program

Replace this section with the following.

STD COL 5.3-2-A

The description of the reactor vessel material surveillance program in DCD Section 5.3.1.6 is supplemented as follows.

A complete reactor vessel material surveillance program will be developed as described above in accordance with the implementation schedule provided in Section 13.4.

5.3.1.8.1 Locations of Capsules in Core Beltline Region

A total of four irradiation exposure specimen sets containing the required specimens are located near the vessel wall slightly above the core midplane. The irradiation exposure specimen sets are contained in specimen holders that are welded to the inner diameter of the core beltline forging. Each specimen holder houses two specimen containers that form the irradiation exposure set. The elevation and azimuth locations of the exposure specimen sets align with the maximum calculated fluence within the core beltline. Based on the location of the samples relative to the shell forging and their placement at the peak fluence location, the lead factors for the samples will be greater than 1.0. The lead factor for the specimens when placed at the peak location has been estimated to be 1.17.

5119

5.3.1.8.2 Preparation of Capsule Specimens

As stated in DCD Section 5.3.1.6.1, the reactor vessel materials specimens are provided in accordance with the requirements of ASTM E 185 and 10 CFR 50, Appendix H. The surveillance specimen materials are prepared from full thickness samples taken from the actual core beltline forging and from the adjacent forgings and weld materials. The materials include the base metal and weld metal that have the highest adjusted reference temperature at end-of-life. The fabrication or heat treatment history (austenitizing, quench and tempering, and post-weld heat treatment) of the test material is fully representative of the fabrication history of the materials in the beltline of the RPV.

The base metal sample blocks from which the specimens are taken are located at least one “T” from any quenched edge of the block, where “T” is the material thickness, and at least 25 mm from a flame cut edge or weld fusion line.

The weld metal sample blocks are fabricated using the same welding procedure and process as the vessel shell weld they represent. The welding materials (electrodes, flux, or gas) are from the same heat and lot as the material used to make the production weld. The welder is qualified to ASME Section IX. The weld must satisfy the same examination and inspection requirements as the production weld. The weld or HAZ samples are taken at least one “T” from any quenched edge of the block, at least 25 mm from a flame cut edge, and at least 13 mm from the root of the weld.

Base Metal Samples

The longitudinal axes of tensile specimens are located 1/4T from the as-quenched vessel surface. The specimens are oriented so that the longitudinal axis is parallel to the forging and normal to the major working direction of the forging.

5119

Charpy V-notch specimens are removed 1/4T from the as-quenched vessel surface. The longitudinal axes of specimens are oriented parallel to the forging surface and normal to the major working direction.

Weld Metal Samples

The longitudinal axes of tensile specimens are located in the approximate center of the weld metal and at least 13 mm from the final weld surface and the root of the weld. The axis is parallel to the plate or forging surface.

The roots of the notch of Charpy V-notch specimens are in the approximate center of the weld metal. The specimens are taken at least 13 mm from the final weld surface and the root of the weld. The notch is perpendicular to the plate or forging surface.

All tensile specimens and Charpy V-notch specimens correspond to the allowable specimen types, as defined in ASTM E 185.

Fracture Toughness Samples

Fracture toughness specimens are provided from the limiting base and weld metals and are consistent with the guidelines in ASTM E 1820 and ASTM E 1921.

5.3.1.8.3 Number and Type of Specimens

The number of specimens in each exposure set satisfies or exceeds the requirements of ASTM E 185. Additional fracture toughness specimens of the limiting materials are included as shown in Table 5.3-201. Four sets of specimens are provided for the 60-year life of the ESBWR. The quantities of specimens per irradiation exposure set are provided in Table 5.3-201.

S119

5.3.1.8.4 Report of Test Results

A summary technical report, including test results, is submitted as specified in 10 CFR 50.4, for the contents of each capsule withdrawn, within one year of the date of capsule withdrawal unless an extension is granted by the Director, Office of Nuclear Reactor Regulation. The report includes the data required by ASTM E185-82, as specified in Paragraph III.B.1 of 10 CFR 50, Appendix H, and includes the results of the fracture toughness tests conducted on the beltline materials in the irradiated and unirradiated conditions. If the test results indicate a change in the Technical Specifications is required, the expected date for submittal of the revised Technical Specification will be provided with the report.

5.3.3.6 Operating Conditions

Add the following after the first sentence.

STD SUP 5.3-1

Development of plant operating procedures is addressed in Section 13.5. These procedures require compliance with the Technical Specifications. The Technical Specifications (which are developed by the methodology also identified in the Technical Specifications) are intended to ensure that the P-T limits identified in DCD Section 5.3.2 are not exceeded during normal operating conditions and anticipated plant transients.

5.3.4 COL Information

5.3-2-A Materials and Surveillance Capsule

STD COL 5.3-2-A

This COL Item is addressed in Section 5.3.1.8.

5.4 Component and Subsystem Design

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

5.4.8 Reactor Water Cleanup/Shutdown Cooling System

Add the following paragraph at the end of this section.

STD SUP 5.4-1 Operating procedures provide guidance to prevent severe water hammer caused by mechanisms such as voided lines.

5.4.12 Reactor Coolant System High Point Vents

Add the following paragraph at the end of this section.

STD SUP 5.4-2 A human factors analysis of the control room displays and controls for the RCS vents is included as part of the overall human factors analysis of the control room displays and controls described in DCD Chapter 18. This analysis considers:

- The use of this information by an operator during both normal and abnormal plant conditions;
- Integration into emergency procedures;
- Integration into operator training; and
- Other alarms during an emergency and the need for prioritization of alarms.

5.4.12.1 Operation of RPV Head Vent System

Add the following paragraph at the end of this section.

STD SUP 5.4-3 Operating procedures for the reactor vent system address considerations regarding when venting is needed and when it is not needed, including a variety of initial conditions for which venting may be required. The development of operating procedures is addressed in Section 13.5.

STD COL 5.3-2-A

Table 5.3-201 Quantities of Reactor Vessel Materials Specimens per Irradiation Exposure Set

Material	Specimen Type	No. of Specimens per Irradiation Exposure Set	Comments
Base Metal	Charpy	45	15 samples from each of three forgings in accordance with ASTM E 185-02.
	Tensile	9	3 samples from each of three forgings in accordance with ASTM E 185-02.
	Fracture Toughness	8	Taken from most limiting material in accordance with ASTM E 185-02.
Weld Metal	Charpy	30	15 specimens per weld in accordance with ASTM E 185-02.
	Tensile	6	3 specimens per weld in accordance with ASTM E 185-02.
	Fracture Toughness	8	Taken from most limiting material in accordance with ASTM E 185-02.
HAZ	Charpy	12	In accordance with ASTM E 185-82.

5119

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 Design Basis Accident Engineered Safety Feature Materials

N1276

This section of the referenced DCD is incorporated by reference with no departures or supplements. S051

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 Testing 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 fourth sentence in the first paragraph with the following. S002 S004

STD COL 6.2-1-H

DCD Tables 6.2-16 through 6.2-45 require an entry for the length of pipe from the containment to the inboard and outboard isolation valves. Pipe S004 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

6.2-1-H Pipe Length from Containment to Inboard/Outboard Isolation Valve S004

STD COL 6.2-1-H This COL item is addressed in Section 6.2.4.2. S004

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.

6.4.4 System Operation Procedures

Replace the second paragraph with the following.

STD 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. S002 S034a

6.4.5 Design Evaluations

System Safety Evaluation

Add the following after the second paragraph.

NAPS SUP 6.4-1 The impact of a postulated design basis accident (DBA) in Units 1 or 2 on the Unit 3 control room was evaluated. The bounding case is a release from the Unit 2 RB to the Unit 3 Control Building receptor based on a minimum distance criterion. The evaluation was performed as follows: N041d

- Atmospheric dispersion factors, χ/Qs, at the Unit 3 MCR intakes were conservatively calculated assuming a point source, a distance of approximately 400 m (1312 ft), and a release height of 10 m (32.8 ft). N041d

Meteorological data used for cross-unit impact is consistent with that used for the χ/Q values presented in Section 2.3. A nominal "receptor to source" direction of 60 degrees was assumed (clockwise with respect to "true north"). The χ/Q values are presented in Table 2.3-207.

N041d

- The Unit 2 LOCA as described in Section 15.4.1.8 of the Units 1 and 2 UFSAR was reviewed. The resultant dose at the Unit 3 MCR intake was determined by adjusting the LPZ dose consequences by the ratio of the χ/Q values, and the ratio of the breathing rates (BR) for the LPZ versus the control room values. Detailed modeling of the Unit 3 control room was not performed because the doses are bounded by a postulated Unit 3 LOCA. No credit was taken for the reduced control room occupancy factor, the Unit 3 control room emergency filtration units, or the "finite cloud" model allowed per RG 1.194.

Based on this conservative analysis, the resultant dose is bounded by the control room operator dose from a postulated Unit 3 DBA, and is less than GDC 19 limits.

Replace DCD Table 6.4-2 with Table 2.2-202, replace the third paragraph with the following, and delete the last paragraph.

S092

NAPS COL 6.4-2-A

Potential toxic gas sources are evaluated to confirm that an external release of hazardous chemicals does not impact control room habitability. These sources include: 1) offsite industrial facilities and transportation routes; 2) Units 1 and 2; and 3) Unit 3.

Evaluation of potentially hazardous off-site chemicals within 8 km (5 miles) of the control room is addressed in Section 2.2. As described therein, there are no manufacturing plants, chemical plants, storage facilities, major water transportation routes, oil pipelines or gas pipelines within 8 km (5 miles) of the control room. There are also no significant control room habitability impacts due to chemicals being transported along offsite routes within 8 km (5 miles) of the plant.

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.

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

Hydrogen and oxygen storage facilities are in excess of 230 meters (750 ft) from the control room. This distance is acceptable for toxic gas concerns per 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 HWCS 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.

The maximum concentrations for on-site chemicals, as calculated for Units 1 and 2, are based on the equations provided in NUREG-0570. This evaluation is bounding for the Unit 3 control room intake on the basis of a greater separation distance from Unit 1 and 2 control rooms than the Unit 3 control room. The relative locations for the chemical storage areas, as well as the control room intakes and refresh rates for Unit 1/2 and Unit 3 were considered in the analysis along with the properties of the stored chemicals. The maximum concentrations determined for the room intakes were evaluated for safety in comparison with the toxicity limits from RG 1.78. The analysis performed shows that the control room concentration for a given chemical does not exceed the applicable toxicity limit. Based on this analysis, Seismic Category I Class safety-related toxic gas monitoring instrumentation is not required.

6.4.9 COL Information

6.4-1-A CRHA Procedures and Training

STD COL 6.4-1-A This COL item addressed in Section 6.4.4.

6.4-2-A Toxic Gas Analysis

NAPS COL 6.4-2-A This COL item addressed in Section 6.4.5 and Table 2.2-202.

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.

STD COL 6.6-2-A Delete the second sentence in the third paragraph. S052

Replace the last three sentences and the parenthetical statement of the fourth paragraph with the following. S034a S052

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.

6.6.2 Accessibility

S052

Replace the last sentence in the second paragraph with the following. S052

STD COL 6.6-2-A All Class 2 or 3 austenitic or dissimilar metal welds are included in the referenced certified design.

During the construction phase of the project, anomalies and construction issues are addressed using change control procedures. Procedures require that changes to approved design documents, including field changes and modifications, are subject to the same review and approval process as the original design.

Accessibility and inspectability are key components of the design process. Control of accessibility for inspectability and testing during licensee design activities affecting Class 2 and 3 components is provided via procedures for design control and plant modifications.

S052

UT will be the preferred NDE method for all PSI and ISI volumetric examinations; RT will be used as a last resort only if UT cannot achieve the necessary coverage. The same NDE method used during PSI will be used for ISI to the extent possible to assure a baseline point of reference. If a different NDE method is used for ISI than was used for PSI, equivalent coverage will be achieved as required by code.

6.6.6 System Pressure Tests

05.02.04-4

Revise the second sentence of the first paragraph as follows.

05.02.04-4

STD COL 5.2-1-A

Regardless of which test method is chosen, system leakage and hydrostatic pressure tests will meet all applicable requirements of ASME Code Section XI, IWA-5000 and IWC-5000 for Class 2 components; and IWD-5000 for Class 3 components, including the limitations of 10 CFR 50.55a(b)(2)(xx) and 10 CFR 50.55a(b)(2)(xxvi).

05.02.04-4

6.6.7 Augmented Inservice Inspections

5052

STD COL 6.6-1-A

6.6.7.1 Flow Accelerated Corrosion Program Description

The flow accelerated corrosion (FAC) monitoring program analyzes, inspects, monitors, and trends nuclear power plant piping and components that are susceptible to FAC damage. The FAC program is based on EPRI NSAC-202L (Reference 6.6-201).

Prior to start-up, a comprehensive FAC-susceptibility screening will be performed to identify any plant systems that may be susceptible to FAC degradation. Should any plant systems remain susceptible, a FAC program will be implemented as described below. Program implementation milestones are provided in Section 13.4. Pre-service baseline nondestructive examination (NDE) inspections will be performed and material constituency identified for each as-fabricated piping component in the susceptible systems.

10.03.06-2

6.6.7.1.1 Analysis

A program similar to that described in EPRI NSAC-202L is used to identify the most susceptible components and to evaluate the rate of wall thinning for components and piping potentially susceptible to FAC. Each susceptible component is tracked in a database and is inspected, based on susceptibility. For each piping component, the program predicts the wear, and the estimated time until it must be re-inspected, repaired, or replaced.

5052

6.6.7.1.2 Industry Experience

Industry experience provides a valuable supplement to plant analysis and associated inspections. Reviews of industry experience are performed to identify generic plant problem areas and determine differences in similar

5052

types of components. This information is used to update the FAC program. S052

6.6.7.1.3 Inspections

Wall thickness measurements establish the extent of wear in a given component, provide data to help evaluate trends, and provide data to refine the predictive model. Components are inspected for wear using ultrasonic techniques (UT), radiography techniques (RT), or by visual observation. The preservice inspections are used as a baseline for later inspections. Therefore, the preservice inspections use grid locations and measurement methods most likely to be used for inservice inspections according to industry guidelines. Each subsequent inspection determines the wear rate for the piping and components and the need for inspection frequency adjustment for those components.

10.03.06-2

S117

6.6.7.1.4 Training and Engineering Judgement

The FAC program is administered by trained and experienced personnel. Task-specific training is provided for plant personnel that implement the monitoring program. Specific NDE is carried out by personnel qualified in the given NDE method. Inspection data is analyzed by engineers or other experienced personnel to determine the overall effect on the system or component.

S052

6.6.7.1.5 Long-Term Strategy

The FAC program includes a long-term strategy that focuses on reducing wear rates, using improved water chemistry, and optimizing the inspection planning process.

S052

6.6.7.1.6 FAC Program Documentation

A procedure documents the overall program description and its implementation.

Governing Program Description

A governing program description defines the overall program and associated responsibilities. This program description addresses the following elements:

S052

- A corporate commitment to monitor and control FAC.
- Identification of the tasks to be performed (including implementing procedures) and associated responsibilities.

- Identification of the position that has overall responsibility for the FAC program.
- Communication requirements between the lead position and other departments that have responsibility for performing support tasks.
- Quality assurance requirements.
- Identification of long-term goals and strategies for reducing high FAC wear.
- A method for evaluating plant performance against long-term goals.

Program Implementation

The implementation of each specific task conducted as part of the FAC program is described in one or more procedures, including:

S052

- Identifying susceptible systems
- Developing FAC inspection drawings
- Developing a FAC inspection database
- Performing FAC analysis
- Selecting and scheduling components for initial inspection
- Performing inspections
- Evaluating inspection data
- Evaluating worn components
- Identifying components for repair and replacement when necessary
- Selecting and scheduling locations for follow-on inspections

6.6.7.1.7 Documentation

The results of inspections are documented in accordance with the requirements of the implementing documents. Periodically, reports are prepared that identify the components inspected, justify the basis for their selection (i.e., predictive ranking, industry experience, engineering judgment), document the results of the inspections, and evaluate and disposition worn components.

S052

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 with the following. |5034a

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. |5034a

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.

6.6-2-A PSI/ISI NDE Accessibility Plan Description |5052

STD COL 6.6-2-A

This COL item is addressed in Section 6.6.2. |5052

6.6.12 References

6.6-201 Electric Power Research Institute, "Recommendations for an Effective Flow-Accelerated Corrosion Program," NSAC-202L-R2. |5052

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 TRACG Nodalization for the ESBWR Licensing Analysis |5014

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.

Appendix 6D Containment Passive Heat Sink Details

This section of the referenced DCD is incorporated by reference with no departures or supplements. |5009

Appendix 6E TRACG LOCA Containment Response Analysis

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

5068

Appendix 6F Break Spectrums of Break Sizes and Break Elevations

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

5008

Appendix 6G TRACG LOCA SER Confirmation Items

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

5068

Appendix 6H Additional TRACG Outputs and Parametrics Cases

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

5038

Appendix 6I Results of the Containment Design Basis Calculations With Suppression Pool Bypass Leakage Assumption of 1 cm^2 (1.08E-03 ft^2)

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

5068

Chapter 7 Instrumentation and Control Systems

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

Chapter 8 Electric Power

8.1 Introduction

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

8.1.2.1 Utility Power Grid Description

Add the following to the end of the first paragraph.

NAPS SUP 8.1-1

The output of Unit 3 is delivered to a main 500/230 kV switchyard through the unit main step-up transformers, and an intermediate switchyard as described in Sections 8.2 and 8.3. The main switchyard serves four 500 kV lines and one 230 kV line. The plant is connected to the main switchyard by a 500 kV normal preferred transmission line, and a 230 kV alternate preferred transmission line that supplies power to the two reserve auxiliary transformers. The 500 kV lines go to the Ladysmith, Morrisville, and Midlothian substations. The 230 kV line goes to the Gordonsville substation. These intra-system ties transit from the NAPS main switchyard to the east, west, north, and south as shown in Figure 8.2-203. Dominion's transmission system and intra-system ties are further described in Section 8.2.

8.2 Offsite Power Systems

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

8.2.1.1 Transmission System

Replace this section with the following.

NAPS COL 8.2.4-1-A

NAPS, that is, Units 1, 2 and 3, is connected to the Dominion transmission system by four 500 kV lines (three of which were constructed for Units 1 and 2) and one 230 kV line. The lines are designed and located to minimize the likelihood of simultaneous failure.

The Unit 3 main generator feeds electric power through a 27 kV isolated-phase bus to a bank of three single-phase transformers, stepping the generator voltage up to the transmission voltage of 500 kV. Figure 8.2-201 provides a one-line diagram of the electric system from the switchyard to the onsite system. The physical arrangement of power lines from offsite power sources is shown in Figure 8.2-202. Figure 8.2-203 maps the offsite transmission lines.

The transmission lines and towers connecting the switchyard to the transmission system are as follows:

- Two 500 kV overhead lines to the Ladysmith substation (approximately 15 miles)
- A 500 kV overhead line to the Midlothian substation (approximately 41 miles)
- A 500 kV overhead line to the Morrisville substation (approximately 33 miles)
- A 230 kV overhead line to the Gordonsville substation (approximately 31 miles)

The two Ladysmith lines (one of which was constructed for Units 1 and 2) utilize a common right-of-way. Each of the other lines utilizes separate rights-of-way. The 230 kV Gordonsville line crosses under the 500 kV Ladysmith and Morrisville lines near the switchyard.

Transmission tower separation, line installation, and clearances are consistent with the National Electric Safety Code (NESC) and Dominion transmission line standards. Basic tower structural design parameters, including the number of conductors, height, materials, color, and finish are consistent with Dominion transmission line design standards. Adequate clearance exists between wire galloping ellipses to minimize conductor or structure damage. (Reference 8.2-202)

8.2.1.2 Offsite Power System

Replace the first and second paragraphs with the following. I N006

NAPS COL 8.2.4-3-A
NAPS COL 8.2.4-4-A

The offsite power system is a nonsafety-related system. Power is supplied to the plant from multiple independent and physically separate offsite power sources. The normal preferred power source is any one of the four 500 kV lines, and the alternate preferred power source is any other one of the four 500 kV lines.

The normal preferred power source is supplied to the UATs through the intermediate transformer, MODs and isolation circuit breakers. The normal preferred power interface with the offsite power system occurs at the incoming disconnect switch of the intermediate switchyard. The MOD feeding a faulted UAT will be opened after the UAT high voltage breaker opens.

Delete the last paragraph and add the following paragraph. N006

Underground cables connect the normal and alternate preferred power sources to the UATs and RATs, respectively. The underground cables have a metallic sheath to prevent moisture ingress into the cable insulation. The metallic sheath is machine applied to the cable core and mechanically sealed to form a continuous barrier against moisture. To maintain their independence from each other, the underground cables are routed in duct banks and are physically and electrically separate from each other. Manholes associated with these duct banks are inspected every six months for excessive accumulation of water.

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Control, instrumentation, and miscellaneous power cables associated with the normal and alternate preferred circuits are routed in duct bank between the power block and the Intermediate Switchyard. Adequate separation is ensured by either routing cables associated with the normal preferred circuit in a separate duct bank from cables associated with the alternate preferred circuit, or by routing these cables in separate conduits within the same duct bank.

08.02-2

08.02-29

8.2.1.2.1 Switchyard

Replace the last paragraph with the following.

NAPS COL 8.2.4-2-A
NAPS COL 8.2.4-6-A
NAPS COL 8.2.4-7-A
NAPS COL 8.2.4-8-A

The NAPS switchyard, prior to the point of interconnection with Unit 3, is a 500/230 kV, air-insulated, breaker-and-a-half bus arrangement. Unit 3 is connected to this switchyard by an overhead conductor circuit.

The physical location and electrical interconnection of the switchyard is shown on Figure 8.2-201 and Figure 8.2-202.

Control and relay protection systems are provided. Support systems, such as grounding, raceway, lighting, AC/DC station service, and switchyard lightning protection, are also provided.

The North Anna switchyard uses surge suppressors on the high and low sides of Transformers 1, 2, 3, 5, and 6. The insulation coordination and surge protective devices are applied in compliance with IEEE 1313.2 2004, “IEEE Guide for the Application of Insulation Coordination,” and IEEE C62.22 2003, “IEEE Guide for the Application of Metal Oxide Surge Arrester for Alternating Current Systems.” The surge protective devices

08.02-25

are maintained according to NEMA requirements and manufacturer's recommendations.

A shield wire arrangement is designed for lightning abatement in the switchyard in accordance with IEEE 62.22 2003, "IEEE Guide for the Application of Metal Oxide Surge Arrestors for Alternating Current Systems," IEEE 988-2000, "Guide to Direct Lightning Shielding of Substations," and "Insulation Coordination for Power Systems."

08.02-25

The capacity and electrical characteristics for switchyard equipment are as follows:

Transformers	Voltage Rating	MVA Rating
Transformer	500/230 kV	67.2/89.6/112
Transformer	500/230 kV	112/145

Breakers	Max Design (kV)	Rated Current (A)	Interrupting Current at Max kV
500 kV	550	3000	40 kAIC
230 kV	242	2000	40 kAIC

N006

Transmission Lines	Rated Current at 100°F
500 kV	3954A
230 kV	2190A

Bus Work	Rated Current at 100°F
500 kV	3891A
230 kV	2750A

NAPS COL 8.2.4-5-A

8.2.1.2.2 Protective Relaying

I N006

The 500 kV transmission lines are protected with redundant high-speed relay schemes with re-closing and communication equipment to minimize line outages. The 500 kV switchyard buses have redundant bus differential protection using separate and independent current and control circuits. Generating unit tie-lines and auxiliary transformer underground cable circuits are protected with redundant high-speed relay schemes. Transformers are protected with differential and over-current relay schemes.

Dominion is responsible for engineering, constructing, operating, and maintaining its electric transmission system, and for interfacing with PJM, the Regional Transmission Organization (RTO). Dominion's responsibility includes designing, maintaining, and operating all switchyard protective relaying associated with connecting Unit 3 to the North Anna switchyard. PJM studied the interconnection of Unit 3 to the North Anna switchyard and recommended no additional design requirements above those typically used by Dominion in the design of the protective relaying scheme at the switchyard.

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-7

Breakers are equipped with dual trip coils. Each redundant protection circuit that supplies a trip signal is powered from its redundant DC power load group and connected to a separate trip coil. Equipment and cabling associated with each redundant system is physically separated from its redundant counterpart. Breakers are provided with a breaker failure scheme that isolates a breaker that fails to trip due to a malfunction.

NAPS SUP 8.2-2

8.2.1.2.3 Testing and Inspection

Transmission lines are inspected via an aerial inspection program approximately twice per year. The inspection focuses on such items as right-of-way encroachment, vegetation management, conductor and line hardware condition, and the condition of supporting structures.

Routine switchyard inspection activities include, but are not necessarily limited to, the following:

- Daily transformer inspections
- Periodic inspections of circuit breakers and batteries
- Quarterly infrared scans
- Semi-annual infrared scans (relay panels)
- Semi-annual inspection of substation equipment
- Annual infrared scans
- Annual corona camera scan

Routine switchyard testing activities include, but are not necessarily limited to, the following:

- Semiannual dissolved gas analysis on transformers
- Biennial circuit breaker profile or timing tests
- Biennial 500 kV relay testing

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- Triennial 230 kV relay testing
- 4-year dissolved gas analysis on transformer load tap changers
- 5-year battery discharge testing
- 8-year PT testing
- 8-year ground grid testing
- 10-year CCVT testing
- 10-year arrester testing
- 10-year wave trap testing

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Switchyard protection system monitoring, maintenance, and testing are performed in accordance with North American Electric Reliability Corporation (NERC) Standard PRC-005-1, "Transmission and Generation Protection System Maintenance and Testing," Standard PRC-008-0, "Underfrequency Load Shedding Equipment Maintenance Program," and Standard PRC-017-0, "Special Protection System Maintenance and Testing."

08.02-8

8.2.2.1 Reliability and Stability Analysis

Replace this section with the following.

NAPS COL 8.2.4-9-A
NAPS COL 8.2.4-10-A

A system impact study analyzed load flow, transient stability and fault analysis for the addition of Unit 3. (Reference 8.2-201) The study was prepared using 2011 summer light-load and 2014 summer base-case projections.

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The analysis was performed using Power Technology International Software PSS/E. The analysis examined conditions involving loss of the largest generating unit, loss of the most critical transmission line, and multiple facility contingencies. The study also examined import/export power flows between transmission system utilities.

NAPS COL 8.2.4-10-A

The equipment considered is from the point of interconnection of Unit 3 to the switchyard out to the 500 kV transmission system. This included the 230 kV buses and interconnections. The 34.5 kV portion of the North Anna switchyard is not modeled separately, but the 34.5 kV loads are considered at the 500 kV level. Maximum and minimum switchyard voltage limits have been established for the 500 kV switchyard at 534 kV and 505 kV, respectively. Normal operating and abnormal procedures exist to maintain the switchyard voltage schedule and address

08.02-32

challenges to the maximum and minimum limits. Upon approaching or exceeding a limit, these procedures verify the availability of required and contingency equipment and materials, and direct notifications to outside agencies, until the normal voltage schedule can be maintained. Dominion has established a Switchyard Interface Agreement and protocols for Maintenance, Communications, Switchyard Control, and System Analysis sufficient to safely operate and maintain the power station interconnection to the transmission system.

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The TSO provides analysis capabilities for both Long Term Planning and Real Time Operations. System conditions are evaluated to ensure a bounding analysis and model parameters are selected that are influential in determining the system's ability to provide offsite power adequacy. Elements included in the analysis are system load forecasts (including sufficient margin to ensure a bounding analysis over the life of the study), system generator dispatch (including outages of generators known to be particularly influential in offsite power adequacy of affected nuclear units), outage schedules for transmission elements that have significant influence on offsite power adequacy, cross-system power transfers and power imports/exports, and system modification plans and schedules. A Real Time State Estimator is used to assist in the evaluation of actual system conditions. These capabilities are described in the System Analysis Protocol of the Switchyard Interface Agreement.

The study concluded that with the additional generating capacity of Unit 3, the transmission system remains stable under the analyzed conditions, preserving the grid connection and supporting the normal and shutdown power requirements of Unit 3.

The reliability of the overall system design is indicated by the fact that there have been no widespread system interruptions. Failure rates of individual facilities are low. Transmission lines are designed to have less than one lightning flashover per 100 miles per year, and the record shows much better performance, indicating conservative designs. Most lightning-caused outages are momentary, with few instances of line damage. Other facilities do fail occasionally, but these are random occurrences, and experience has shown that equipment specifications are adequate.

Grid availability in the region over the past 20 years was also examined and it was confirmed that the system has been highly reliable with minimal outages due to equipment failures.

Grid stability is evaluated on an ongoing basis based on load growth, the addition of new transmission lines, or new generation capacity.

NAPS SUP 8.2-3

8.2.2.3 Failure Modes and Effects Analysis

8.2.2.3.1 Introduction

There are no single failures that can prevent the NAPS offsite power system from performing its function to provide power to Unit 3. (Reference 8.2-201)

8.2.2.3.2 Transmission System Evaluation

Unit 3 is connected to the Dominion transmission system via four 500 kV and one 230 kV overhead transmission lines. The normal preferred power source is any one of the four 500 kV lines. (See Section 8.2.1.1 and Section 8.2.1.2.)

Each transmission line occupies a separate right-of-way, except the two parallel Ladysmith lines, which share the same right-of-way. The 500 kV towers provide clearances consistent with the NESC. The towers are grounded with either ground rods or a counterpoise ground system. Failure of any one tower due to structural failure can at most disrupt and cause a loss of power distribution to itself and the adjacent line.

Failure of a line conductor would cause the loss of one of the four 500 kV lines, with the other three lines remaining available as normal and alternate preferred power sources.

8.2.2.3.3 Switchyard Evaluation

A breaker-and a-half scheme is incorporated in the design of the switchyard. The equipment in the switchyard is rated and positioned within the bus configuration according to the following criteria in order to maintain incoming and outgoing load flow from Unit 3.

- Equipment continuous current ratings are such that no single contingency in the switchyard (e.g., a breaker being out of service for maintenance) results in current exceeding 100 percent of the continuous current rating of the equipment.
- Interrupting duties are such that no faults occurring on the system exceed the equipment rating.
- Momentary ratings are such that no fault occurring on the system exceeds the equipment momentary rating.

- Voltage ratings for the equipment are specified to be greater than the maximum expected operating voltage.

The breaker-and-a-half switchyard arrangement offers the following flexibility to control a failed condition within the switchyard:

- Any faulted transmission line into the switchyard can be isolated without affecting any other transmission line.
- Either bus can be isolated without interruption of any transmission line or other bus.
- All relay schemes used for protection of the offsite power circuits and the switchyard equipment include primary and backup protection features. All breakers are equipped with dual trip coils. Each protection circuit that supplies a trip signal is connected to a separate trip coil.

8.2.2.3.4 Intermediate Switchyard

The intermediate switchyard is an integral part of the normal preferred power supply. The failure of any component within the intermediate switchyard may disrupt the normal preferred power supply. However, the alternate preferred power supply will remain available to supply the load.

The equipment in the intermediate switchyard is rated according to the following criteria:

- Interrupting duties are specified such that no faults occurring on the system exceed the equipment rating.
- Momentary ratings are specified such that no faults occurring on the system exceed the equipment momentary rating.
- Voltage ratings are specified to be greater than the maximum expected operating voltage.
- Circuit breaker continuous current ratings are chosen such that no single contingency will result in a load exceeding 100 percent of the nameplate continuous current rating of the breaker.

The normal preferred and alternate preferred power supplies are electrically independent and are physically separate from each other.

Therefore, a minimum of one preferred source of power remains available to supply the load during all plant conditions.

8.2.3 Design Basis Requirements

IN006

STD COL 8.2.4-9-A Delete the parenthetical statement at the end of the ninth bullet-list entry.

IN006

8.2.4 COL Information

8.2.4-1-A Transmission System Description

NAPS COL 8.2.4-1-A This COL item is addressed in Section 8.2.1.1.

8.2.4-2-A Switchyard Description

NAPS COL 8.2.4-2-A This COL item is addressed in Section 8.2.1.2.1.

8.2.4-3-A Normal Preferred Power

NAPS COL 8.2.4-3-A This COL item is addressed in Section 8.2.1.2.

8.2.4-4-A Alternate Preferred Power

NAPS COL 8.2.4-4-A This COL item is addressed in Section 8.2.1.2.

8.2.4-5-A Protective Relaying

NAPS COL 8.2.4-5-A This COL item is addressed in Section 8.2.1.2.2.

IN006

8.2.4-6-A Switchyard DC Power

NAPS COL 8.2.4-6-A This COL item is addressed in Section 8.2.1.2.1.

8.2.4-7-A Switchyard AC Power

NAPS COL 8.2.4-7-A This COL item is addressed in Section 8.2.1.2.1.

8.2.4-8-A Switchyard Transformer Protection

NAPS COL 8.2.4-8-A This COL item is addressed in Section 8.2.1.2.1.

8.2.4-9-A Stability and Reliability of the Offsite Transmission Power Systems

NAPS COL 8.2.4-9-A This COL item is addressed in Section 8.2.2.1.

8.2.4-10-A Interface Requirements

NAPS COL 8.2.4-10-A This COL item is addressed in Section 8.2.2.1.

8.2.5 References

8.2-201 PJM Generator Interconnection Q65 North Anna 500 kV System Impact Study, June 2007.

8.2-202 VA PJM Design and Application of Overhead Transmission Lines 69kV and above, May 20, 2002.

NAPS COL 8.2.4-1-A Figure 8.2-201 500/230 kV Switchyard Single-Line Diagram

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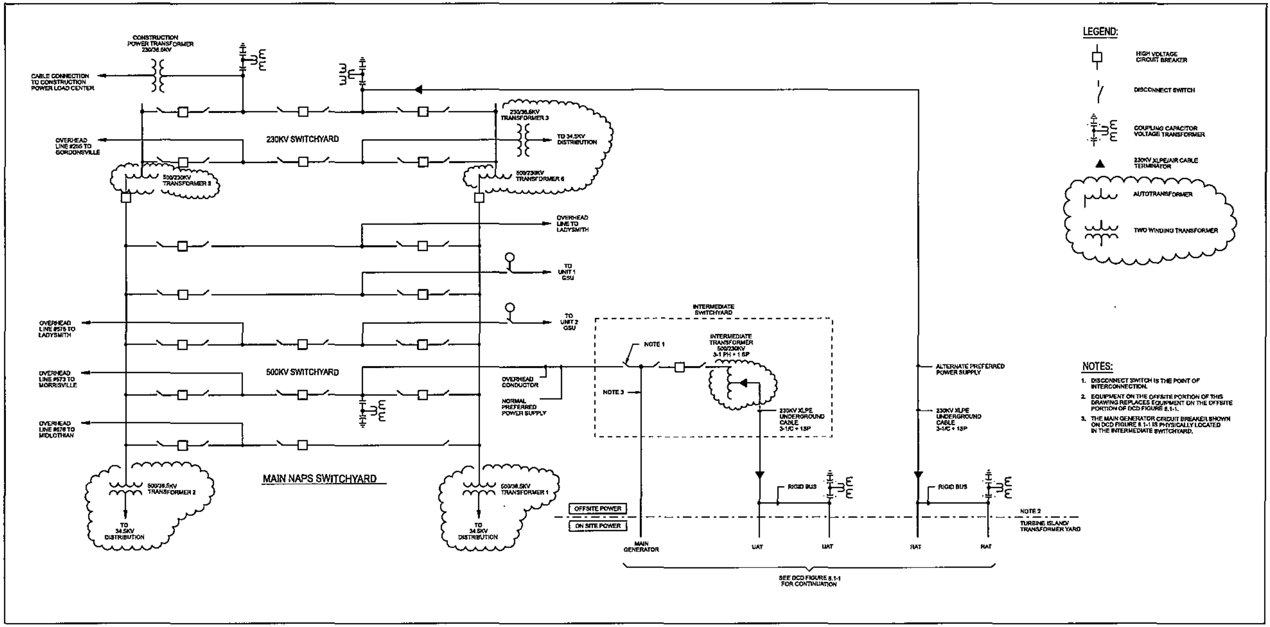
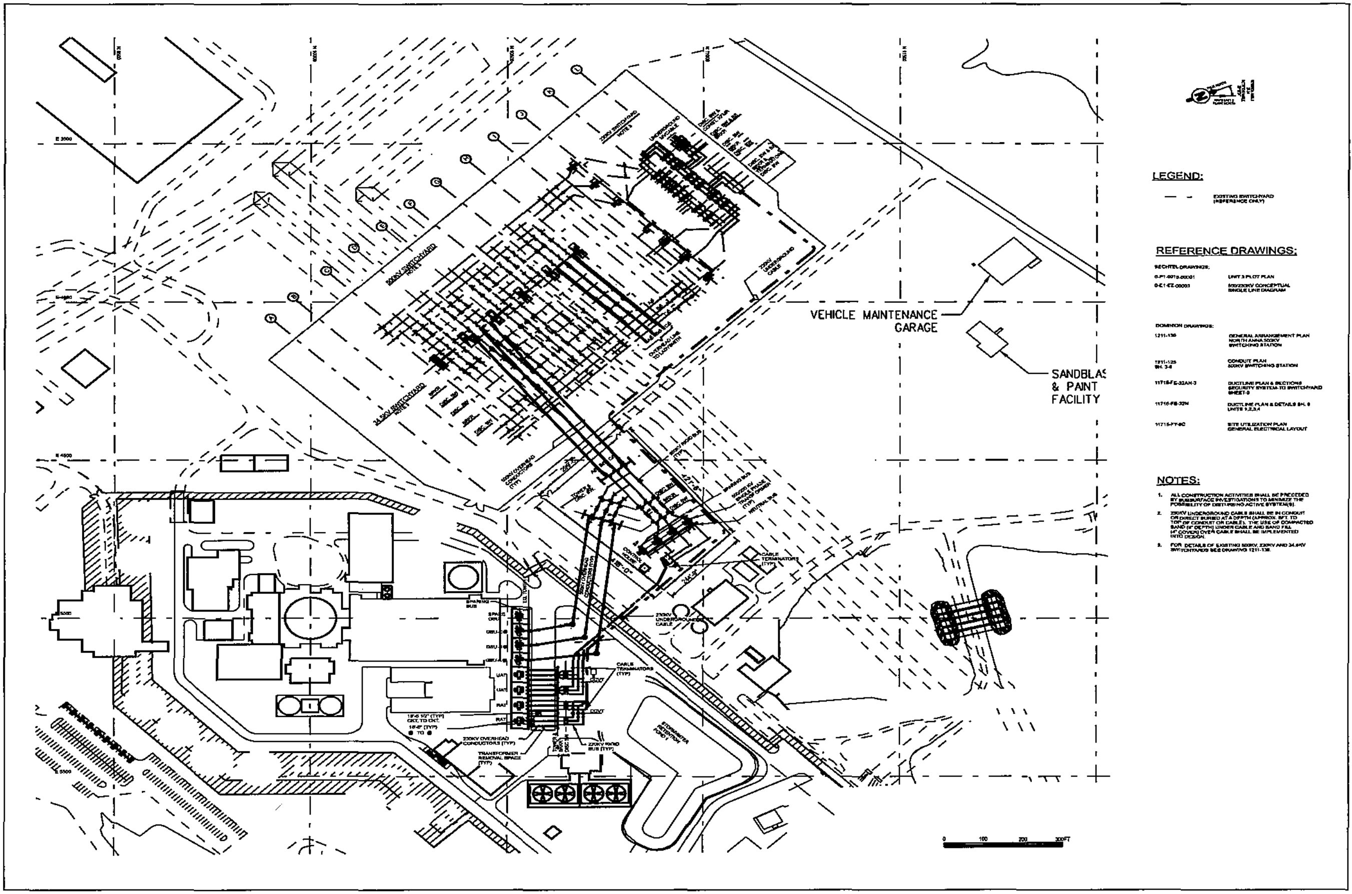


NOTES:

1. DISCONNECT SWITCH IS THE POINT OF INTERCONNECTION.
2. EQUIPMENT ON THE OFFSITE PORTION OF THIS DRAWING REPLACES EQUIPMENT ON THE OFFSITE PORTION OF DCD FIGURE 8.1-1.
3. THE MAIN GENERATOR CIRCUIT BREAKER SHOWN ON DCD FIGURE 8.1-1 IS PHYSICALLY LOCATED IN THE INTERMEDIATE SWITCHYARD.

- For Information Only -

NAPS COL 8.2.4-1-A **Figure 8.2-202 500/230 kV Switchyard Arrangement**



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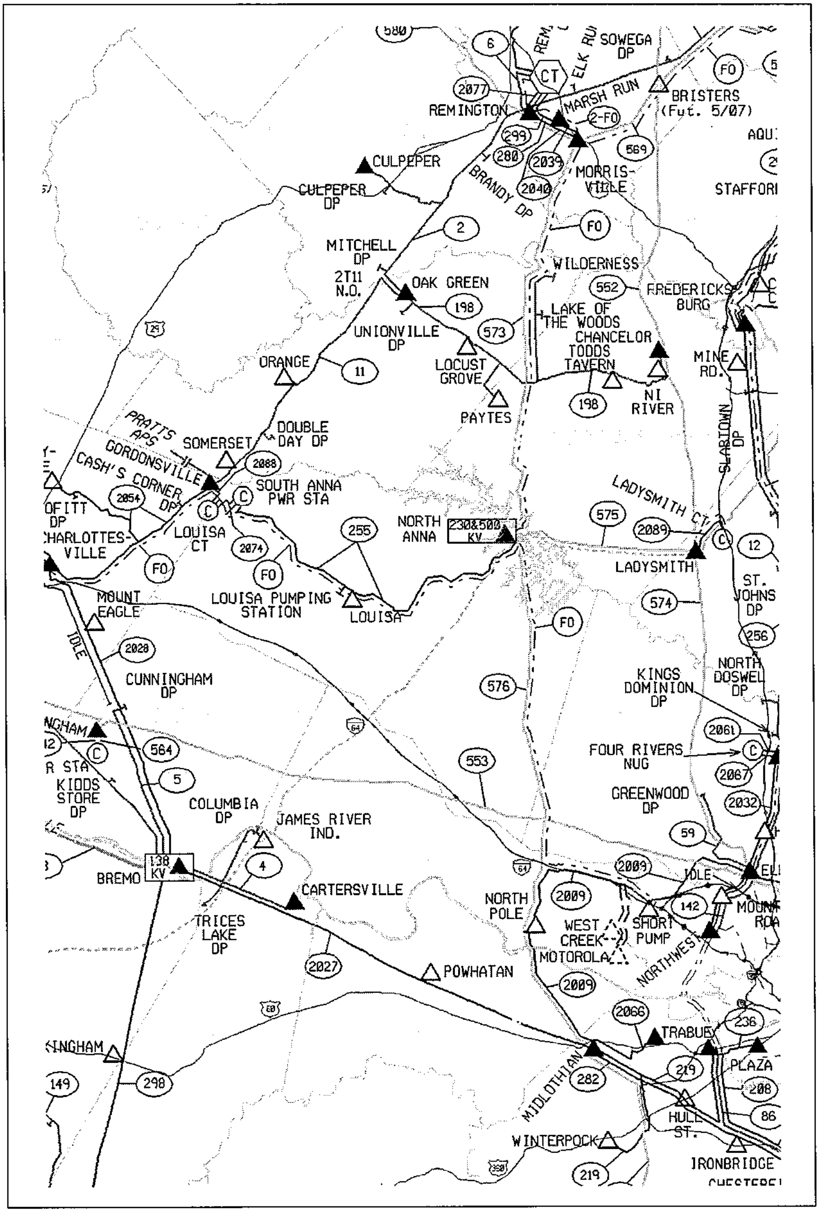
NAPS SUP 8.1-1 **Figure 8.2-203 Dominion Transmission Line Map**



8.3 Onsite Power Systems

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

8.3.1.1 Description

Insert the following as the first paragraph.

NAPS SUP 8.3-1

An intermediate switchyard is utilized to transition off-site power from the NAPS switchyard to the Unit 3 main power transformers, and unit auxiliary transformers (UATs). This intermediate switchyard contains the main generator circuit breaker, and a supply circuit breaker, which provides power to 500/230 kV intermediate transformers used to supply power to the UATs. These intermediate transformers consist of three single phase transformers and include an installed spare transformer. Also included in the intermediate switchyard is a transmission tower which supports a 500 kV disconnect switch that is identified as the point of interconnection between the onsite power sources and the offsite power sources. This point of interconnection is the demarcation between Unit 3 and the NAPS switchyard and transmission system. (See Figure 8.2-201)

8.3.2.1.1 Safety-Related Station Batteries and Battery Chargers

Station Blackout

Add the following paragraph at the end of this section.

NAPS SUP 8.3-2

Training and procedures to mitigate an SBO event are implemented in accordance with Sections 13.2 and 13.5, respectively. As recommended by NUMARC 87-00 (Reference 8.3-201), SBO event mitigation procedures address SBO response (e.g., restoration of on-site standby power sources), AC power restoration (e.g., coordination with transmission system load dispatcher), and severe weather guidance (e.g., identification of site-specific actions to prepare for the onset of severe weather such as an impending tornado), as applicable. The ESBWR is a passive design and does not rely on offsite or onsite AC sources of power for at least 72 hours after an SBO event, as described in DCD Section 15.5.5, Station Blackout. In addition, there are no nearby large power sources, such as a gas turbine or black start fossil fuel plant, that can directly connect to the station to mitigate the SBO event.

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02-1

Restoration from an SBO event will be contingent upon power being made available from any one of the following sources:

- Any of the standby or ancillary diesel generators.
- Restoration of any one of the four 500 kV transmission lines described in Section 8.2.
- Restoration of the 230 kV transmission line described in Section 8.2.

08.03.02-1

8.3.5 References

8.3-201 Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors, NUMARC 87-00, Revision 1, August 1991.

08.03.02-1

Appendix 8A Miscellaneous Electrical Systems

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

8A.2.1 Description

Replace DCD Section 8A.2.1 with the following.

N006

NAPS COL 8A.2.3-1-A

A cathodic protection system is provided to the extent required. The system is designed in accordance with the requirements of the National Association of Corrosion Engineers (NACE) Standards (DCD Reference 8A-5).

8A.2.3 COL Information

8A.2.3-1-A Cathodic Protection System

NAPS COL 8A.2.3-1-A

This COL item is addressed in Section 8A.2.1.

Chapter 9 Auxiliary Systems

9.1 Fuel Storage and Handling

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

9.1.1.7 Safety Evaluation

Structural Design S040

STD COL 9.1-4-A — Delete the last sentence of the third paragraph. S040

Protection Features of the New Fuel Storage Facilities S040

STD COL 9.1-4-A — Delete the last sentence of the third paragraph. S040

9.1.4 Light Load Handling System (Related to Refueling)

9.1.4.13 Refueling Operations

Add the following at the end of this section. S034a

STD COL 9.1-4-A — Section 13.5 requires development of fuel handling procedures. Fuel handling procedures address the status of plant systems required for refueling; inspection of replacement fuel and control rods; designation of proper tools; proper conditions for spent fuel movement and storage; proper conditions to prevent inadvertent criticality; proper conditions for fuel cask loading and movement; and status of interlocks, reactor trip circuits and mode switches. These procedures provide instructions for use of refueling equipment, actions for core alterations, monitoring core criticality status, and accountability of fuel for refueling operations. Fuel handling procedures are developed six months before fuel receipt to allow sufficient time for plant staff familiarization, to allow NRC staff adequate time to review the procedures, and to develop operator licensing examinations. S040

Personnel qualifications and training for fuel handlers are addressed in Section 13.2.

9.1.4.19 Inspection and Testing Requirements

Add the following at the end of this section. S034a

STD COL 9.1-4-A — Section 17.5 describes the QA program that is applied to monitoring, implementing, and ensuring compliance with fuel handling procedures. S040

As part of normal plant operations, the fuel-handling equipment is inspected for operating conditions before each refueling operation. During the operational testing of this equipment, procedures are followed that will affirm the correct performance of the fuel-handling system interlocks. Other maintenance and test procedures are developed based on manufacturer's requirements.

9.1.5 Overhead Heavy Load Handling Systems (OHLHS)

9.1.5.6 Other Overhead Load Handling System

Add the following at the end of this section.

STD COL 9.1-5-A

Special Lifting Devices

9.01.05-1

Testing and inspection of special lifting devices follow the guidelines of ANSI N14.6.

Other Lifting Devices

Slings used for heavy load lifts meet the requirements specified for slings in ANSI B30.9 and the guidance specified in NUREG-0612, Section 5.1.1(5).

9.01.05-1

9.1.5.8 Operational Responsibilities

Replace this section with the following.

STD COL 9.1-5-A

Procedures 5040

Section 13.5 requires the development of administrative procedures to control heavy loads prior to fuel load to allow sufficient time for plant staff familiarization, to allow NRC staff adequate time to review the procedures, and to develop operator licensing examinations. Heavy loads handling procedures address:

- Equipment identification
- Required equipment inspections and acceptance criteria prior to performing lift and movement operations
- Approved safe load paths and exclusion areas
- Safety precautions and limitations
- Special tools, rigging hardware, and equipment required for the heavy load lift
- Rigging arrangement for the load

- Adequate job steps and proper sequence for handling the load 15016

Safe load paths are defined for movement of heavy loads to minimize the potential for a load drop on irradiated fuel in the reactor vessel or spent fuel pool or on safe shutdown equipment. Paths are defined in procedures and equipment layout drawings. Safe load path procedures address the following general requirements:

- When heavy loads must be carried directly over the spent fuel pool, reactor vessel or safe shutdown equipment, procedures will limit the height of the load and the time the load is carried.
- When heavy loads could be carried (i.e., no physical means to prevent) but are not required to be carried directly over the spent fuel pool, reactor vessel or safe shutdown equipment, procedures will define an area over which loads shall not be carried so that if the load is dropped, it will not result in damage to spent fuel or operable safe shutdown equipment or compromise reactor vessel integrity.
- Where intervening structures are shown to provide protection, no load travel path is required.
- Defined safe load paths will follow, to the extent practical, structural floor members.
- When heavy loads movement is restricted by design or operational limitation, no safe load path is required.
- Supervision is present during heavy load lifts to enforce procedural requirements.

Inspection and Testing

Cranes addressed in this section are inspected, tested, and maintained in accordance with Section 2-2 of ANSI B30.2, Section 11.2 of ANSI B30.11, or Sections 16-1.2.1 and 16-1.2.3 of ANSI B30.16 with the exception that tests and inspections may be performed prior to use for infrequently used cranes. Prior to making a heavy load lift, an inspection of the crane is made in accordance with the above applicable standards.

Training and Qualification

Training and qualification of operators of cranes addressed in this section meet the requirements of ANSI B30.2, and include the following:

- Knowledge testing of the crane to be operated in accordance with the applicable ANSI crane standard.

- Practical testing for the type of crane to be operated.
- Supervisor signatory authority on the practical operating examination.
- Applicable physical requirements for crane operators as defined in the applicable crane standard.

Quality Assurance

Procedures for control of heavy loads are developed in accordance with Section 13.5. In accordance with Section 17.5, other specific quality program controls are applied to the heavy loads handling program, targeted at those characteristics or critical attributes that render the equipment a significant contributor to plant safety.

9.1.5.9 Safety Evaluations

Add the following at the end of this section.

STD COL 9.1-5-A No heavy loads are identified that are outside the scope of the certified design. In addition, there is no heavy load handling equipment, nor interlocks associated with heavy load handling equipment, outside the scope of the certified design. 9.01.05-2

9.1.6 COL Information

9.1-4-A Fuel Handling Operations 15040

STD COL 9.1-4-A This COL item is addressed in Section 9.1.4.13 and Section 9.1.4.19. 15040

9.1-5-A Handling of Heavy Loads

STD COL 9.1-5-A This COL item is addressed in Section 9.1.5.6, Section 9.1.5.8, and Section 9.1.5.9. 9.01.05-2

9.2 Water Systems

9.2.1 Plant Service Water System

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

9.2.1.2 **System Description**

Replace the Summary Description, Detailed System Description, and Operation portions of this section with the following.

NAPS CDI

Summary Description

The PSWS rejects heat from nonsafety-related RCCWS and TCCWS heat exchangers to the environment. The source of cooling water to the PSWS is from the auxiliary heat sink (AHS), while the heat removed is rejected to the AHS. Unit 3 utilizes mechanical draft plume abated cooling towers for the AHS.

A simplified diagram of the PSWS is shown in Figure 9.2-201.

Detailed System Description

The PSWS consists of two independent and 100 percent redundant trains that continuously circulate water through the RCCWS and TCCWS heat exchangers.

Each PSWS train consists of two 50 percent capacity vertical pumps taking suction in parallel from the plant service water basin. Discharge is through a check valve, a self-cleaning strainer, and a motor-operated N036 discharge valve at each pump to a common header. Each common header supplies plant service water to each RCCWS and TCCWS heat exchanger train arranged in parallel. The plant service water is returned via a common header to the mechanical draft plume abated cooling tower (AHS) in each train. Remote-operated isolation valves and a cross-tie N036 line permit routing of the plant service water to either cooling tower. The RCCWS and TCCWS heat exchangers are provided with remotely-operated isolation valves. Flow control valves are provided at N036 each heat exchanger outlet.

The PSWS pumps are located at the plant service water basin. Each pump is sized for 50 percent of the train flow requirement for normal operation. The pumps are low speed, vertical wet–pit designs with allowance for increase in system friction loss and impeller wear. The design of the heat rejection facilities and PSWS pumps have sufficient N036 available net positive suction head (NPSH) under worst case conditions. Basin water level is monitored to ensure sufficient NPSH at design flow is provided to the PSWS pumps.

The pumps in each train are powered from redundant electrical buses. During a LOPP, the pumps are powered from the two nonsafety-related standby diesel-generators.

Where needed, valves are provided with hard seats to withstand erosion. The valves are arranged for ease of maintenance, repair, and in-service inspection. During a LOPP, the motor-operated valves are powered from the two nonsafety-related standby diesel-generators.

The AHS provided for each PSWS train is a separate, multi-celled, 100 percent capacity mechanical draft plume abated cooling tower, with the fans in the tower from each train supplied by one of the two redundant electrical buses. During a LOPP, the fans are powered from the two nonsafety-related standby diesel-generators. Each tower cell has an adjustable-speed, reversible motor fan unit that can be controlled for cold weather conditions to prevent freezing in the basin. A full flow bypass is provided to return water directly to the PSWS basin to allow ease of cold weather startup. Mechanical and electrical isolation allows maintenance on one tower, including complete disassembly, during full power operation. The Station Water System (SWS) provides makeup for blowdown, drift, and evaporation losses from the basin. Refer to Section 9.2.10 for the SWS discussion. Fiberglass reinforced polyester pipe is used for buried PSWS piping to preclude long-term corrosion.

Replace the eighth sentence in the sixth paragraph with the following.

NAPS COL 9.2.1-1-A Fiberglass reinforced polyester pipe is used for buried PSWS piping to preclude long-term corrosion. Appropriate chemical treatment is added to the PSWS basin to preclude long-term corrosion and fouling of the PSWS components based on site water quality analysis. PSWS materials are compatible with the PSWS water treatment regime.

9.02.01-3

In the event of a LOPP, the PSWS supports the RCCWS in bringing the plant to cold shutdown condition in 36 hours assuming the most limiting single active or passive component failure.

Unit 3 PSWS heat loads are shown in DCD Table 9.2-1. The PSWS component design characteristics are shown in Table 9.2-201.

The PSWS design detects and alarms in the MCR any potential gross leakage and permits the isolation of any such leak in a sufficiently short period of time to preclude extensive plant damage.

Analysis of routine PSWS basin grab samples will detect RCCWS leakage, which may contain low levels of radioactivity, into the PSWS. This provides the action required by NRC Inspection and Enforcement Bulletin No. 80-10.

11.05-2

The potential for water hammer is mitigated through the use of various system design and layout features, such as automatic air release/vacuum valves installed at high points in system piping and at the pump discharge, proper valve actuation times to minimize water hammer, limiting fluid velocities in piping, procedural requirements ensuring proper line filling prior to system operation and after maintenance operations, and the use of check valves at pump discharges to prevent backflow into the pumps.

Operation

The PSWS operates during startup, normal power operation, hot standby, cooldown, shutdown/refueling, and LOPP.

During normal plant operation, the cross-tie valves in the PSWS pump discharge header are open, allowing two of the four 50 percent capacity PSWS pumps to supply water to both PSWS trains. Heat removed from the RCCWS and TCCWS is rejected to the auxiliary heat sink.

Operation of any two of the four PSWS pumps is sufficient for the design heat load removal in any normal operating mode. During normal and LOPP cooldown mode, three pumps can be used for operational convenience to bring the plant to cold shutdown condition in 24 hours.

During a LOPP, running PSWS pumps restart automatically using power supplied by the nonsafety-related standby diesel-generators.

9.2.1.6 COL Information

9.2.1-1-A Material Selection

NAPS COL 9.2.1-1-A This COL item is addressed in Section 9.2.1.2.

9.2.2 Reactor Component Cooling Water System

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

9.2.3 Makeup Water System

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

9.2.3.2 System Description

Replace the introductory text and the Demineralization Subsystem portions of this section with the following.

NAPS CDI

The MWS consists of two subsystems: 1) the demineralization subsystem and 2) the storage and transfer subsystem. The makeup water transfer pumps and the demineralization subsystem are sized to meet the demineralized water needs of all operational conditions except for shutdown/refueling/startup. During the shutdown/refueling/startup mode, the increases in plant water consumption require use of a temporary demineralization subsystem and temporary makeup water transfer pumps to be used as a supplemental water source.

N083

The MWS major equipment is housed entirely in the Water Treatment Building except for the demineralized water storage tank (which is outdoors and adjacent to this building) and the distribution piping to the interface systems. Freeze protection is provided for the demineralized water storage tank and piping exposed to freezing conditions.

The MWS equipment and associated piping in contact with demineralized water are fabricated from corrosion resistant materials such as stainless steel to prevent contamination of the makeup water.

Table 9.2-202 lists the major MWS components.

Demineralization Subsystem

Feedwater for the demineralization subsystem is provided by the SWS. Production of demineralized water by the demineralization subsystem can be initiated and shut down either automatically (based on the demineralized water storage tank level) or manually. Feedwater is treated in the following sequence:

1. Activated carbon filters
2. Reverse osmosis modules
3. Mixed bed demineralizers

Each reverse osmosis (RO) module includes cartridge filters. The RO modules are separated by an inter-stage break tank. Chemical addition is provided upstream of the RO module cartridge filters as required. High pressure pumps provide the pressure required for flow through the RO unit membranes. The RO unit reject flow is sent to the cooling tower blowdown facility. The RO product water is temporarily stored in an RO product water storage tank before being pumped by one of the forwarding pumps to the mixed bed demineralizer unit. Operation of the RO high-pressure pumps is interlocked with that of the forwarding pumps. The mixed bed demineralizer consists of both strong cation and anion resins in the same vessel that polishes the RO product water. The mixed bed unit effluent is monitored for water quality. This effluent is automatically recirculated to the station water storage tank until the water quality requirements are met. Makeup water is then delivered to the MWS demineralized water storage tank. The modular design of the RO unit and the mixed bed unit allows continuous demineralized water production. Cleaning, back flushing, or module removal are manual operations based on elevated differential pressure across the module or total flow through the system. No regeneration of mixed bed modules is performed on-site. IN083

9.2.4 Potable and Sanitary Water Systems

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

Delete the first paragraph and replace the last paragraph with the following.

NAPS CDI

9.2.4.1 Design Bases

Safety Design Basis

The Potable Water System (PWS) and Sanitary Waste Discharge System (SWDS) do not perform any safety-related function. Therefore, the PWS and SWDS have no safety design bases.

Power Generation Design Basis

The PWS and SWDS are designed to provide potable water supplies and sewage collection and treatment necessary for normal plant operation and shutdown periods. The PWS provides sufficient supply and is designed to supply up to 12.6 liters per second (200 gallons per minute) of potable water during peak demand periods.

The potable water system supplies the quality of water required by the authorities having jurisdiction.

The sanitary waste discharge system is designed to produce a waste water effluent quality required by Federal, state, and local regulations and permits.

9.2.4.2 System Description

Potable Water System

The PWS consists of ground wells at various locations on site. As shown on Figure 9.2-202, for each well house there is a pump, compressor, hydro-pneumatic tank, and interconnecting piping and valves. Combined potable water volume of the hydro-pneumatic tanks is 50,000 liters (13,200 gallons). Potable water from hydro-pneumatic tanks flows to a common potable water header for supply to Unit 3 facilities. The Unit 3 PWS underground header is connected to the Unit 1 and 2 domestic water header via a normally-closed isolation valve. This cross-tie connection is provided for operational flexibility and ease of system maintenance. In addition to non-radiological areas, potable water is provided to areas where inadvertent backflow into the system could result in radiological contamination of the potable water. For those PWS branches with outlets in areas where the potential for radiological contamination exists, backflow prevention is provided through the installation of backflow preventers.

Sanitary Waste Discharge System

The sanitary waste generated by Unit 3 is collected by a network of sumps and is pumped to the Unit 3 Sewage Treatment Plant (STP). The Unit 3 STP consists of two extended aeration type packaged units, each rated for a normal capacity of 94,500 liters per day (25,000 gallons per day). The two packaged units in parallel can treat 189,000 liters per day (50,000 gallons per day) of sanitary sewage. During normal plant operation, only one of the packaged units is required, and during outages, both packaged units can be operated to serve additional demand. The effluent is discharged to the cooling tower blow down sump and subsequently drained to the WHTF.

Analysis of routine STP sludge tank grab samples will detect events that might contaminate the STP downstream of the sludge tank. This provides the action required by Inspection and Enforcement Bulletin No. 80-10. The quality of effluent meets, at a minimum, the standards established by 11.05-2

Federal, state, and local regulations and permits. Sewage sludge is transferred to a truck for off-site disposal. A simplified diagram of the SWDS is shown in Figure 9.2-203.

9.2.4.3 Safety Evaluation

Potable Water System

The PWS has no safety-related function and is not connected to any safety-related system or component. Failure of the system does not compromise any safety-related equipment or component and does not prevent safe shutdown of the plant. The PWS does not handle radioactive fluids. It is neither connected to, nor does it interface with any system that may contain radioactive fluids.

Sanitary Waste Discharge System

The SWDS has no safety-related function and is not connected to any safety-related system or component. Failure of the system does not compromise any safety-related equipment or component and does not prevent safe shutdown of the plant.

The SWDS is not designed to handle radioactive fluids. It is neither connected to, nor does it interface with, any system that may contain radioactive fluids. As a precautionary measure, the STP sludge tank is grab sampled on a batch basis for potential radiological contamination. In the event radioactivity is detected above predetermined limits, controls are in place to initiate treatment and prevent unmonitored, uncontrolled radioactive releases to the environment. 11.05-2

9.2.4.4 Testing and Inspection Requirements

The PWS and SWDS are proven operable by their use during normal plant operation.

9.2.4.5 Instrumentation Requirements

The PWS and SWDS are furnished with instrumentation that permit local and/or remote monitoring, and local control of each of the respective processes. This instrumentation includes meters, switches, indicators, pressure gauges, flow switches, transmitters, controllers, and valves as 11.05-2
required for service, operation, and protection of plant personnel and equipment.

9.2.5 Ultimate Heat Sink

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

Replace the second to last sentence in the seventh paragraph with the following.

STD COL 9.2.5-1-H Procedures that identify and prioritize available makeup sources seven days after an accident, and provide instructions for establishing necessary connections, will be developed in accordance with the procedure development milestone in Section 13.5. |5041

9.2.5.1 COL Information

9.2.5-1-H Post 7 day Makeup to UHS |5041

STD COL 9.2.5-1-H This COL Item is addressed in Section 9.2.5. |5041

9.2.6 Condensate Storage and Transfer System

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

9.2.6.2 System Description

Add the following at the end of the first paragraph.

STD SUP 9.2.6-1 Freeze protection is provided for the CS&TS.

9.2.7 Chilled Water System

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

9.2.8 Turbine Component Cooling Water System

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

9.2.9 Hot Water System

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

9.2.10 Station Water System

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

9.2.10.2 System Description

Replace the Detailed System Description portion of this section with the following.

NAPS CDI

Detailed System Description

The SWS consists of the following subsystems:

- Plant Cooling Tower Makeup System (PCTMS)
- Pretreated Water Supply System (PWSS)

The PCTMS provides makeup water to the cooling tower basins for both the PSWS (**Section 9.2.1**) and CIRC (Section 10.4). The supply of water makes up for losses resulting from evaporation, drift and blowdown from the cooling towers. In addition, the PCTMS provides makeup water to replace water used for strainer backwashes. The PCTMS consists of a water source, pumps, strainers, connecting piping, valves and instrumentation. See **Figure 9.2-204** for a simplified system diagram and **Table 9.2-203** for component design parameters for the PCTMS.

The PWSS chemically conditions and filters the water supplied to the Makeup Water System (MWS) (**Section 9.2.3**) for further treatment for use as demineralized water. The PWSS also supplies water to the Fire Protection System (FPS) (**Section 9.5.1**) for filling the primary firewater tanks. In addition, the PWSS provides PSWS cooling tower makeup as an alternate to the PCTMS. The PWSS also provides water for the strainers and filter backwashes. The PWSS consists of a water source, pumps, strainers, filters, chemical injection equipment, station water storage tank (SWST), connecting piping, valves and instrumentation. See **Figure 9.2-205** for a simplified diagram and **Table 9.2-204** for component design parameters for the PWSS.

NAPS COL 9.2.1-1-A

Table 9.2-201 PSWS Component Design Characteristics

|S016

	PSWS Pumps		
	Type	Vertical, wet-pit, centrifugal turbine	
	Quantity	4	
	Capacity Each	1.262 m^3/s (20,000 gpm)	
	Plant Service Water System [1]		
NAPS CDI	Flow (AHS)	2.524 m^3/s (40,000 gpm)	|N036
	PSWS Cooling Towers and Basins		
NAPS CDI	Type	Mechanical draft, multi-cell, adjustable speed reversible fans, plume abated	|N036
	Quantity	2	
	Heat Load Each [2]	90 MW (3.07 × 10^8 BTU/hr)	|N036
	Flow Rate (Water) Each	2.524 m^3/s (40,000 gpm)	
NAPS CDI	Ambient Wet Bulb Temperature [3]	26.1°C (79°F)	
	Approach Temperature	5.0°C (9°F)	
	Cold Leg Temperature	31.1°C (88°F)	
NAPS SUP 9.2.1-1	Basin Reserve Storage Capacity [1]	2.6 million gallons	
	Strainers		
	Type	Automatic cleaning basket	|N036
	Quantity	4	

1. PSWS required to remove 2.02 × 10^7 MJ (1.92 × 10^{10} BTU) for period of 7 days without active makeup.
2. Cooling tower sizing capacity including margin over system design heat loads as defined in DCD Table 9.2-1. |S016 |N036
3. Ambient web bulb temperature includes a 0.5°C (1°F) recirculation allowance. |N036

NAPS CDI

Table 9.2-202 Major Makeup Water System Components

IS016

Two activated carbon filter feed pumps

One activated carbon filter unit consisting of multiple modules

Four 5 micron cartridge filters

Two first pass reverse osmosis (RO) high-pressure pumps

Two second pass RO booster pumps

Two second pass RO high-pressure pumps

One RO system consisting of multiple modules

One RO break tank

One chemical treatment system that provides chemical conditioning for the RO system

One chemical cleaning system for the RO membranes

NAPS CDI

Table 9.2-203 Station Water System - Plant Cooling Tower Makeup System Component Design Parameters

IS016

Pumps	
Type	Vertical, wet pit, centrifugal turbine
Quantity	3 × 50%
Capacity each	Approximately 2,700 m^3/hr (11,888 gpm)
Strainers	
Type	Duplex, basket
Quantity	3

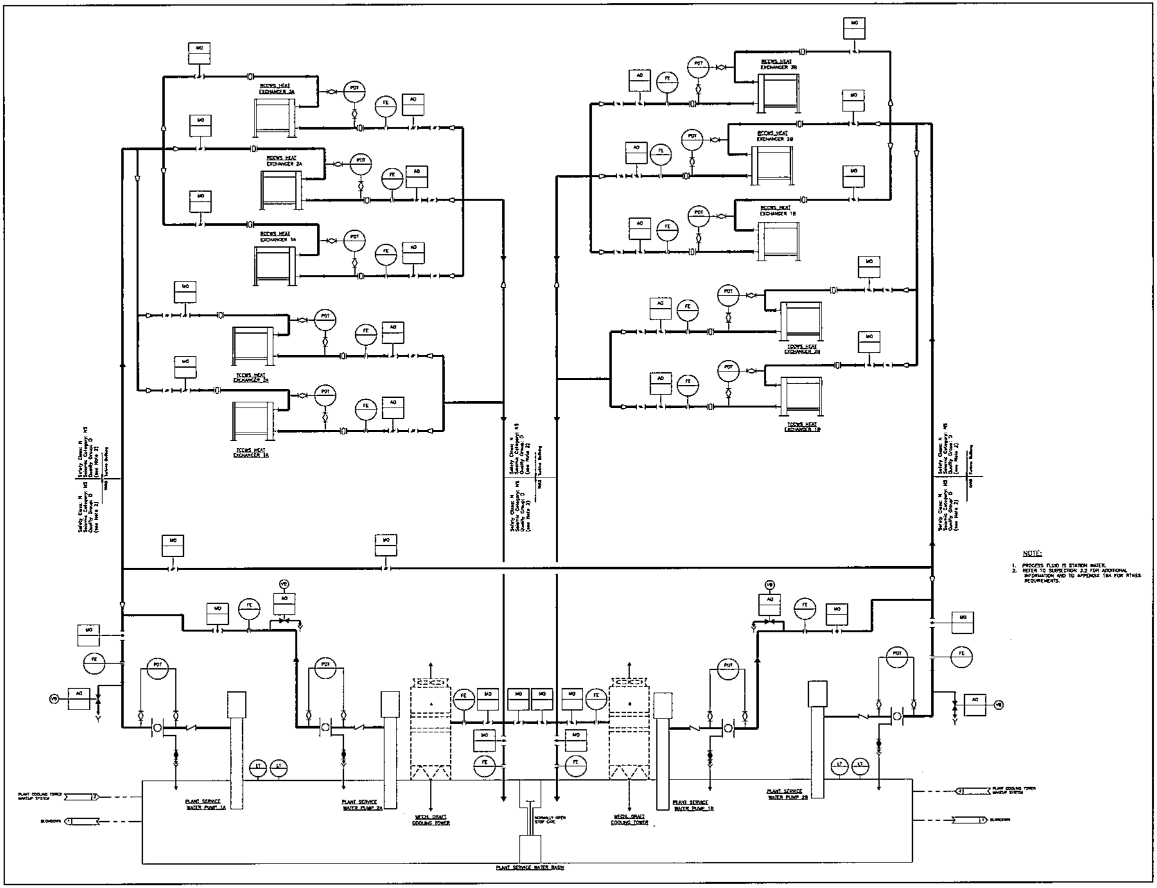
NAPS CDI

Table 9.2-204 Station Water System – Pretreated Water Supply System Component Design Parameters

I5016

PWSS Pumps	
Type	Vertical, wet pit, centrifugal turbine
Quantity	2 × 100%
Capacity each	Approximately 170 m^3/hr (750 gpm)
FWS Makeup Pumps	
Type	Horizontal, centrifugal
Quantity	2 × 100%
Capacity each	Approximately 170 m^3/hr (750 gpm)
Miscellaneous Users Supply Pumps	
Type	Horizontal, centrifugal
Quantity	2 × 100%
Capacity each	Approximately 25 m^3/hr (110 gpm)
Storage Tank capacity	Approximately 1,100 m^3 (290,000 gallons)
Strainers	
Type	Duplex, basket
Quantity	2
PWSS Filtration System	
Quantity	1 Lot
PWSS Chemical Injection System	
Quantity	1 Lot

Figure 9.2-201 Plant Service Water System Simplified Diagram



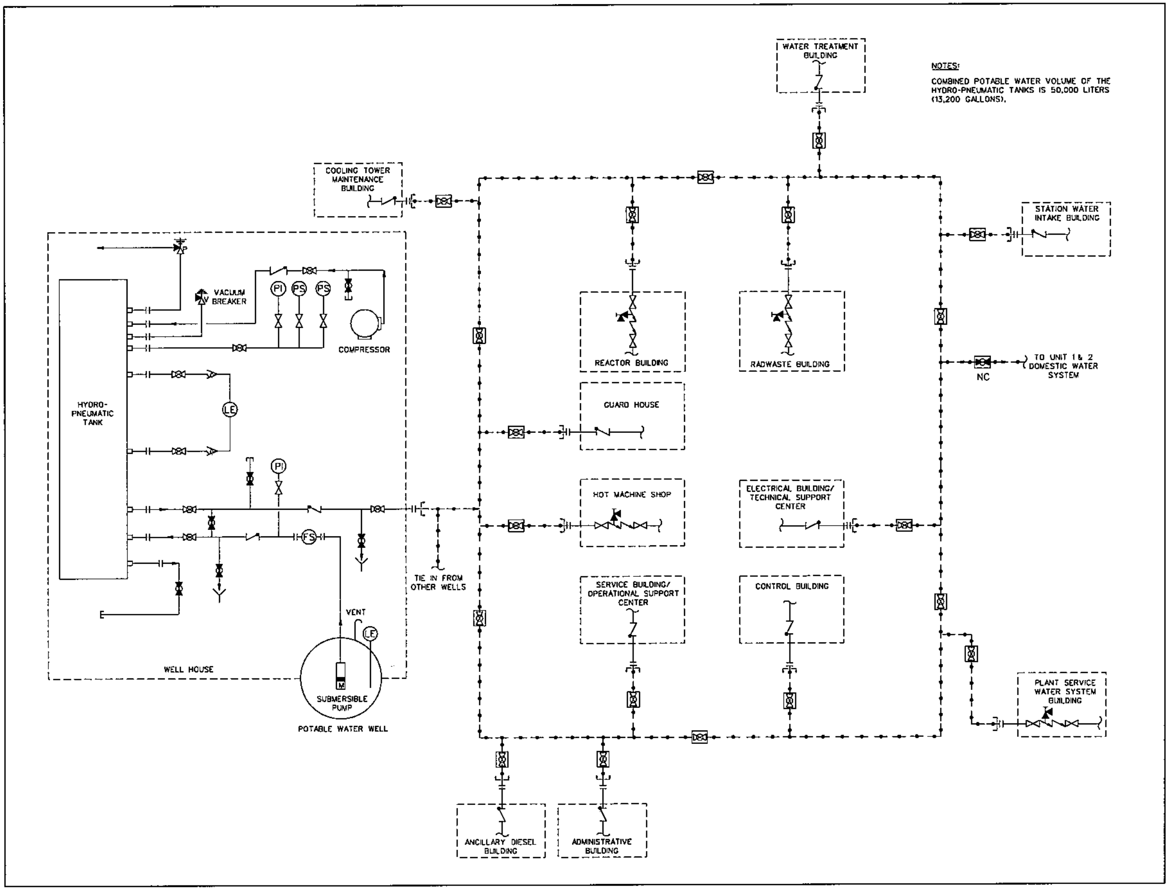
NOTE:
1. PROCESS FLUID IS STATION WATER.
2. REFER TO SUBSECTION 3.2 FOR ADDITIONAL INFORMATION AND TO APPENDIX 19A FOR RTNSS REQUIREMENTS.

9.02.01-1

N036

S016

Figure 9.2-202 Potable Water System Simplified Diagram



NOTES:

COMBINED POTABLE WATER VOLUME OF THE HYDRO-PNEUMATIC TANKS IS 50,000 LITERS (13,200 GALLONS).

①

②

① N100
② S016

- For Information Only -

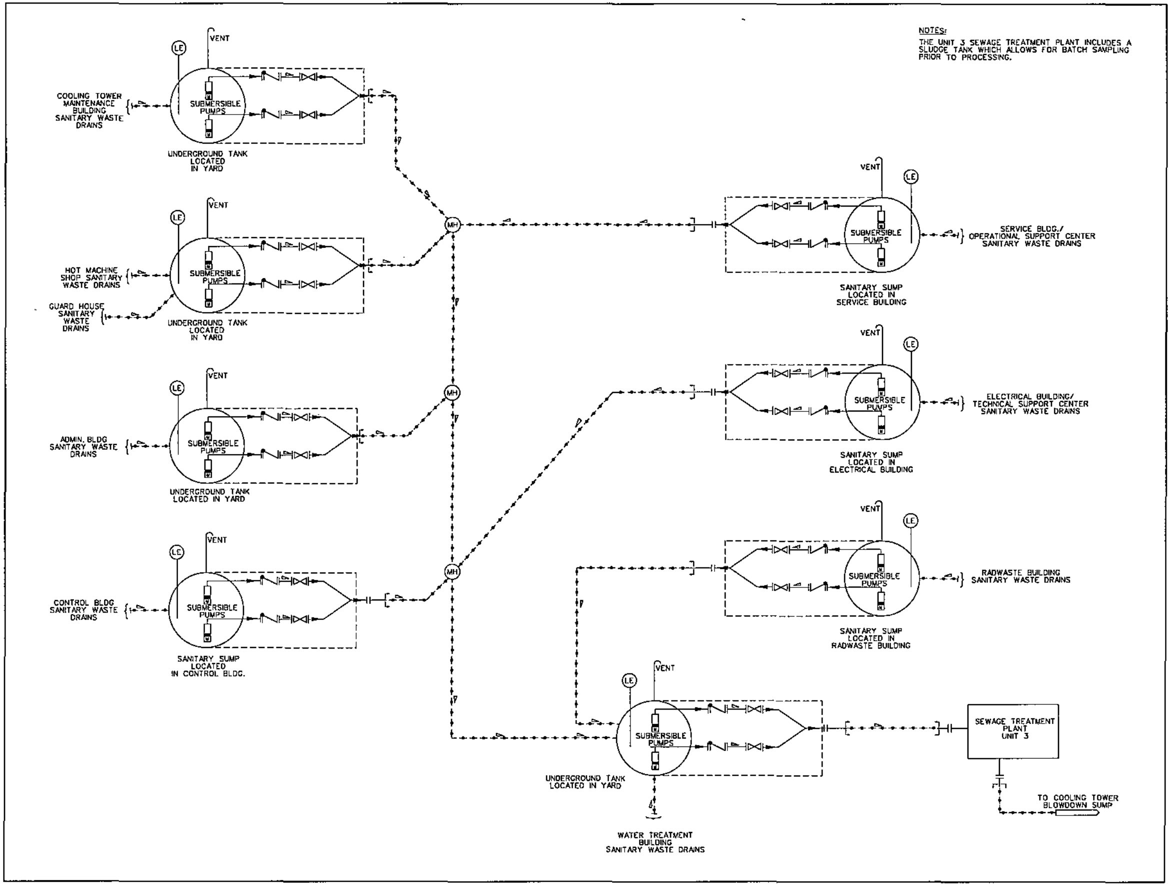
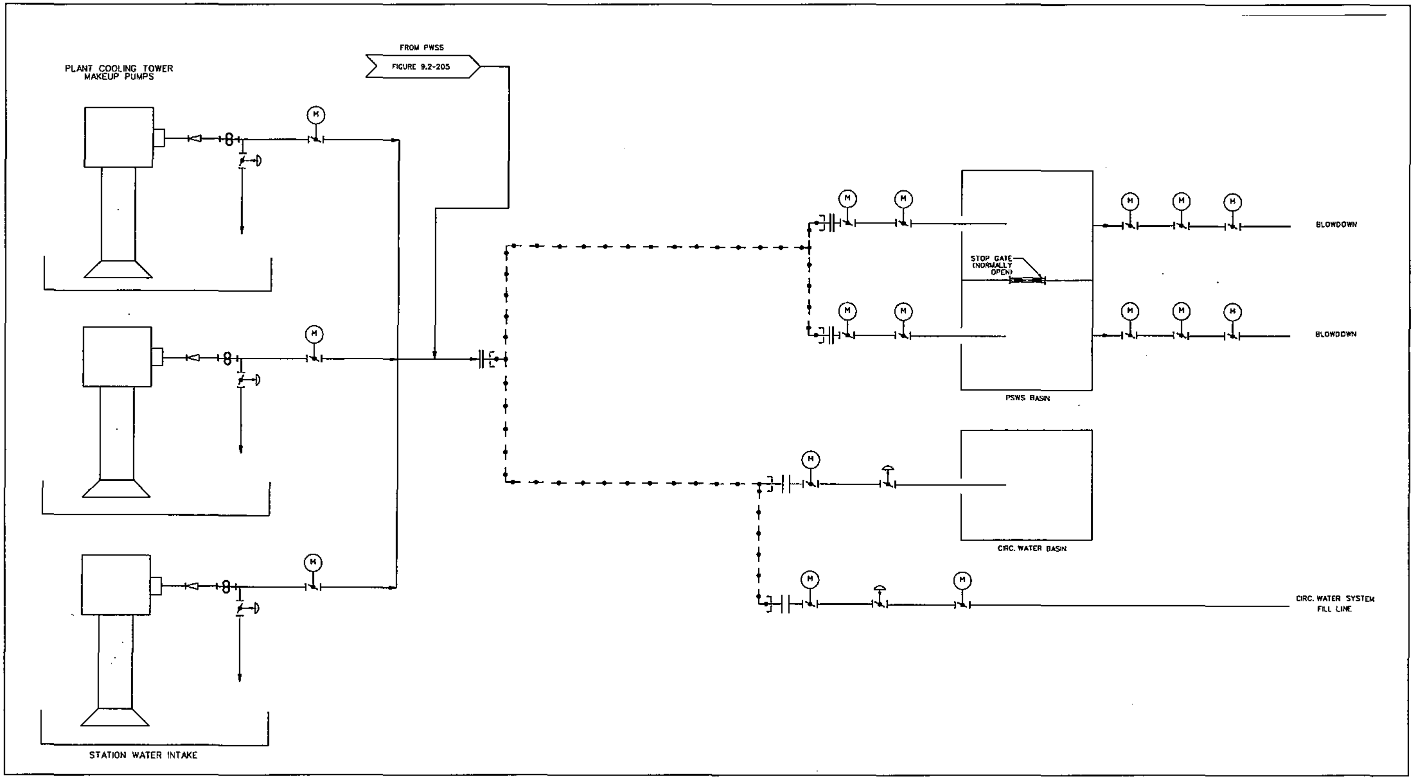


Figure 9.2-203 Sanitary Waste Discharge System Simplified Diagram

①
②
③

① 11.05-2
② N100
③ S016

Figure 9.2-204 Station Water System - Plant Cooling Tower Makeup System (PCTMS)



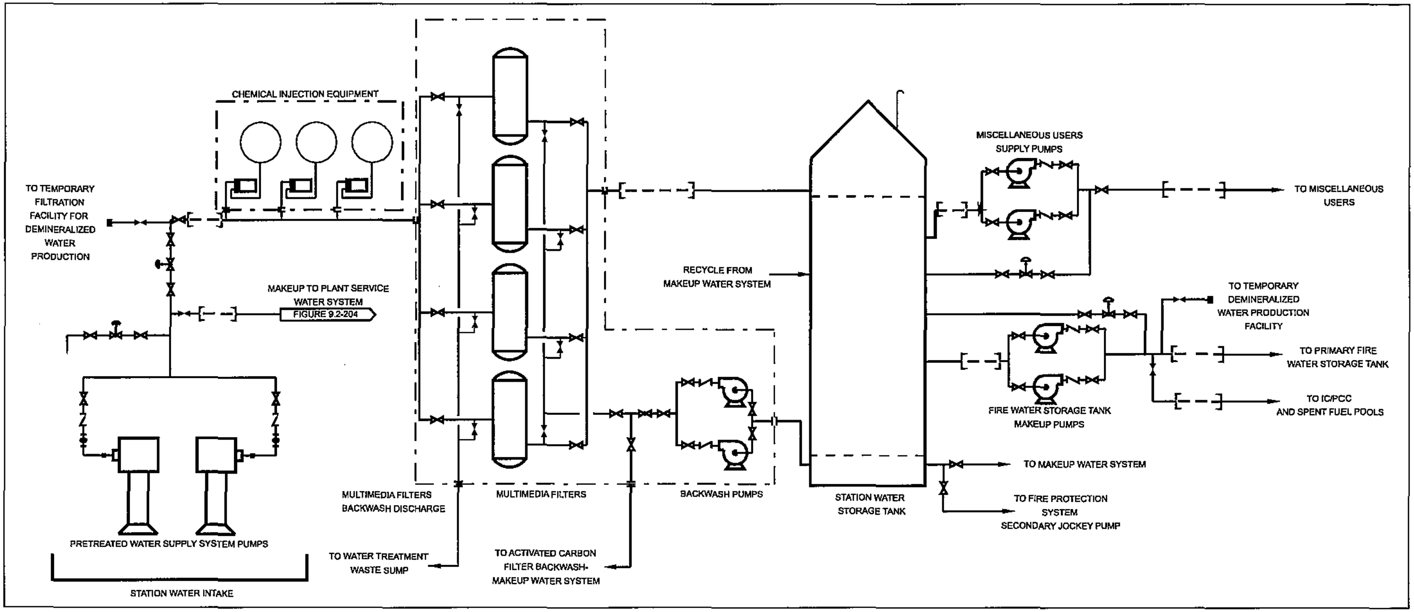
①

②

① N114
② S016

Figure 9.2-205 Station Water System - Pretreated Water Supply System (PWSS)

|①



① 5016

9.3 Process Auxiliaries

9.3.1 Compressed Air Systems

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

9.3.2 Process Sampling System

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

9.3.2.2 System Description

Add the following at the end of this section.

STD COL 9.3.2-1-A

Post-Accident Sampling Program

The post-accident sampling program consists of the following:

- Emergency Operating Procedures that rely on Emergency Action Levels, defined in the Emergency Plan, are used to classify fuel damage events. These procedures rely on installed post-accident radiation monitoring instrumentation described in DCD Section 7.5 and do not require the capability to obtain and analyze highly radioactive coolant samples although sample analyses may be used for classification as well.
- Plant procedures contain instructions for obtaining highly radioactive grab samples from the following:

  Reactor Coolant - from the RWCU/SDC sample line using the Reactor Building Sample Station. These samples can be analyzed for the parameters indicated in DCD Table 9.3-1. If coolant activity is greater than 1.0 Ci/ml, handling of the samples is delayed to avoid overexposure of personnel.

  Suppression Pool - from FAPCS sample line at the Reactor Building Sample Station. These samples can be analyzed for the parameters indicated in DCD Table 9.3-1. If coolant activity is greater than 1.0 Ci/ml, handling of the samples is delayed to avoid overexposure of personnel.

  Containment Atmosphere - may be taken as described in DCD Section 11.5.3.2.11 and analyzed for fission products.

9.03.02-1

- DCD Section 7.5.2.2 describes Containment Monitoring System operation in post-LOCA mode for gaseous sampling for O_2 and H_2.
- Effluent radiation monitoring is described in DCD Section 7.5. Field sampling and monitoring capability is maintained in accordance with the Emergency Plan.
- Post accident monitoring is adequate to implement the Emergency Plan without reliance on post accident sampling capability; therefore, the absence of a dedicated Post-Accident Sampling System does not reduce the effectiveness of the Emergency Plan.
- The post-accident sampling program meets the requirements of NUREG-0800, Section 9.3.2 for actions required in lieu of a Post Accident Sampling System.

9.3.2.6 COL Information

9.3.2-1-A Post-Accident Sampling Program

STD COL 9.3.2-1-A This COL item is addressed in Section 9.3.2.2.

9.3.3 Equipment and Floor Drain System

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

9.3.4 Chemical and Volume Control System

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

9.3.5 Standby Liquid Control System

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

9.3.5.2 System Description

Detailed System Description

Add the following to the end of the fifth paragraph.

STD SUP 9.3.5-1 The above provisions adequately prevent loss of solubility of borated solutions (sodium pentaborate).

9.3.6 Instrument Air System

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

9.3.7 Service Air System

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

9.3.8 High Pressure Nitrogen Supply System

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

9.3.9 Hydrogen Water Chemistry System

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

Replace the first paragraph with the following.

STD COL 9.3.9-1-A

The site specific design includes HWCS.

9.3.9.1 Design Basis

Power Generation Design Basis

Replace the first sentence with the following.

STD CDI

Hydrogen is added into the feedwater at the suction of the feedwater pumps and oxygen into the offgas system.

9.3.9.2 System Description

Replace this section with the following.

NAPS CDI

The HWCS, illustrated in DCD Figure 9.3-5, is composed of hydrogen and oxygen supply systems to inject hydrogen in the feedwater and oxygen in the offgas and several monitoring systems to track the effectiveness of the HWCS. Storage requirements are based on the HWC system usage, ESBWR generator usage and estimated losses.

The hydrogen supply system is integrated with the generator hydrogen supply system (as described in DCD Section 10.2.2.2.8). S016

NAPS CDI
NAPS COL 9.3.9-2-A

9.3.9.2.1 Hydrogen Storage Facility

S016

The bulk hydrogen storage facility stores liquid hydrogen in an 18,000 gallon vacuum-jacketed pressure vessel. The storage facility is located within a fenced area outside the plant protected area and is open to prevent the accumulation of hydrogen and meets the requirements of DCD References 9.3.9-1 and 9.3.9-2. The hydrogen storage facility consists of a cryogenic tank, cryogenic pumps, atmospheric vaporizers, a compressor, a high-pressure gas storage tubes bank, a hydrogen supply line, pressure regulating valves, an excess flow check valve, and relief valves. The cryogenic tank meets ASME Section VIII, Division 1, requirements for unfired pressure vessels. The pressure regulating valves limit the supply pressure of hydrogen; a relief valve is provided downstream of the regulating valve station to protect the downstream piping in case of regulating valve failure. The excess flow check valve ensures that a large release is limited to the storage facility location. The relief valves provide protection for the storage tank and each isolable liquid hydrogen filled piping section.

The HWCS is implemented with On-line Noble Chem™. Plant personnel conduct the OLNC process while the plant is operating.

The Oxygen Storage Facility is described in Section 9.3.10.2.

9.3.9.4 Inspection and Testing Requirements

Replace this section with the following.

STD CDI The connections for the HWCS are tested and inspected with the feedwater and offgas piping.

Major components of the HWCS are tested and inspected as separate components prior to installation. The system is tested in accordance with vendor requirements after installation to ensure proper performance.

9.3.9.5 Instrumentation and Controls

Replace the first sentence with the following.

STD CDI Instrumentation is provided to control the injection of hydrogen and augment the injection of oxygen.

9.3.9.6 COL Information

9.3.9-1-A Implementation of Hydrogen Water Chemistry

STD COL 9.3.9-1-A This COL item is addressed in Section 9.3.9.

9.3.9-2-A Hydrogen and Oxygen Storage and Supply

NAPS COL 9.3.9-2-A This COL item is addressed in Section 9.3.9.2.1. IS016

9.3.10 Oxygen Injection System

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

9.3.10.2 System Description

Replace the last paragraph with the following.

NAPS COL 9.3.10-1-A The bulk oxygen storage facility is located outside the plant fenced area. The facility consists of a 34 m^3 (9,000 gal) cryogenic tank, atmospheric vaporizers, an oxygen supply line, a pressure regulating valve, an excess flow check valve, and relief valves. The pressure regulating valve limits the oxygen supply pressure. The excess flow check valve ensures that large releases are limited to the storage facility. The redundant relief valves provide protection for the storage tank and each isolable liquid oxygen filled piping section. The piping carrying gaseous oxygen from the storage facility to the turbine building is routed underground. The storage tank meets ASME Code Section VIII, Division 1, requirements for unfired pressure vessels, and DCD References 9.3.9-1 and 9.3.9-2.

IS034a

9.3.10.6 COL Information

9.3.10-1-A Oxygen Storage Facility

NAPS COL 9.3.10-1-A This COL item is addressed in Section 9.3.10.2.

9.3.11 Zinc Injection System

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

9.3.11.2 System Description

Replace the second paragraph with the following.

STD COL 9.3.11-1-A A Zinc Injection System is not utilized.

9.3.11.4 Test and Inspections

Replace the second paragraph with the following.

STD COL 9.3.11-2-A A Zinc Injection System is not utilized.

9.3.11.6 COL Information

9.3.11-1-A **Determine Need for Zinc Injection System**

STD COL 9.3.11-1-A This COL item is addressed in Section 9.3.11.2.

9.3.11-2-A **Provide System Description for Zinc Injection System**

STD COL 9.3.11-2-A This COL item is addressed in Section 9.3.11.4.

9.3.12 Auxiliary Boiler System

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

9.4 Heating, Ventilation, and Air Conditioning

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

9.5 Other Auxiliary Systems

9.5.1 Fire Protection System

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

9.5.1.1 Design Bases

Codes, Standards, and Regulatory Guidance

Add the following at the end of this section.

NAPS SUP 9.5.1-1 Table 9.5-201 supplements DCD Table 9.5-1 for those portions outside the DCD and operational aspects of the fire detection and suppression systems.

9.5.1.2 System Description

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

NAPS COL 9.5.1-4-A Figures 9.5-201, 9.5-202, and 9.5-203 provide simplified diagrams of the site-specific firewater supply piping.

9.5.1.4 Fire Protection Water Supply System

Water Sources

Replace the first paragraph with the following.

NAPS COL 9.5.1-4-A Water for the Fire Protection System is supplied from a minimum of two sources: i) at least one "primary" source to the suctions of primary fire pumps and corresponding jockey fire pumps and, ii) at least one "secondary" source to suctions of secondary fire pumps and corresponding jockey fire pumps. The primary source is two dedicated, Seismic Category I, firewater storage tanks. Each primary firewater storage tank has sufficient capacity to meet the maximum firewater demand of the system for a period of 120 minutes. IN035a

NAPS COL 9.5.1-1-A The secondary firewater source is Lake Anna. This large body of water has a capacity well in excess of the 2082 m^3 (550,000 gal) required by NFPA 804. IN035a

The water from Lake Anna is treated with sodium hypochlorite.

Primary Firewater Source

The Pretreated Water Supply System (PWSS) provides treated and filtered water to the firewater storage tanks. PWSS pumps are located in the Station Water Intake Building. Hypochlorite is added to lake water in the Station Water Intake Building intake bay to preclude biofouling or microbiologically induced corrosion. Strainers are installed at the discharge of the PWSS pumps to preclude large-size foreign materials. The water is also preconditioned to facilitate filtering through multimedia filters before being stored in the station water storage tank and supplied to the firewater storage tanks.

9.05.01-8

Secondary Firewater Source

The secondary fire pumps are also located in the Station Water Intake Building and draw water from the intake bay. Hypochlorite is added to lake water in the Station Water Intake Building intake bay to preclude biofouling or microbiologically induced corrosion. Hypochlorite can be injected at the discharge of the secondary fire pumps, if required. Strainers are installed at the discharge of secondary firewater pumps to preclude large-size foreign materials. Filtering is not required because of the small amount of total suspended solids in the lake water.

Sampling and monitoring is performed, as required, to ensure an acceptable level of quality of firewater. Periodic system flushes and flow tests are performed to maintain and verify firewater supply system capability.

9.05.01-8

Water sources that are used for multiple purposes ensure that the required quantity of firewater is dedicated for fire protection use only.

Fire Pumps

Replace the sixth sentence in the first paragraph with the following.

STD COL 9.5.1-2-A

Testing will be performed to demonstrate that the secondary fire protection pump circuit supplies a minimum of 484 m^3/hr (2130 gpm) with sufficient discharge pressure to develop a minimum of 107 psig line pressure at the Turbine Building/yard interface boundary. This cannot be performed until the system is built. This activity will be completed prior to fuel receipt.

9.5.1.5 Firewater Supply Piping, Yard Piping, and Yard Hydrants

Delete the last paragraph and add the following at the end the first paragraph.

NAPS COL 9.5.1-4-A

Figures 9.5-201, 9.5-202, and 9.5-203 provide simplified diagrams of the site-specific firewater supply piping.

9.5.1.10 Fire Barriers

Replace the last paragraph with the following.

STD COL 9.5.1-5-A

Mechanical and electrical penetration seals and electrical raceway fire barrier systems are qualified to the requirements delineated in RG 1.189 by a recognized testing laboratory in accordance with the applicable guidance of NFPA 251 and/or ASTM E-119. Detailed design in this area is not complete. Specific design and certification test results for penetration seal designs and electrical raceway fire barrier systems will be available for review at least six months prior to fuel receipt.

9.05.01-8

9.5.1.11 Building Ventilation

Replace the last sentence in the third paragraph with the following.

STD COL 9.5.1-6-H

Procedures for manual smoke control will be developed as part of the Fire Protection Program implementation. The required elements of the Fire Protection Program are fully operational prior to receipt of new fuel for buildings storing new fuel and adjacent fire areas that could affect the fuel storage area. Other required elements of the Fire Protection Program described in this section are fully operational prior to initial fuel loading per Section 13.4.

9.5.1.12 Safety Evaluation

Replace the first two sentences of the fifth paragraph with the following. S035

STD COL 9.5.1-7-H

A compliance review of the final as-built design against the assumptions and requirements stated in the FHA will be completed in accordance with the milestones in Section 13.4. Based on this review, the FHA will be updated as necessary. S035 S035

9.5.1.15 Fire Protection Program

Replace the last sentence of the first paragraph with the following.

STD COL 9.5.1-8-A

The elements of the Fire Protection Program necessary to support receipt and storage of fuel onsite for buildings storing new fuel and adjacent fire areas that could affect the fuel storage area are fully operational prior to receipt for new fuel. Other required elements of the Fire Protection Program described in this section are fully operational prior to initial fuel loading per Section 13.4.

9.5.1.15.1 Fire Protection Program Criteria

Add the following at the end of this section.

NAPS SUP 9.5.1-1

Table 9.5-201 supplements DCD Table 9.5-1.

9.5.1.15.2 [Deleted] 9.05.01-1

9.5.1.15.3 Fire Protection Program Staffing Requirements S035

Replace this section with the following. S035

NAPS COL 13.1-1-A Fire protection staffing and organization of the fire brigade are described in Section 13.1. S035

9.5.1.15.4 Onsite Fire Operations Training

Replace the first paragraph with the following.

NAPS COL 9.5.1-10-H Implementation of the fire brigade will be in accordance with the milestones in Section 13.4 for the Fire Protection Program.

9.5.1.15.6 Control of Combustible Materials, Hazardous Materials and Ignition Sources S123 9.05.01-5

Add the following at the end of this section.

STD SUP 9.5.1-3

- In rooms adjacent to the main control room and in computer rooms that are not part of the control room complex: 9.05.01-5
    - Transient combustible materials are not left unattended during lunch breaks, shift changes, or other similar periods unless stored in approved containers. 9.05.01-7
    - Electrical appliances and other potential ignition sources are controlled.
- Prohibit the storage of transient combustibles below the raised floor in the main control complex. 9.05.01-6
- Prohibit the storage of hazardous chemicals in areas that contain or expose equipment important to safety. 9.05.01-13

9.5.1.15.9 Quality Assurance

Replace this section with the following. S034a

STD COL 9.5.1-11-A Quality assurance controls are applied to the activities involved in the design, procurement, installation, and testing and the administrative controls of fire protection systems, in accordance with the measures outlined in Chapter 17. 9.05.01-11

For the operational fire protection program, the Quality Assurance Program implements the requirements of RG 1.189 through site-specific administrative controls procedures. The procedures will be developed six months prior to fuel receipt and will be fully implemented prior to fuel receipt. 9.05.01-11

9.5.1.16 COL Information

9.5.1-1-A Secondary Firewater Storage Source

NAPS COL 9.5.1-1-A This COL item is addressed in Section 9.5.1.4 and DCD Table 9.5-2. 15016

9.5.1-2-A Secondary Firewater Capacity

NAPS COL 9.5.1-2-A This COL item is addressed in Section 9.5.1.4.

9.5.1-4-A Piping and Instrument Diagrams

NAPS COL 9.5.1-4-A This COL item is addressed in Sections 9.5.1.2, 9.5.1.4, 9.5.1.5, and Figures 9.5-201, 9.5-202, and 9.5-203.

9.5.1-5-A Fire Barriers

STD COL 9.5.1-5-A This COL item is addressed in Section 9.5.1.10.

9.5.1-6-H Smoke Control

STD COL 9.5.1-6-H This COL item is addressed in Section 9.5.1.11.

9.5.1-7-H FHA Compliance Review

STD COL 9.5.1-7-H This COL item is addressed in Section 9.5.1.12.

9.5.1-8-A FP Program Description

15123

STD COL 9.5.1-8-A This COL item is addressed in Section 9.5.1.15.

9.5.1-9-A [Deleted]

9.5.1-10-H Fire Brigade

NAPS COL 9.5.1-10-H This COL item is addressed in Sections 9.5.1.15.4 and 13.1.2.1.5.

9.5.1-11-A Quality Assurance

STD COL 9.5.1-11-A This COL item is addressed in Section 9.5.1.15.9.

DCD Table 9.5-2

NAPS COL 9.5.1-1-A Delete the "*" and "**" footnotes. 15016

9.5.2 Communications System

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

9.5.2.2 System Description

IN033

Emergency Communication Systems

Replace the parenthetical "(COL 9.5.2.5-1-A)" in the first bullet with the following. IN033

NAPS COL 9.5.2.5-1-A The North Anna Emergency Notification System (ENS) is provided in the plant Emergency Plan. The ENS phone lines are routed directly to the local telephone company central office via fiber-optic phone lines through a telephone utility switch that is located on site in the telephone equipment building. The normal power for this device is non-safety related station power. The telephone system will lose its normal power supply during a loss of offsite power; however, the phone system is battery backed for a period of approximately eight hours. This design ensures that the ENS located at the site is fully operable from the site in the event of a loss of offsite power at the site and is in compliance with the requirements of NRC Bulletin 80-15 for the ENS. Automatic Ringdown Circuits (ARD) (described in the plant Emergency Plan) connect the plant to the local and state emergency offices, and are also normally powered from the non-safety related station power and backed with approximately eight hours of battery backup power. In addition to the connections to the local telephone company, a separate Company-owned and maintained fiber-optic network exists which provides communication between the station, the system operations center, and the NRC. This Company network is also capable of external long distant and local telephone calls.

Replace the parenthetical "(COL 9.5.2.5-3-A)" in the second bullet with the following. IN033

NAPS COL 9.5.2.5-3-A The health physics network is described in the Emergency Plan. IN033

Replace the parenthetical "(COL 9.5.2.5-4-A)" in the third bullet with the following. N033

NAPS COL 9.5.2.5-4-A

Communication from the Control Room, TSC, and EOF to NRC headquarters including establishment of Emergency Response Data Systems (ERDS) is described in the Emergency Plan. N033

Replace the parenthetical "(COL 9.5.2.5-3-A)" in the fourth bullet with the following. N033

NAPS COL 9.5.2.5-3-A

The crisis management radio system is part of the plant radio system described in DCD Section 9.5.2.2. N033

Replace the parenthetical "(COL 9.5.2.5-5-A)" in the fifth bullet with the following. N033

NAPS COL 9.5.2.5-5-A

The fire brigade radio system is part of the plant radio system described in DCD Section 9.5.2.2. N033

Replace the last bullet with the following.

NAPS COL 9.5.2.5-2-A

- Transmission System Operator Communications Link: Voice communications with the grid operator are provided via a Company-owned and -maintained fiber optic transmission system that allows telephone communications with the entire Corporate System. Access to this mode of transmission is made via the plant telephone system. A dedicated handset is provided between the Control Room and the power system operator.

Add the following after the last bullet. N033

NAPS COL 9.5.2.5-3-A

- Insta-Phone System - The primary method for notification of State and local authorities is the Insta-phone, which is accessible from the Control Room, TSC, and EOF. The Insta-phone is described in the Emergency Plan. N033

9.5.2.5 COL Information

9.5.2.5-1-A Emergency Notification System

N033

NAPS COL 9.5.2.5-1-A

This COL item is addressed in Section 9.5.2.2. No chg.

9.5.2.5-2-A Grid Transmission Operator

NAPS COL 9.5.2.5-2-A This COL item is addressed in Section 9.5.2.2 and Emergency Plan Section II.F.1. N033

9.5.2.5-3-A Offsite Interfaces (1) N033

NAPS COL 9.5.2.5-3-A This COL item is addressed in Section 9.5.2.2 and Emergency Plan Sections II.E.1 and II.F.1. N033

9.5.2.5-4-A Offsite Interfaces (2) N033

NAPS COL 9.5.2.5-4-A This COL item is addressed in Section 9.5.2.2 and Emergency Plan Sections II.E.1 and II.F.1. N033

9.5.2.5-5-A Fire Brigade Radio System

NAPS COL 9.5.2.5-5-A This COL item is addressed in Section 9.5.2.2. N033

9.5.3 Lighting System

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

9.5.4 Diesel Generator Fuel Oil Storage and Transfer System

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

9.5.4.2 System Description

Detailed System Description S016 S036

Standby Diesel Generators

Replace the third to last sentence in the first paragraph with the following.

STD COL 9.5.4-1-A Procedures require that the quantity of diesel fuel oil in the standby diesel generator (SDG) fuel oil storage tanks is monitored on a periodic basis. The diesel fuel oil usage is tracked against planned deliveries. Regular transport replenishes the diesel fuel oil inventory during periods of high demand and ensures continued supply in the event of adverse weather conditions. These procedures ensure sufficient diesel fuel oil inventory is available on site so that the SDGs can operate continually for seven days with each operating at its calculated design load, with appropriate design margins. The procedures will be developed in accordance with the milestone and processes described in Section 13.5.

N101b

N101b
9.05.04-
2
S036

Replace the third paragraph with the following.

NAPS COL 9.5.4-2-A The only underground component of the SDGs fuel oil storage and transfer system is carbon steel piping. A corrosion protection system is provided for external surfaces of buried piping systems. The buried sections of the piping are provided with waterproof protective coating and an impressed current type cathodic protection to control external corrosion.

9.05.04-4
9.05.04-6
N034

STD COL 9.5.4-1-A Delete the parenthetical "(COL 9.5.4-1-A)" at the end of the last paragraph.

S036

Ancillary Diesel Generators

S036

Replace the third to last sentence in the first paragraph with the following.

S036

STD COL 9.5.4-1-A Procedures require that the quantity of diesel fuel in the ancillary diesel generator (ADG) fuel oil storage tanks is monitored on a periodic basis. The diesel fuel oil usage is tracked against planned deliveries. Regular transport replenishes the fuel oil inventory during periods of high demand and ensures continued supply in the event of adverse weather conditions. These procedures ensure sufficient diesel fuel oil inventory is available on site so that the ADGs can operate continually for seven days with each operating at its calculated design load, with appropriate design margins. The procedures will be developed in accordance with the milestone and processes described in Section 13.5.

N016
9.05.04-2
S036

Replace the third paragraph with the following.

NAPS COL 9.5.4-2-A The only underground component of the ADGs fuel oil storage and transfer system is carbon steel piping. A corrosion protection system is provided for external surfaces of buried piping systems. The buried sections of the piping are provided with waterproof protective coating and an impressed current type cathodic protection to control external corrosion.

N034

System Operation

Standby Diesel Generators

S036

STD COL 9.5.4-1-A Delete the parenthetical "(COL 9.5.4-1-A)" at the end of the paragraph.

S036

Ancillary Diesel Generators IS036

STD COL 9.5.4-1-A Delete the parenthetical "(COL 9.5.4-1-A)" at the end of the paragraph. IS036

9.5.4.6 COL Information

9.5.4-1-A Fuel Oil Capacity

STD COL 9.5.4-1-A This COL item is addressed in Section 9.5.4.2.

9.5.4-2-A Protection of Underground Piping

NAPS COL 9.5.4-2-A This COL item is addressed in Section 9.5.4.2.

9.5.5 Diesel Generator Jacket Cooling Water System

IS100

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

9.5.6 Diesel Generator Starting Air System

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

9.5.7 Diesel Generator Lubrication System

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

9.5.8 Diesel Generator Combustion Air Intake and Exhaust System

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

NAPS SUP 9.5.1-1
NAPS SUP 9A-01

Table 9.5-201 Codes and Standards

American Society of Mechanical Engineers (ASME)

Boiler and Pressure Vessel Code	Section IX, Qualification Standard for Welding and Brazing Procedures, Welder, Brazers and Welding and Brazing Operators

Applicable Building Codes

Virginia Uniform Statewide Building Code	Virginia Uniform Statewide Building Code, Part I (Virginia Construction Code) As defined in the Virginia Uniform Statewide Building Code edition of record.

National Fire Protection Association (NFPA)

NFPA 1	Uniform Fire Code	N101d
NFPA 25	Recommended Practices for Inspection, Testing, and Maintenance of Standpipes and Hose Systems	
NFPA 55	Standard for Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks	
NFPA 259	Standard Test Method for Potential Heat of Building Materials	N101d
NFPA 703	Standard for Fire-Retardant Treated Wood and Fire Retardant Coatings for Building Materials	N101d
NFPA 750	Standard for Water Mist Fire Protection Systems	N101d
NFPA 1144	Standard for Reducing Structure Ignition Hazards from Wildland Fire	N101d
NFPA 1410	Standard on Training for Initial Emergency Scene Operations	N101d
NFPA 1620	Recommended Practice for Pre-Incident Planning	N101d
NFPA 2001	Standard for Clean Agent Fire Extinguishing	N101d

Environmental Protection Agency (EPA)

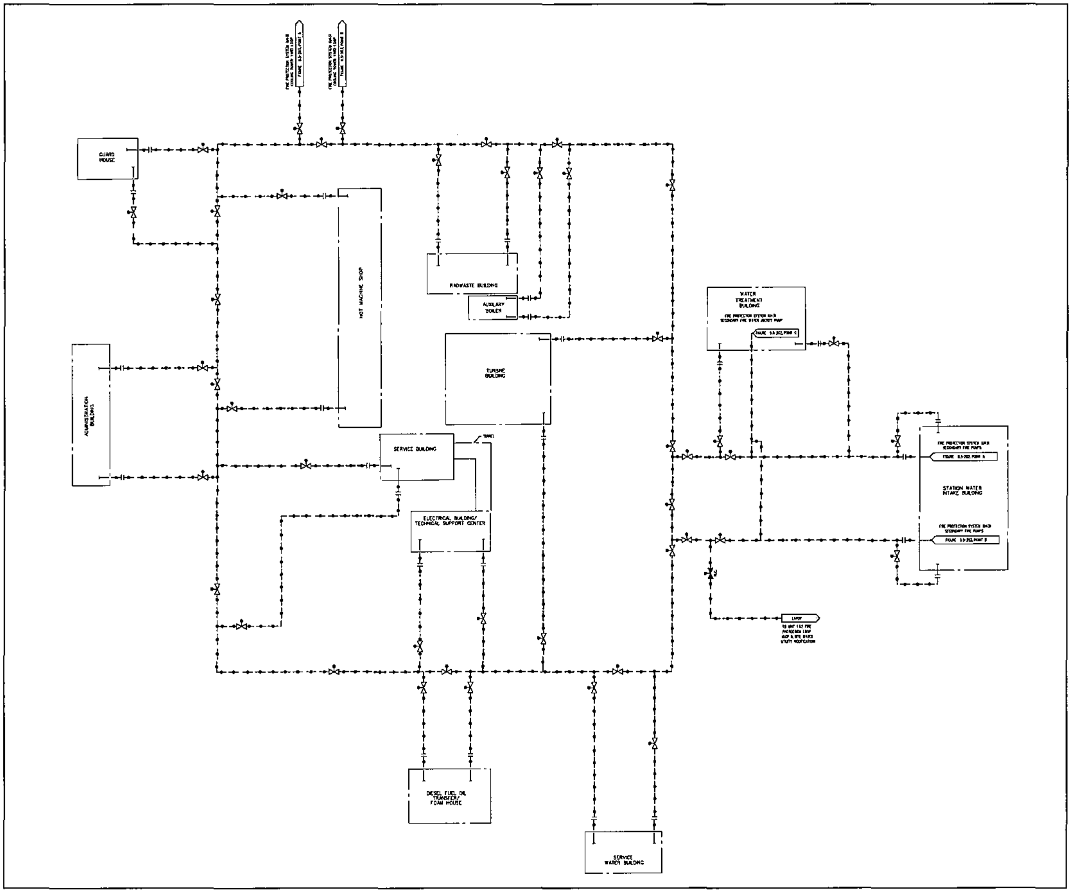
Environmental Protection Agency (EPA)	EPA Standards of Performance for Stationary Compression Ignition Internal Combustion Engines; Final Rule (40 CFR Parts 60, 85 et al.)

Listing/Approval Agencies

N101d

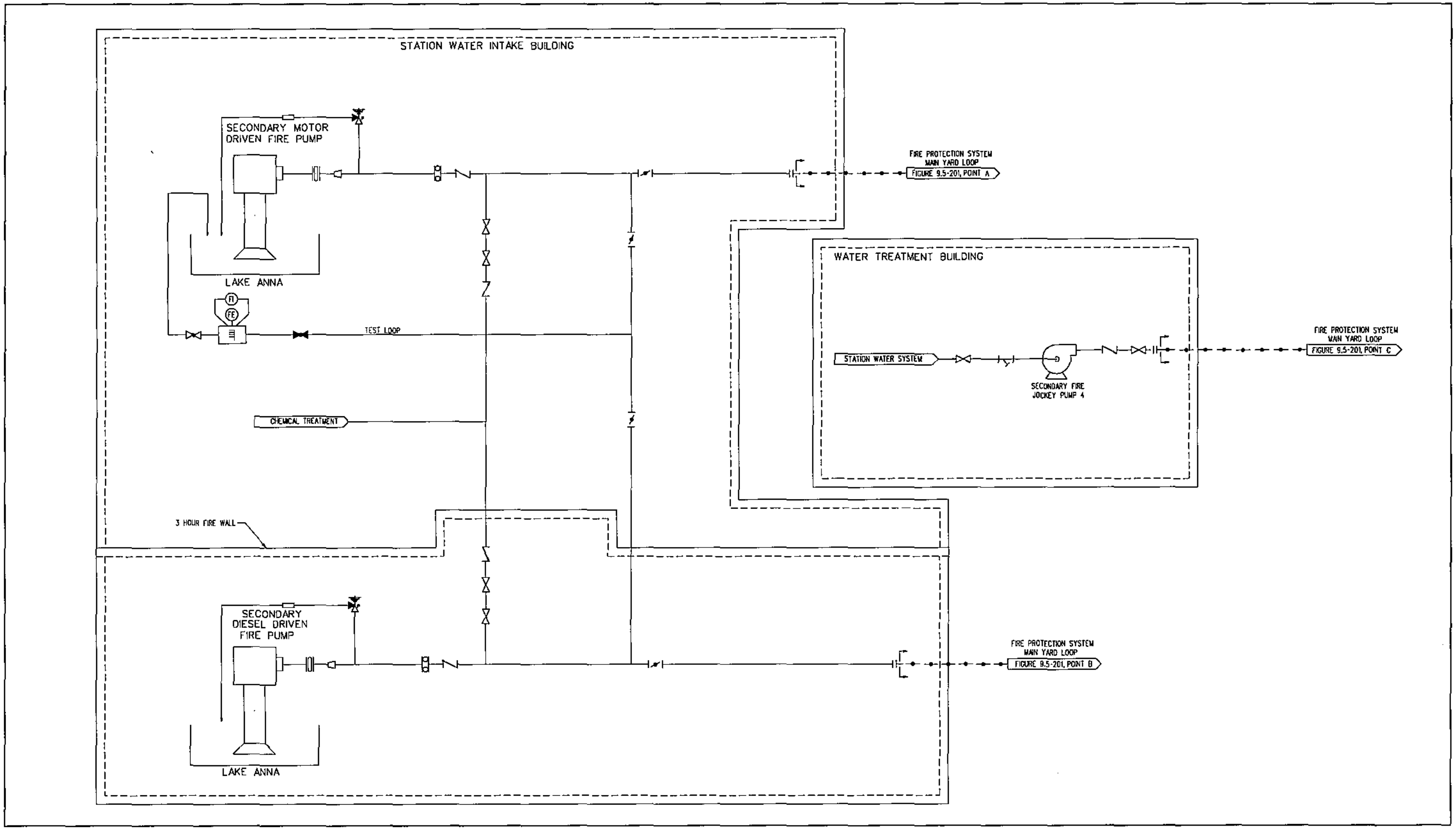
Nuclear Electric Insurance Limited (NEIL)	N101d

NAPS COL 9.5.1-4A Figure 9.5-201 Fire Protection System; Main Yard Loop



9.05.01-17 N101a

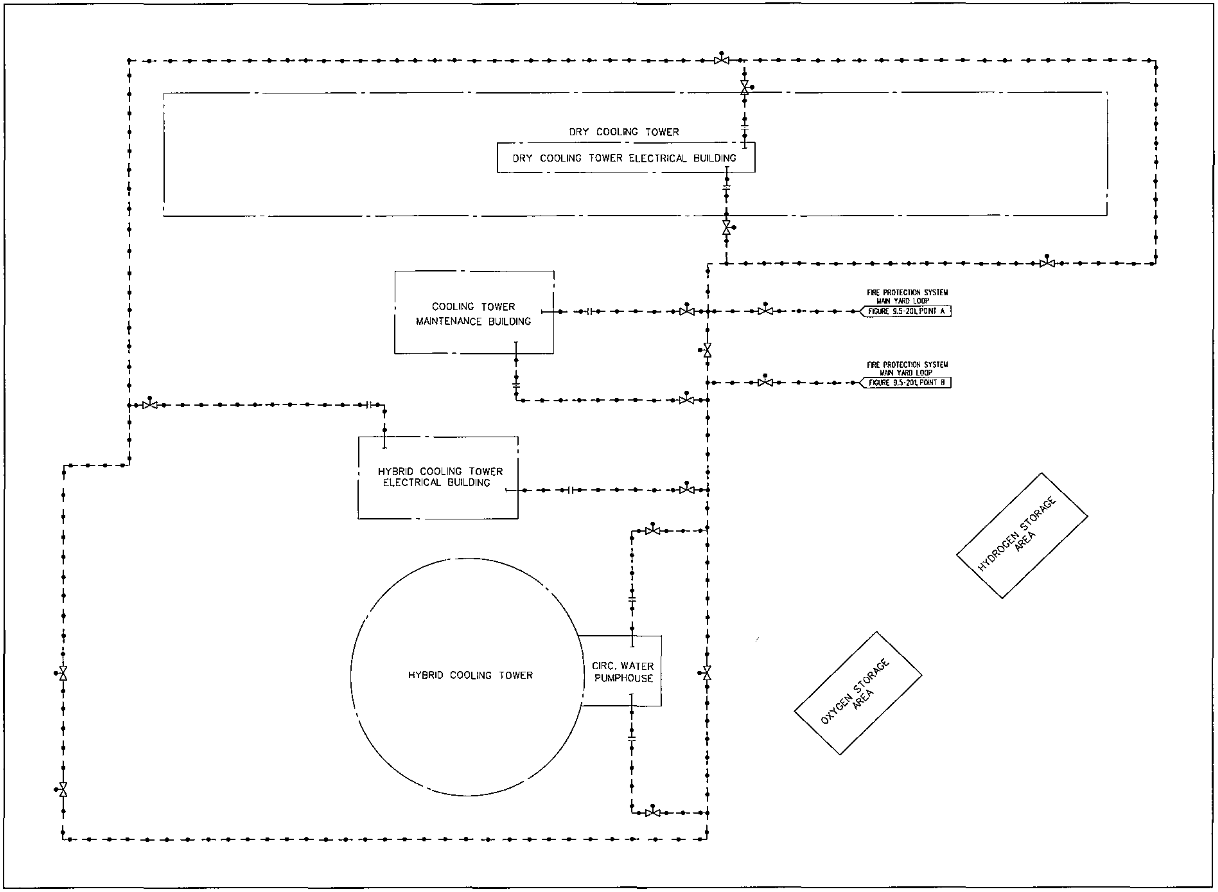
NAPS COL 9.5.1-4-A **Figure 9.5-202 Fire Protection System Secondary Fire Pumps**



N101c

N035b

NAPS COL 9.5.1-4-A **Figure 9.5-203 Fire Protection System; Cooling Tower Yard Loop**



N101c

N0356

Appendix 9A Fire Hazards Analysis

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

Contents

NAPS CDI Replace 9A.4.9 Service Water/Water Treatment Building with 9A.4.9 Service Water Building.

Replace 9A.5.9 Service Water/Water Treatment Building with 9A.5.9 Service Water Building. S016

Add 9A.5.12, Water Treatment Building N098

9A.1 Introduction

NAPS CDI In the first sentence of the first paragraph, replace "Service Water/Water Treatment Building" with "Service Water Building, Water Treatment Building,"

and

Replace "Pump House" with "Circulating Water Pump House, Station Water Intake Building." N101b S016

NAPS CDI In the first sentence of the first paragraph, delete "Cold Machine Shop, Warehouse." 9.05.01-17

9A.2.1 Codes and Standards

Add the following second paragraph.

NAPS SUP 9A-01 The codes and standards that are applicable to the design of the site-specific portions of the yard are listed in Table 9.5-201. Table 1.9-204 identifies the relevant editions for each applicable code and standard. These codes and standards also apply to the operational aspects of the fire detection and suppression systems. N101b

9A.3.1 Review Data

NAPS CDI

In the second paragraph, first sentence replace "Pump House" with "Circulating Water Pump House, Station Water Intake Building."

N1016

and

Replace "Service Water/Water Treatment Building" with "Service Water Building, Water Treatment Building."

NAPS CDI

In the first sentence of the second paragraph, delete "Cold Machine Shop, Warehouse."

9.05.01-17
N098

9A.4.7 Yard

Replace the first paragraph with the following.

STD COL 9A.7-1-A

The Yard includes all portions of the plant site external to the Reactor Building, Fuel Building, Control Building, Turbine Building, Radwaste Building, and Electrical Building. The fire zone drawings for the site-specific portions of the yard are provided in Figures 9A.2-201 through 9A.2-206.

Replace the second paragraph with the following.

NAPS COL 9A.7-2-A

A detailed fire hazards analysis of the yard area that is outside the scope of the certified design can not be completed until cable routing is performed during final design. This information will be provided six months prior to fuel load. The FSAR will be revised to include this information, as appropriate, as part of a subsequent FSAR update.

S016

NAPS CDI

In the first sentence of the third paragraph, delete "Cold Machine Shop, Warehouse."

Delete the eighth paragraph.

9.05.01-17
N098

9A.4.9 Service Water/Water Treatment Building

NAPS CDI

Replace the title with "Service Water Building."

In the first sentence of the first paragraph, replace "Service Water/Water Treatment Building (SF/WT)" with "Service Water Building."

Replace "SF/WT" with "Service Water Building" in the first, second, and third paragraphs.

9A.5.7 Yard

Replace the last two sentences with the following. S016

NAPS COL 9A.7-2-A

A detailed fire hazards analysis of the yard area that is outside the scope of the certified design can not be completed until cable routing is performed during final design. This information will be provided six months prior to fuel load. The FSAR will be revised to include this information, as appropriate, as part of a subsequent FSAR update. S016

9A.5.8 Service Building

Replace the last two sentences with the following. S016

NAPS CDI
NAPS COL 9A.7-2-A

A detailed fire hazards analysis of the yard area that is outside the scope of the certified design, which includes the Service Building, can not be completed until cable routing is performed during final design. This information will be provided six months prior to fuel load. The FSAR will be revised to include this information, as appropriate, as part of a subsequent FSAR update. S016 S016

9A.5.9 Service Water/Water Treatment Building

NAPS CDI

Replace the title with “Service Water Building.”

Replace this section with the following.

NAPS COL 9A.7-2-A

The Service Water Building is protected in accordance with applicable codes. The Service Water Building contains service water equipment which has RTNSS functions. A detailed fire hazards analysis of the yard area that is outside the scope of the certified design, which includes the Service Water Building, can not be completed until cable routing is performed during final design. This information will be provided six months prior to fuel load. The FSAR will be revised to include this information, as appropriate, as part of a subsequent FSAR update. S016

NAPS CDI
NAPS COL 9A.7-2-A

9A.5.12 Water Treatment Building

S016
S098

The Water Treatment Building is protected in accordance with applicable NFPA Codes. The Water Treatment Building is site specific.

A detailed fire hazards analysis of the yard area that is outside the scope of the certified design, which includes the Water Treatment Building, can not be completed until cable routing is performed during final design. This information will be provided six months prior to fuel load. The FSAR will be revised to include this information, as appropriate, as part of a subsequent FSAR update. S128a S016

9A.7 COL Information

9A.7-1-A Yard Fire Zone Drawings

NAPS COL 9A.7-1-A This COL item is addressed in Section 9A.4.7. S016

9A.7-2-A FHA for Site-Specific Areas

NAPS COL 9A.7-2-A This COL item is addressed in Sections 9A.4.7, 9A.5.7, 9A.5.8, 9A.5.9, and 9A.5.12. N098

Table 9A.5-7 Revisions

NAPS COL 9A.7-2-A Delete Fire Area F4202.

Replace Fire Area F5159 with F5159R.

Replace Fire Area F5169 with F5169R.

Delete Fire Area F7100.

Add Fire Areas F7151, F7152, F7153, F7154, F7161, F7162, F7163, F7164, F7174, F7165, and F7155. N101e 9.05.01-17

Add Fire Area F7180.

Add Fire Area F7188.

Delete Fire Area F7200.

Delete Fire Area F7300.

Add Fire area F7301, F7302, F7303, and F7304.

Add Fire Area F7305.

Delete Fire Area F7400.

Delete Fire Area F7500 S128b

Replace Fire Area F7700 with F7700R.

Replace Fire Area F7900 with F7900R.

Add Fire Areas F8101, F8102, and F8103.

Add Fire Areas F8104, F8105, F8106 and F8108. N101e

Add Fire Areas F8181, F8282, F8183, F8184, F8185, F8186, F8187, F8188, and F8283.

Add Fire Areas F8200, F8201, F8107, F8109 and F8189.

Delete all fire areas designated as “site specific.”

N101e
S128c

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard

NIOle

Fire Area	F5159R
Description	Fuel Oil Storage Tank A
Building	Diesel Tanks
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 11, 16, 24, 30, 72, 804

Building code occupancy classification	U
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	A
Surrounded by fire barriers rated at	N/A
Except	

Niole

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	215,400 gal Class II Fuel Oil	Spot Heat Inside Tank	Manual Pulls	Foam Injection - Manual Release	Foam Hose Stations

Niole

Anticipated combustible load, MJ/m^2	> 700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	N/A
Manual firefighting	Access all around
Property loss	Moderate

Niole

Niole

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

Niole

**NAPS
COL 9A.7-2-A**

Table 9A.5-7R Yard (continued)

Fire Area	F5169R
Description	Fuel Oil Storage Tank B
Building	Diesel Tanks
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 11, 16, 24, 30, 72, 804
Building code occupancy classification	U
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	B
Surrounded by fire barriers rated at	N/A
Except	

| Nlole

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	215,400 gal Class II Fuel Oil	Spot Heat Inside Tank	Manual Pulls	Foam Injection - Manual Release	Foam Hose Stations

| Nlole

Anticipated combustible load, MJ/m^2	> 700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	N/A
Manual firefighting	Access all around
Property loss	Moderate

| Nlole

| Nlole

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

| Nlole

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7151
Description	Pump Room Train A
Building	Service Water Building
Fire Zone Dwg	9A.2-204
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	A
Surrounded by fire barriers rated at	3-hour
Except	

Niole

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Manual Pulls (at EXITs)	None	Fire Extinguishers	Yard Hydrants

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

Niole

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7152
Description	Electrical Room Train A
Building	Service Water Building
Fire Zone Dwg	9A.2-204
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	A
Surrounded by fire barriers rated at	3-hour
Except	

Nlole

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Smoke	Manual Pulls (at EXITs)	Preaction Sprinkler LATER L/min per m^2	CO_2 Fire Extinguishers Yard Hydrants

Nlole

Anticipated combustible load, MJ/m^2	> 700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

Nlole

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7153
Description	Cooling Tower Train A
Building	Service Water Building
Fire Zone Dwg	9A.2-204
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	A
Surrounded by fire barriers rated at	3-hour
Except	

I NIole

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Fill Material	Manual Pulls (at EXITs)	None	Fire Extinguishers	Yard Hydrants

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

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NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7154
Description	Transfer Pump Room A
Building	Diesel Fuel Oil Transfer/Foam House
Fire Zone Dwg	9A.2-202
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	A
Surrounded by fire barriers rated at	3-hour
Except	

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	No. 2 Diesel Fuel Oil Cable Insulation Electrical Equipment	Manual Pulls (at EXITS)	None	Foam Hose Racks	Fire Extinguishers

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

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NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

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Fire Area	F7155
Description	Electrical Room A
Building	Diesel Fuel Oil Transfer/Foam House
Fire Zone Dwg	9A.2-202
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	A
Surrounded by fire barriers rated at	3-hour
Except	Exterior Walls (non-rated)

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Electrical Equipment	Area Wide Ionization	Manual Pulls	CO_2 Fire Extinguishers	Hose Racks

Anticipated combustible load, MJ/m^2	< 1400
Non-sprinkled combustible load limit, MJ/m^2	1400

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7161
Description	Pump Room Train B
Building	Service Water Building
Fire Zone Dwg	9A.2-204
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804

Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	B
Surrounded by fire barriers rated at	3-hour
Except	

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Manual Pulls (at EXITS)	None	Fire Extinguishers	Yard Hydrants

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

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NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7162
Description	Electrical Room Train B
Building	Service Water Building
Fire Zone Dwg	9A.2-204
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	B
Surrounded by fire barriers rated at	3-hour
Except	

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Consisting of the following rooms:

			Fire Detection		Fire Suppression	
Elevation	Room #	Potential Combustibles	Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Manual Pulls (at EXITS)	None	Fire Extinguishers	Yard Hydrants

Anticipated combustible load, MJ/m^2	<1400
Non-sprinkled combustible load limit, MJ/m^2	1400

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Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

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NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7163
Description	Cooling Tower Train B
Building	Service Water Building
Fire Zone Dwg	9A.2-204
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	B
Surrounded by fire barriers rated at	3-hour
Except	

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Fill Material	Manual Pulls (at EXITS)	None	Fire Extinguishers	Yard Hydrants

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

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NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7164
Description	Transfer Pump Room B
Building	Diesel Fuel Oil Transfer/Foam House
Fire Zone Dwg	9A.2-202
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804

Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	B
Surrounded by fire barriers rated at	3-hour
Except	

| Note

Consisting of the following rooms:

			Fire Detection		Fire Suppression	
Elevation	Room #	Potential Combustibles	Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	No. 2 Diesel Fuel Oil Cable Insulation Electrical Equipment	Manual Pulls (at EXITS)	None	Foam Hose Racks	Fire Extinguishers

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

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Fire Area	F7165
Description	Electrical Room B
Building	Diesel Fuel Oil Transfer/Foam House
Fire Zone Dwg	9A.2-202
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	B
Surrounded by fire barriers rated at	3-hour
Except	Exterior Walls (non-rated)

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Electrical Equipment	Area Wide Ionization	Manual Pulls	CO_2 Fire Extinguishers	Hose Racks

Anticipated combustible load, MJ/m^2	< 1400
Non-sprinkled combustible load limit, MJ/m^2	1400

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and/or cables in this fire area will not affect any safety-related, safe shutdown, or RTNSS divisional equipment and/or cables outside of this fire area.

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7174	
Description	Foam House	
Building	Diesel Fuel Oil Transfer/Foam House	
Fire Zone Dwg	9A.2-202	
Applicable Codes	IBC; Reg Guide 1.189; NFPA 10, 13, 72, 75, 90A, 101, 804	
Building code occupancy classification	F-1	
Electrical classification	N/A	
Safety-related divisional equipment or cables	N/A	
Non-safety-related redundant trains or equipment or cables	N/A	
Surrounded by fire barriers rated at	3-hour	NIole
Except		

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	LATER	Manual Pulls (at EXITS)	None	Fire Extinguisher	Foam Hose Rack

Anticipated combustible load, MJ/m^2	< 700	NIole
Non-sprinkled combustible load limit, MJ/m^2	700	NIole

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None	NIole
Radiological release	None, no radiological materials present	
Life safety	To be determined during detailed design	
Manual firefighting	To be determined during detailed design	
Property loss	To be determined during detailed design	

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable. NIole

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7301
Description	General Area
Building	Water Treatment Building
Fire Zone Dwg	9A.2-201
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804

Building code occupancy classification	H-4
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Plastic Filter Membranes Corrosive/ Toxic Chemicals	Manual Pulls (at EXITS)	None	Wet-Pipe Sprinkler LATER L/min per m^2	Hose Racks Portable Extinguishers

Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None, but may affect makeup water chemistry
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment, but could affect nonsafety-related equipment including equipment which could be used for make-up to IC/PCCS pools and spent fuel pool if 7 days post accident; all safety divisions and both on-site and off-site power supplies are unaffected by fire and are operable.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7302
Description	Electrical Room
Building	Water Treatment Building
Fire Zone Dwg	9A.2-201
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	1 hour per IBC table 302.3.2
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Electrical Equipment	Smoke	Manual Pulls (at EXITs)	Pre-Action Sprinkler LATER L/min per m^2	Hose Racks Portable Extinguishers

Anticipated combustible load, MJ/m^2	>1400
Non-sprinkled combustible load limit, MJ/m^2	1400

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Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None, but may affect makeup water chemistry
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment, but could affect nonsafety-related equipment including equipment which could be used for make-up to IC/PCCS pools and spent fuel pool 7 days post accident; all safety divisions and both on-site and off-site power supplies are unaffected by fire and are operable.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7303
Description	Control Room
Building	Water Treatment Building
Fire Zone Dwg	9A.2-201
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	1 hour per IBC table 302.3.2
Except	Outside walls

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Electrical Equipment	Smoke	Manual Pulls (at EXITs)	Pre-Action Sprinkler LATER L/min per m^2	Hose Racks Portable Extinguishers

Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None, but may affect makeup water chemistry
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment, but could affect nonsafety-related equipment including equipment which could be used for make-up to IC/PCCS pools and spent fuel pool 7 days post accident; all safety divisions and both on-site and off-site power supplies are unaffected by fire and are operable.

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7304
Description	Lab
Building	Water Treatment Building
Fire Zone Dwg	9A.2-201
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	1 hour per IBC table 302.3.2
Except	Outside walls

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Electrical Equipment Cable Insulation	Smoke	Manual Pulls (at EXITs)	Pre-Action Sprinkler LATER L/min per m^2	Hose Racks Portable Extinguishers

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Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None, but may affect makeup water chemistry
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment, but could affect nonsafety-related equipment including equipment which could be used for make-up to IC/PCCS pools and spent fuel pool 7 days post accident; all safety divisions and both on-site and off-site power supplies are unaffected by fire and are operable.

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7305
Description	Circulating Water Pump House
Building	Circulating Water Pump House
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804

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Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	N/A

Consisting of the following rooms:

			Fire Detection		Fire Suppression	
Elevation	Room #	Potential Combustibles	Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	LATER	Manual Pulls (at EXITs)	None	LATER	LATER

Anticipated combustible load, MJ/m^2	< 700
Non-sprinkled combustible load limit, MJ/m^2	700

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Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7180
Description	Guard House
Building	Guard House
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 10, 24, 72, 90A, 101, 804
Building code occupancy classification	B
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Smoke	Manual Pulls (at EXITs)	Wet-Pipe Sprinkler	Fire Extinguishers

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Anticipated combustible load, MJ/m^2	> 700
Non-sprinkled combustible load limit, MJ/m^2	700

Nlole
Nlole

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

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Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7188
Description	Chemical Storage Area
Building	Service Water Building
Fire Zone Dwg	9A.2-204
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	1-hour
Except	Exterior Walls (non-rated)

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Corrosive/ Toxic Chemicals	Manual Pulls (at EXITs)	None	Wet-Pipe Sprinkler LATER L/min per m^2	Fire Extinguishers Yard Hydrants

Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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Table 9A.5-7R Yard (continued)

Fire Area	F7700R	
Description	Service Building	
Building	Service Building	
Fire Zone Dwg	9A.2-33R	
Applicable Codes	IBC; Reg Guide 1.189; NFPA 10, 13, 72, 90A, 101, 804; 28 CFR 36	
Building code occupancy classification	B	
Electrical classification	N/A	
Safety-related divisional equipment or cables	N/A	
Non-safety-related redundant trains or equipment or cables	N/A	
Surrounded by fire barriers rated at	3-hour	NIole
Except	South, East, North Walls (non-rated)	NIole

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression		
			Primary	Backup	Primary	Backup	
To be determined during detailed design	To be determined during detailed design	Class A Combustibles Cable Insulation	Smoke	Manual Pulls (at EXITs)	Wet-Pipe Sprinkler	ABC Fire Extinguisher	NIole

Anticipated combustible load, MJ/m^2	> 700	NIole
Non-sprinkled combustible load limit, MJ/m^2	700	NIole

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None	NIole
Radiological release	None, no radiological materials present	
Life safety	To be determined during detailed design	
Manual firefighting	To be determined during detailed design	
Property loss	To be determined during detailed design	

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F7900R
Description	Administration Building
Building	Administration Building
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 10, 13, 72, 90A, 101, 804
Building code occupancy classification	B
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Class A Combustibles Cable Insulation	Suppression Flowswitch	Manual Pulls (at EXITs)	Wet-Pipe Sprinkler	Fire Extinguishers Hose Racks

Anticipated combustible load, MJ/m^2	> 700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8101
Description	Motor Driven Fire Pump (Intake Area)
Building	Station Water Intake Building
Fire Zone Dwg	9A.2-203
Applicable Codes	IBC; Reg Guide 1.189; NFPA 10, 13, 20, 24, 30, 37, 72, 101, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	3-hour
Except	Exterior Walls (non-rated)

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Suppression Flowswitch	Manual Pulls (at EXITs)	Wet-Pipe Sprinkler LATER L/min per m^2	Fire Extinguishers Yard Hydrants

Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	Via exterior door
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8102
Description	Diesel Driven Fire Pump Room
Building	Station Water Intake Building
Fire Zone Dwg	9A.2-203
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	3-hour
Except	Exterior Walls (non-rated)

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation No. 2 Diesel Fuel Oil	Smoke	Manual Pulls (at EXITs)	Wet-Pipe Sprinkler 10.2 L/min per m^2 over entire area	Fire Extinguishers Yard Hydrants

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Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8103
Description	Electrical Room
Building	Station Water Intake Building
Fire Zone Dwg	9A.2-203
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable insulation Electrical Equipment	Area Wide Ionization	Manual pulls (at EXIT)	Wet-pipe sprinkler 12.2 L/min per m^2 over entire area	Fire Extinguishers Yard Hydrants

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Anticipated combustible load, MJ/m^2	>1400
Non-sprinkled combustible load limit, MJ/m^2	1400

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Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	Via EXIT Door
Property loss	Minor

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Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8104
Description	Nitrogen Storage Area
Building	Nitrogen Storage Area
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 101, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	LATER	Manual Pulls	None	Hydrants	Fire Extinguisher

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Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8105
Description	Hydrogen Storage Area
Building	Hydrogen Storage Area
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Hydrogen	H_2 System Instrumentation	Manual Pull	Yard Hydrants	Fire Extinguishers

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Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8106
Description	Oxygen Storage Area
Building	Oxygen Storage Area
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	LATER	LATER	LATER	Yard Hydrants	Fire Extinguishers

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Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8107
Description	Dry Cooling Tower Electrical Building
Building	Dry Cooling Tower Electrical Building
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Electrical Equipment	Area Wide Ionization	Manual Pulls	CO_2 Fire Extinguisher	Hose Rack

Anticipated combustible load, MJ/m^2	< 1400
Non-sprinkled combustible load limit, MJ/m^2	1400

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

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NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

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Fire Area	F8109
Description	Dry Cooling Tower
Building	Dry Cooling Tower
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804

Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	LATER	LATER	LATER	Yard Hydrants	Yard Hydrants

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8181
Description	Hot Machine Shop
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-205, 9A.2-206
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

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Consisting of the following rooms:

			Fire Detection		Fire Suppression	
Elevation	Room #	Potential Combustibles	Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Flammable Solvents Oil	Manual Pulls (at EXITs)	None	Hose Racks	Fire Extinguishers Yard Hydrants

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment. All safety divisions and both onsite and offsite Power Supplies A and B are unaffected by fire and are operable.

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NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8282
Description	Electrical Work Area
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-205
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804

|N/ole
|N/ole
|N/ole

Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Flammable Solvents Oil	Manual Pulls (at EXITs)	None	Hose Racks	Fire Extinguishers Yard Hydrants

Anticipated combustible load, MJ/m^2	< 1400
Non-sprinkled combustible load limit, MJ/m^2	1400

|N/ole
|N/ole

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

|N/ole

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8183
Description	Office Area (First Floor)
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-206
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	B
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	3-hour wall against machine shops 2 hours for stairwells and elevator shaft
Except	

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Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Office Supplies	Smoke	Manual Pulls (at EXITs)	Wet-Pipe Sprinklers LATER L/min per m^2	Fire Extinguishers Yard Hydrants

Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8184
Description	Stairwell (South)
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-205, 9A.2-206
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	2-hour
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Area Wide Ionization	Manual Pulls (at EXITs)	Hose Rack	ABC Fire Extinguishers

Anticipated combustible load, MJ/m^2	< 700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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N/ole
N/ole
N/ole

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8185	
Description	Stairwell (North)	|N/ole
Building	Hot Machine Shop	|N/ole
Fire Zone Dwg	9A.2-205, 9A.2-206	
Applicable Codes	IBC; Reg Guide 1.189; NFPA 10, 14, 72, 75, 101, 804	|N/ole
Building code occupancy classification	F-1	|N/ole
Electrical classification	N/A	
Safety-related divisional equipment or cables	N/A	
Non-safety-related redundant trains or equipment or cables	N/A	
Surrounded by fire barriers rated at	2 hour	|N/ole
Except	3-hour against hot machine shop	|N/ole

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression		
			Primary	Backup	Primary	Backup	
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Area Wide Ionization	Manual Pulls (at EXITs)	Hose Racks	ABC Fire Extinguishers	|N/ole

Anticipated combustible load, MJ/m^2	<700	|N/ole
Non-sprinkled combustible load limit, MJ/m^2	700	

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8186
Description	Elevator
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-205, 9A.2-206
Applicable Codes	IBC; Reg Guide 1.189; NFPA 10, 12, 13, 14, 72, 75, 101, 804; ASME A17.1
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	3-hour wall against machine shops 2 hours for stairwells and elevator shaft
Except	

N/ole

N/ole

N/ole

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Electrical Equipment Class III B Lubricant	Area Wide Ionization	Manual Pulls (at EXITs)	CO_2 Fire Extinguishers ABC Fire Extinguishers (outside elevator at each floor)	Hose Rack

N/ole

Anticipated combustible load, MJ/m^2	<700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

N/ole

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8187
Description	HVAC Equipment Room
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-205, 9A.2-206
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	B
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	1-hour
Except	Exterior Walls

Consisting of the following rooms:

			Fire Detection		Fire Suppression	
Elevation	Room #	Potential Combustibles	Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation	Smoke	Manual Pulls (at EXITs)	Wet-Pipe Sprinklers LATER L/min per m^2	Fire Extinguishers Yard Hydrants

Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8188
Description	Elevator Maintenance Access
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-205, 9A.2-206
Applicable Codes	IBC; Reg Guide 1.189; NFPA 10, 14, 72, 101, 804; ASME A17.1
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	2 hours
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Electrical Equipment Class IIIB Lubricants	Area Wide Ionization	Manual Pulls (at EXITs)	CO_2 Fire Extinguisher	ABC Fire Extinguishers Yard Hydrants

Anticipated combustible load, MJ/m^2	<700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8189
Description	Mechanics Work Area
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-206
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	3 hour
Except	Exterior Walls (non-rated)

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Flammable Solvents Oil	Manual Pulls (at EXITs)	None	Hose Racks	Fire Extinguishers Yard Hydrants

Anticipated combustible load, MJ/m^2	< 700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

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NAPS COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

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Fire Area	F8200
Description	Cooling Tower Maintenance Building
Building	Cooling Tower Maintenance Building
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	LATER	Manual Pulls (at EXITs)	None	LATER	LATER

Anticipated combustible load, MJ/m^2	LATER
Non-sprinkled combustible load limit, MJ/m^2	LATER

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	To be determined during detailed design
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Nlole

Fire Area	F8201
Description	Hybrid Cooling Tower Electrical Building
Building	Hybrid Cooling Tower Electrical Building
Fire Zone Dwg	9A.2-33R
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	F-1
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	N/A
Except	

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Electrical Equipment	Area Wide Ionization	Manual Pulls	CO_2 Fire Extinguishers	Hose Racks

Anticipated combustible load, MJ/m^2	< 1400
Non-sprinkled combustible load limit, MJ/m^2	1400

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment.

NAPS
COL 9A.7-2-A

Table 9A.5-7R Yard (continued)

Fire Area	F8283
Description	Office Area (Second Floor)
Building	Hot Machine Shop
Fire Zone Dwg	9A.2-205
Applicable Codes	IBC; Reg Guide 1.189; NFPA 15, 45, 72, 75, 804
Building code occupancy classification	B
Electrical classification	N/A
Safety-related divisional equipment or cables	N/A
Non-safety-related redundant trains or equipment or cables	N/A
Surrounded by fire barriers rated at	3-hour
Except	Stairwell/Elevator 2 hour Elevator Door 1.5 hour

Consisting of the following rooms:

Elevation	Room #	Potential Combustibles	Fire Detection		Fire Suppression	
			Primary	Backup	Primary	Backup
To be determined during detailed design	To be determined during detailed design	Cable Insulation Office Supplies	Smoke	Manual Pulls (at EXITs)	Wet-Pipe Sprinklers LATER L/min per m^2	Fire Extinguishers

Anticipated combustible load, MJ/m^2	>700
Non-sprinkled combustible load limit, MJ/m^2	700

Assuming operation of fire suppression systems, effect of fire upon:

Plant operation	None
Radiological release	None, no radiological materials present
Life safety	To be determined during detailed design
Manual firefighting	To be determined during detailed design
Property loss	To be determined during detailed design

Assuming all fire suppression systems inoperable, effect of design basis fire on safe shutdown:

Complete burnout of all equipment and cables within this fire area affects no safety-related or safe shutdown divisional equipment; all safety divisions and both on-site and off-site Power Supplies A and B are unaffected by fire and are operable.

| N1ole
| N1ole
| N1ole
| N1ole
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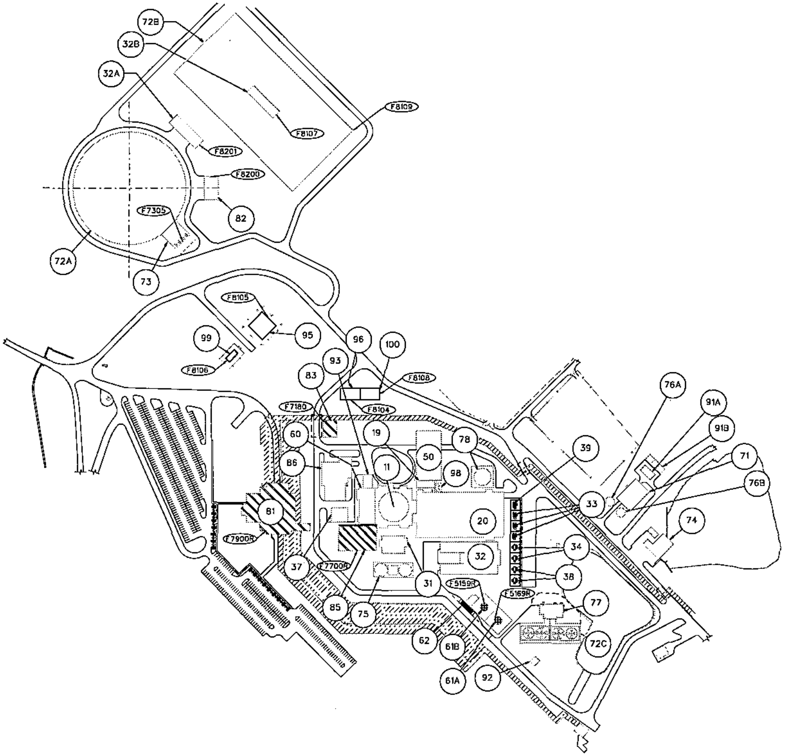
- For Information Only -

NAPS COL 9A.7-1-A

Figure 9A.2-33R Site Fire Protection Zone ESBWR Plot Plan

N/01f

N/01a



LEGEND

11.	REACTOR BUILDING
19.	AUXILIARY BOILER
20.	TURBINE BUILDING
31.	CONTROL BUILDING
32.	ELECTRICAL BUILDING / TECH SUPPORT CENTER
32A.	HYBRID COOLING TOWER ELECTRICAL BUILDING
32B.	DRY COOLING TOWER ELECTRICAL BUILDING
33.	MAIN TRANSFORMERS
34.	AUX. TRANSFORMERS
37.	ANCILLARY DIESEL BUILDING
38.	RESERVE AUX TRANSFORMER
39.	SPARE TRANSFORMER
50.	RADWASTE BUILDING
60.	FUEL BUILDING
61A.	DIESEL TANK A
61B.	DIESEL TANK B
62.	DIESEL FUEL OIL TRANSFER/FOAM HOUSE
71.	WATER TREATMENT BUILDING
72A.	HYBRID COOLING TOWER
72B.	DRY COOLING TOWER
72C.	SERVICE WATER COOLING TOWER
73.	CIRCULATING WATER PUMP HOUSE
74.	STATION WATER INTAKE BUILDING
75.	FIRE WATER TANKS AND PUMPS
76A.	DEMINERALIZED WATER STORAGE TANK
76B.	STATION WATER STORAGE TANK
77.	SERVICE WATER BUILDING
78.	CONDENSATE STORAGE TANK
81.	ADMINISTRATION BUILDING
82.	COOLING TOWER MAINTENANCE BUILDING
83.	GUARD HOUSE
85.	SERVICE BUILDING
86.	HOT MACHINE SHOP
91A.	SEWAGE TREATMENT PLANT (STP)
91B.	DRYING BEDS
92.	BLOWDOWN SUMP
93.	WASH DOWN BAYS
95.	HYDROGEN STORAGE AREA
96.	NITROGEN STORAGE AREA
98.	DIRTY / CLEAN LUBE OIL STORAGE TANKS
99.	OXYGEN STORAGE AREA
100.	CO2 STORAGE AREA

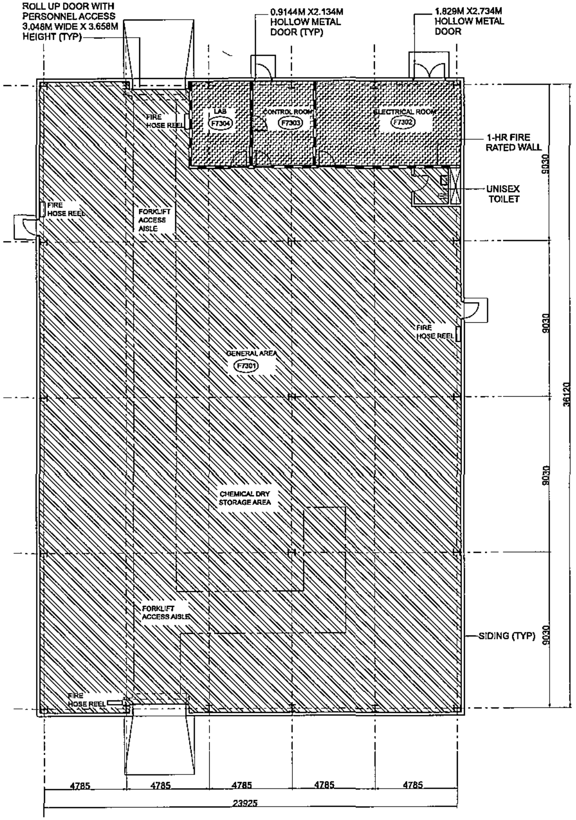
NOTES:

1. THE FOLLOWING SYMBOLS ARE USED ON THIS DRAWING:
   - ▬ 3-HR RATED FIRE BARRIER WALL.
   - (XXXX) FIRE AREA DESIGNATION.
   - ▧ WET-PIPE SPRINKLER COVERAGE.
   - ▦ FOAM WATER DELUGE COVERAGE.
2. FOR BUILDINGS NOT SHOWN WITH FIRE AREA DESIGNATIONS, REFER TO INDIVDUAL BUILDING FIRE ZONE DRAWINGS.

- For Information Only -

STD COL 9A.7-1-A

Figure 9A.2-201 Fire Zones - Water Treatment Building



NOTES:

1. THE FOLLOWING SYMBOLS ARE USED ON THIS DRAWING:

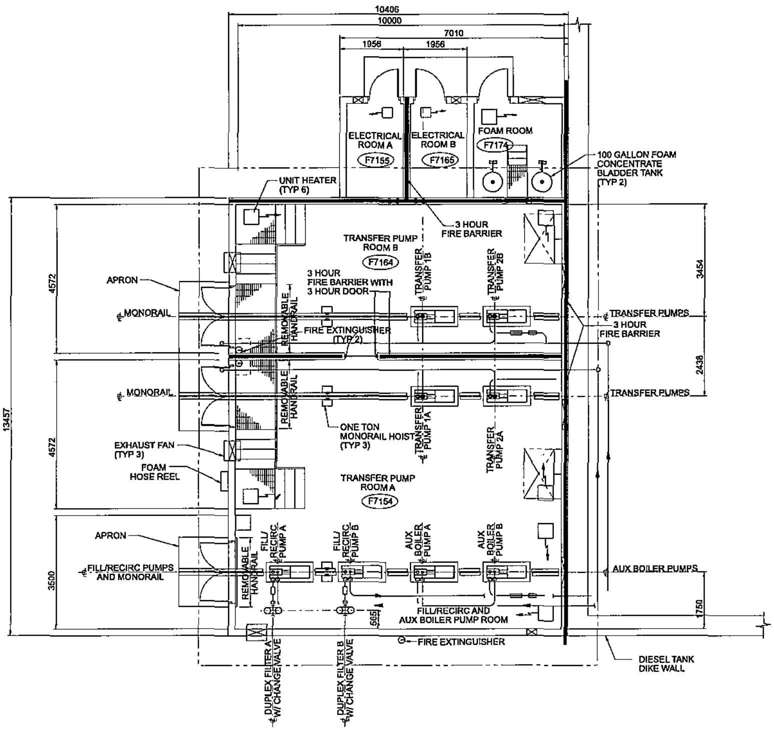
▨	PRE-ACTION SPRINKLER COVERAGE
▧	WET-PIPE SPRINKLER COVERAGE
▦	GRATING
━	1- HR RATED FIRE BARRIER (WALL)
⬭	FIRE AREA DESIGNATION
◸	FIRE RATED DOOR

2. BACKGROUND GENERAL ARRANGEMENT INFORMATION IS FOR REFERNCE ONLY.

N101 f

N101 a

STD COL 9A.7-1-A **Figure 9A.2-202 Fire Zones - Diesel Fuel Oil Transfer/Foam House**



NOTES:

1. THE FOLLOWING SYMBOLS ARE USED ON THIS DRAWING:

▨ GRATING
1- HR RATED FIRE BARRIER (WALL)
2- HR RATED FIRE BARRIER (WALL)
3- HR RATED FIRE BARRIER (WALL)
FIRE RATED DOOR
(FXXXX) FIRE AREA DESIGNATION

2. BACKGROUND GENERAL ARRANGEMENT INFORMATION IS FOR REFERNCE ONLY.

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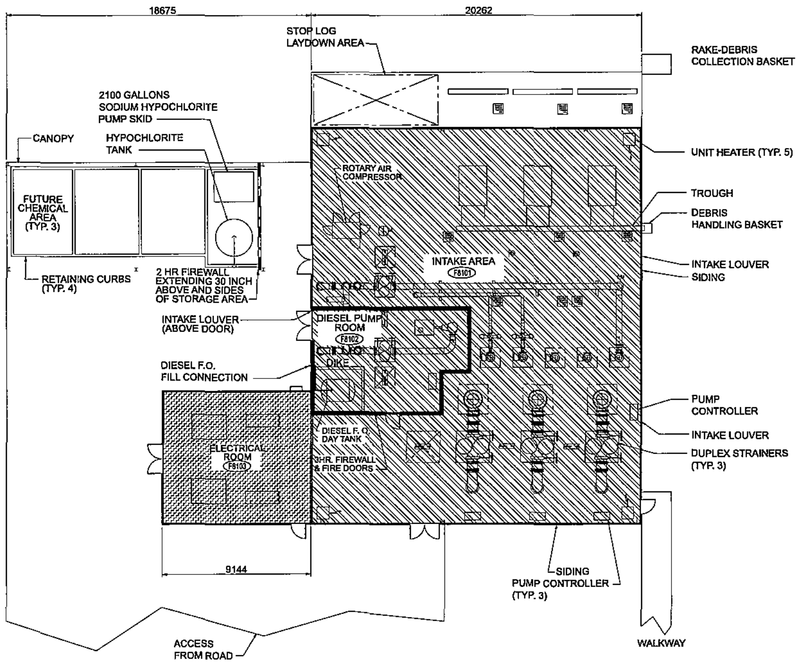
N101a

STD COL 9A.7-1-A Figure 9A.2-203 Fire Zones - Station Water Intake Building



NOTES:

1. THE FOLLOWING SYMBOLS ARE USED ON THIS DRAWING:
   - ▨ PRE-ACTION SPRINKLER COVERAGE
   - ▧ WET-PIPE SPRINKLER COVERAGE
   - ▦ GRATING
   - ━ ━ 2- HR RATED FIRE BARRIER (WALL)
   - ━━ 3- HR RATED FIRE BARRIER (WALL)
   - ⊾ FIRE RATED DOOR
   - (FXXXX) FIRE ZONE NUMBER
2. BACKGROUND GENERAL ARRANGEMENT INFORMATION IS FOR REFERNCE ONLY.

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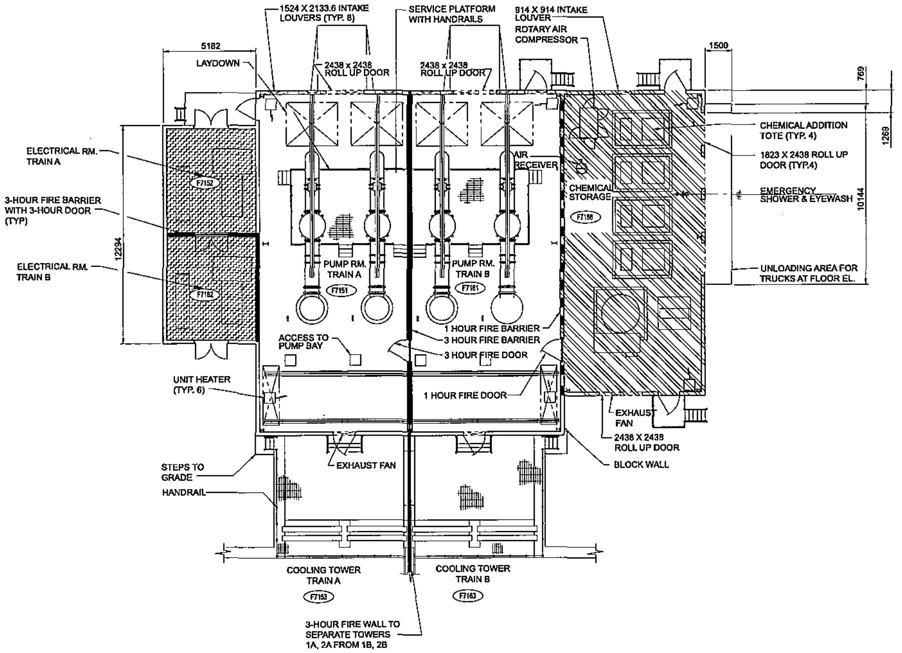
N101a

- For Information Only -

STD COL 9A.7-1-A



NOTES:

1. THE FOLLOWING SYMBOLS ARE USED ON THIS DRAWING:

▨ PRE-ACTION SPRINKLER COVERAGE
▨ WET-PIPE SPRINKLER COVERAGE
▤ GRATING
▬ 1- HR RATED FIRE BARRIER (WALL)
▬ 3- HR RATED FIRE BARRIER (WALL)
⌂ FIRE RATED DOOR
(FXXXX) FIRE ZONE NUMBER

2. BACKGROUND GENERAL ARRANGEMENT INFORMATION IS FOR REFERNCE ONLY.

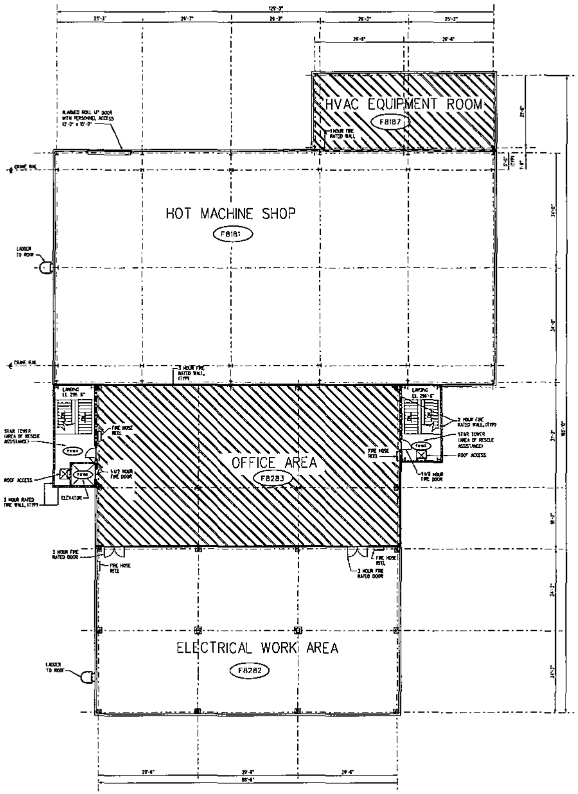
Figure 9A.2-204 Fire Zones - Service Water Building

N/01 f

N/01 a

STD COL 9A.7-1-A

Figure 9A.2-205 Fire Zones - Hot Machine Shop Second Floor



NOTES:

1. THE FOLLOWING SYMBOLS ARE USED ON THIS DRAWING:
   - ▨ WET-PIPE SPRINKLER COVERAGE
   - ▬ GRATING
   - — 1- HR RATED FIRE BARRIER (WALL)
   - — 2- HR RATED FIRE BARRIER (WALL)
   - — 3- HR RATED FIRE BARRIER (WALL)
   - ⬭ FIRE AREA DESIGNATION
   - ⌐ FIRE RATED DOOR
2. BACKGROUND GENERAL ARRANGEMENT INFORMATION IS FOR REFERNCE ONLY.

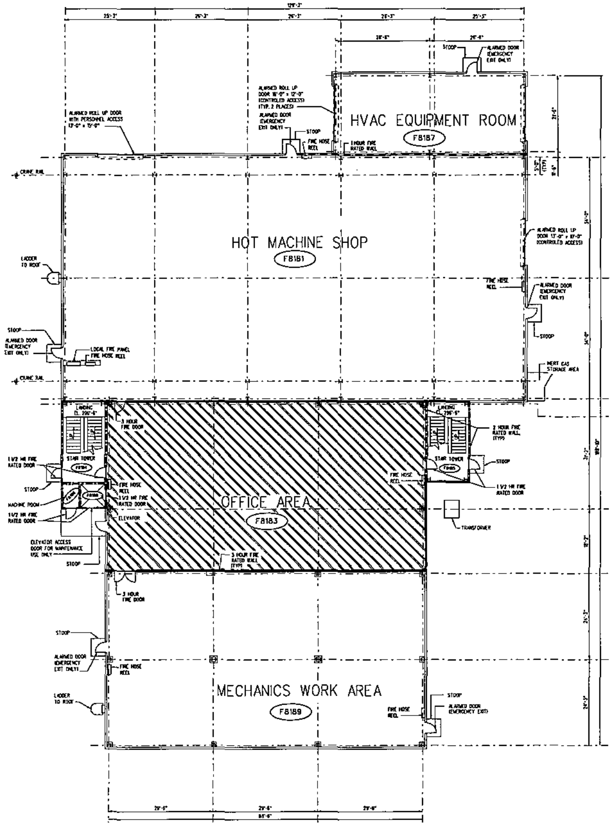
N/01f

N/01a

- For Information Only -

STD COL 9A.7-1-A

Figure 9A.2-206 Fire Zones - Hot Machine Shop First Floor



NOTES:

1. THE FOLLOWING SYMBOLS ARE USED ON THIS DRAWING:

▨ WET-PIPE SPRINKLER COVERAGE

▤ GRATING

— 1- HR RATED FIRE BARRIER (WALL)

— 2- HR RATED FIRE BARRIER (WALL)

— 3- HR RATED FIRE BARRIER (WALL)

⬭ FIRE AREA DESIGNATION

FIRE RATED DOOR

2. BACKGROUND GENERAL ARRANGEMENT INFORMATION IS FOR REFERNCE ONLY.

N101f

N101a

Appendix 9B Summary of Analysis Supporting Fire Protection Design Requirements

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

Chapter 10 Steam and Power Conversion System

10.1 Summary Description

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

10.2 Turbine Generator

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

10.2.3.4 Turbine Design

Add the following at the beginning of this section. S039

STD SUP 10.2-1 The General Electric Company manufactures the turbine and generator. The model N3R-6F52 turbine is from General Electric's N series nuclear steam turbines. S111

10.2.3.6 Inservice Maintenance and Inspection of Turbine Rotors S039

Replace the last paragraph with the following. S039

STD COL 10.2-1-A The turbine maintenance and inspection program that supports the Original Equipment Manufacturer's turbine missile generation probability calculation is described in DCD Sections 10.2.2.7, 10.2.3.5, 10.2.3.6, and 10.2.3.7. The associated turbine maintenance and inspection frequencies will be established upon completion of the bounding missile probability analysis. This analysis will be completed in the second quarter of 2009 and the FSAR will be revised to incorporate the maintenance and inspection frequencies as part of a subsequent FSAR update. S039

10.2.3.8 Turbine Missile Probability Analysis

Replace the last paragraph with the following.

STD COL 10.2-2-A The probability of turbine missile generation will be calculated based on bounding material property values until actual material test specimens are available for testing. The bounding analysis will be completed in the second quarter of 2009 and the FSAR will be revised to reflect this analysis as part of a subsequent FSAR update. S039

10.2.5 COL Information

10.2-1-A Turbine Maintenance and Inspection Program S039

STD COL 10.2-1-A

This COL Item is addressed in Section 10.2.3.6

S039

10.2-2-A Turbine Missile Probability Analysis

STD COL 10.2-2-A

This COL Item is addressed in Section 10.2.3.8. S039

10.3 Turbine Main Steam System

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

10.4 Other Features of Steam and Power Conversion System

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

10.4.5.2.1 General Description

Replace the text with the following.

NAPS CDI

The CIRC is depicted in Figures 10.4-201 through 10.4-203. The CIRC consists of the following components:

- Condenser water boxes, piping, and valves
- Condenser tube cleaning equipment
- Water box drain subsystem
- Four 25 percent capacity pumps and pump discharge valves
- A removable assembly of coarse and fine screens that separate the pump forebay (suction) from the hybrid cooling tower basin
- An array of dry, mechanical draft cooling tower cells arranged in banks
- One combination (hybrid) wet/dry, mechanical draft cooling tower

Table 10.4-3R includes the temperature range of the water delivered by the CIRC pumps to the main condenser.

The CIRC water is normally circulated by four motor-driven pumps through the condenser and back to the cooling towers. Depending on ambient conditions, system configuration, and heat load, one CIRC pump may be taken out of operation with the flow of the remaining three CIRC pumps providing sufficient water for condenser heat removal.

The four pumps are arranged in parallel. Discharge lines combine into two parallel main circulating water supply lines to the main condenser. Each main circulating water supply line connects to a low pressure condenser inlet water box.

Two interconnecting lines are provided between the two main circulating water supply lines. The first interconnecting line is located near the discharge of the circulating water pumps and is used for flow balancing. The second interconnecting line is near the location where the CIRC pipes enter the turbine building and is used as a blowdown point. A motor operated isolation valve is provided on the flow balancing line. Two motor operated valves are located on the blowdown cross-connect line, one on either side of the blowdown line. These valves allow operation of the CIRC with one main circulating water supply line out of service.

The discharge of each pump is fitted with a remotely operated valve. This arrangement permits isolation and maintenance of any one pump while the others remain in operation and minimizes the backward flow through an out-of-service pump.

The CIRC and condenser are designed to permit isolation of half of the three series connected tube bundles to permit repair of leaks and cleaning of water boxes while operating at reduced power.

The CIRC includes water box vents to help fill the condenser water boxes during startup and remove accumulated air and other gases from the water boxes during normal operation.

The CIRC system incorporates design provisions that minimize the effect of hydraulic transients upon the functional capability and the integrity of the system components. These design features include slow-stroke motor-operated valves (MOVs), air release valves to fill and keep the system full, vacuum release valves that minimize pressure transients, valve control and interlock features that ensure correct valve line-up prior to pump start, and discharge isolation valves that open and close with pump start and stop signals. 10.04.05-1

Circulating water chemistry is maintained by the Chemical Storage and Transfer System and with blowdown. Circulating water chemical equipment injects the required chemicals into the circulating water pump bay before entering the circulating water pumps.

10.4.5.2.2 Component Description

Replace the last paragraph with the following. | ①

NAPS CDI Table 10.4-3R provides reference parameters for the major components of the CIRC. | ①

10.4.5.2.2.1 CIRC Chemical Injection

Circulating water chemistry is maintained by the Chemical Storage and Transfer System. Chemical feed equipment injects the required chemicals into the circulating water at the pump bay before water enters the circulating water pumps.

Chemical injection maintains a non-corrosive, non-scale-forming condition and limits the biological film formation that reduces the heat transfer rate in the condenser and cooling towers.

Plant chemistry specifies the required chemicals used within the system. The chemicals can be divided into five categories based upon function: biocide, algaecide, pH adjuster, corrosion inhibitor, and scale inhibitor. The pH adjuster, corrosion inhibitor, and scale inhibitor are metered into the system continuously or as required to maintain proper concentrations. Biocide application frequency may vary with seasons. Algaecide is applied, as necessary, to control algae formation in the cooling towers. Chemicals that are injected in the CIRC include sodium hypochlorite, acid, bromide, dispersants, and non-oxidizing biocides.

Circulating water chemistry is also controlled as required with blowdown.

Chemicals selected are compatible with selected materials or components used in the CIRC.

10.4.5.2.3 System Operation

Add the following at the end of this section.

NAPS CDI The four circulating water pumps take suction from the pump forebay and circulate the water through the main condenser. Circulating water returns through the condenser discharge to the cooling towers. The operating configuration of the cooling towers and CIRC is modified depending on desired configuration, heat load, and ambient conditions.

Circulating water discharged from the condenser first passes through the dry cooling tower arrays where sensible heat is removed. The water then

① 10.04.05-1

passes through the dry section of the hybrid tower, where additional sensible heat is removed prior to entering the wet section of the hybrid tower. In the wet section, the water is distributed through nozzles in the hybrid cooling tower's distribution headers. The water then falls through film-type fill material to the basin beneath the tower. In the process, the water rejects additional heat to the atmosphere through direct contact with the air and evaporation of a small amount of water.

Provisions are made to vary the operation of the CIRC and cooling towers during specific ambient conditions such as hot and cold weather and in response to specific environmental conditions such as periods of low water level in Lake Anna. Various configurations are utilized where select mechanical draft fans are started, operated at reduced speed, or stopped, select portions or all of the NPHS is bypassed, and condenser halves are isolated. These alternate and transitional configurations are utilized to provide benefits such as freeze protection, water conservation, energy conservation, plume minimization, and isolation of portions of the CIRC and other systems for maintenance.

Selected components may be taken out of service during power operation. These alternate configurations normally change plant thermal performance. In some configurations, reactor power reduction may be required to avoid a turbine trip on decreasing condenser vacuum.

The SWS supplies makeup water to the circulating water pump forebay to replace water losses due to evaporation, drift, and blowdown. Blowdown from the CIRC is taken from the cross-connect near the turbine building. The blowdown flow is discharged to the plant discharge canal at a maximum of 37.8°C (100°F).

A condenser tube cleaning subsystem cleans the circulating water side of the main condenser tubes.

Leakage of condensate from the main condenser into the CIRC via a condenser tube leak is not likely during power operation, since the CIRC normally operates at a greater pressure than the shell (condensate) side of the condenser. Analysis of routine CIRC cooling tower grab samples will detect events that could lead to unmonitored, uncontrolled radioactive releases to the environment. This provides the action required by NRC Inspection and Enforcement Bulletin No. 80-10.

11.05-2

10.4.5.5 Instrumentation Applications

Insert the following between the fourth and fifth paragraphs.

NAPS CDI

Level instrumentation provided in the circulating water pump forebay controls makeup flow from the SWS to the pump forebay via the N-DCIS. Level instrumentation in the pump forebay initiates alarms in the main control room on abnormally low or high water level.

Pressure indication is provided on the circulating water pump discharge. Differential pressure instrumentation is provided across the inlet and outlet to the condenser and is used to determine the frequency of operating the condenser tube cleaning system.

Local grab samples are used to periodically test the circulating water quality.

Replace the last paragraph with the following.

The temperature in each condenser cooling water supply line is indicated in the MCR. Based on these indications, warm water recirculation is controlled to maintain a minimum inlet temperature of approximately 0°C (32°F).

N097

10.4.5.6 Flood Protection

①②

Add the following at the end of this section.

①

NAPS CDI

Failure of a pipe or component in the CIRC hybrid cooling tower or elsewhere in CIRC in the yard would not have an adverse impact on the intended design functions of safety-related SSCs.

For the hybrid cooling tower, the largest components are the two vertical large-bore CIRC pipes that connect to the hybrid cooling tower's distribution headers. It is conservatively assumed that these large CIRC underground pipes surface outside the confines of the hybrid cooling tower basin.

①
②

A postulated rupture of one of these pipes would result in water flow in the area of the yard with the cooling towers. The yard in this area slopes to the west. Water discharged from such a break would flow down to the drainage ditch along the west side of the cooling tower area and drain away from Unit 3 toward Lake Anna.

① 10.04.05-2
② S089

Depending on the size and orientation of the break, some discharging water may flow eastward toward a drainage ditch along the east side of the cooling tower area or toward the access road leading to Unit 3. Water reaching the access road would flow into the ditches along the plant access road. The flow-rate in the ditches past the power block area would be less than that considered for the local PMP event. Therefore, safety-related SSCs would not be subjected to flooding as a result of a failure of the largest hybrid cooling tower component.

The failure of this vertical large-bore CIRC pipe bounds other failures of piping and components in the CIRC. The remainder of the system is either underground or has a smaller diameter. Failures of these underground and smaller diameter components would have lower flow-rates than a postulated failure of a vertical, above-ground, large-bore CIRC pipe. Also, flow from such failures would be either in the cooling tower area or toward the plant access road ditches and to either the storm water basin or the make-up water intake area. ①

Failure of the CIRC hybrid cooling tower basin has also been considered. Because the basin is an in-ground structure, the maximum water level elevation in the hybrid cooling tower basin is lower than the elevations of the surrounding areas. This design and the selected location ensure that failure of the basin results in no water discharge to the surface. However, should any discharge occur, the water would flow toward the lake rather than toward the plant.

10.4.5.8 Normal Power Heat Sink

Replace the text with the following.

NAPS CDI

The cooling tower arrangement includes a dry cooling tower array and a round, wet/dry (hybrid) cooling tower that may operate independently or in series. The towers may be bypassed or partially or fully utilized as required, depending on desired operating configuration, heat load, and ambient conditions.

The dry tower array is arranged in rectangular banks of multiple cells. Each cell includes air cooled heat exchange surfaces, a motor-driven mechanical draft fan, and inlet and outlet isolation valves. The round, hybrid cooling tower includes a dry upper section and a wet lower section. Both the wet and dry sections of the hybrid tower include mechanical draft fans to provide air flow. The combination of dry and

① 10.04.05-2

hybrid cooling tower arrangements supports a condenser maximum cold water temperature of 35°C (100°F).

Both the dry and hybrid cooling towers are located at least a distance equal to their height away from any seismic Category 1 or 2 structures. Thus, if there were any structural failure of the cooling towers, no Seismic Category 1 or 2 structures or any safety-related systems or components would be affected or damaged.

Both the dry and hybrid cooling towers have multiple fans with associated motors, couplings, and gearboxes. The fans rotate at relatively slow speeds and the fan blades are made of relatively low-density material. A failure of a fan could result in the generation of missiles. However, due to the site arrangement and construction of the respective towers, any damage would be confined to the cooling towers. Therefore, there would be no damage to any Seismic Category 1 or 2 structures or any safety-related systems or components.

10.4.6.3 Evaluation

Replace the second sentence in the third paragraph with the following.

STD COL 10.4-1-A A table summarizing the manufacturer's recommended threshold values of key chemistry parameters and associated operator actions is provided as Table 10.4-201.

10.4.10 COL Information

10.4-1-A Leakage (of Circulating Water Into the Condenser)

STD COL 10.4-1-A This COL Item is addressed in Section 10.4.6.3.

STD COL 10.4-1-A

Table 10.4-201 Recommended Water Quality and Action Levels

Reactor Water Quality-Power Operation

	Action Levels			
Control Parameter	0	1	2	3
Conductivity, µS/cm at 25°C*	≤ 0.100	> 0.300	> 1	≥ 2
Chloride, ppb	≤ 0.3	> 5	> 50	≥ 200
Silica, ppb	≤ 200	> 500	N/A	N/A
Sulfate, ppb	≤ 2	> 5	> 50	≥ 200

IS043

Feedwater Quality—Power Operation***

	Action Levels		
Control Parameter	0	1	2
Conductivity, µS/cm at 25°C**	< 0.057	> 0.065	> 0.100
Dissolved Oxygen, ppb as O_2**	30-50	< 20 or > 200	N/A

IS043

* Value depends on Hydrogen Water Chemistry System operation
** Applicable when Reactor Power >10%
*** Also Condensate Purification System Effluent

Action Level 0:	Target Value. The parameter may be outside the Action Level 0 value and not in Action Level 1, 2, or 3. In this case, efforts should be made to return the parameter to the Action Level 0 value.
Action Level 1:	Lowest Severity. The parameter should be brought below this value within 96 hours. A technical review should be performed to determine the appropriate response.
Action Level 2:	Moderate Severity. If the parameter is not reduced below this level within 24 hours, an orderly shutdown should be initiated.
Action Level 3:	Highest Severity. If the parameter is not reduced below this level within 6 hours, an orderly shutdown should be initiated.

NAPS CDI

Table 10.4-3R Circulating Water System

Parameter	Value
Circulating Water Pumps	
Number of pumps	4
Pump type	Vertical, wet pit, turbine
Unit flow capacity**, m^3/hr (gpm)	Approx. 38,500 (169,600)
Driver Type	Electric motor
Normal Power Heat Sink	
Normal Heat Removal Duty @35°C (95°F) CIRC Supply Temperature, MW (BTU/hr)	2930 (1.00×10^{10})
Dry Cooling Tower Array	
Array Length*, m (ft)	223 (731)
Array Width*, m (ft)	114 (375)
Array Height*, m (ft)	20 (65)
Wet/Dry (Hybrid) Cooling Tower	
Outside Base Diameter*, m (ft)	150 (492)
Height*, m (ft)	55 (180)
Operating Temperatures	
Temperature range of water delivered to the main condenser, °C (°F)	0*** to 37.8 (32 to 100)
CIRC temperature for rated turbine performance, °C (°F)	30 (86)
Maximum CIRC temperature to accommodate the bypass flow resulting from a turbine trip, 100% load reject, or island mode, in conjunction with the power reduction resulting from SRI/SCRRI function, °C (°F)	35.6 (96)

S075

* Cooling tower dimensions and specifications are approximate.

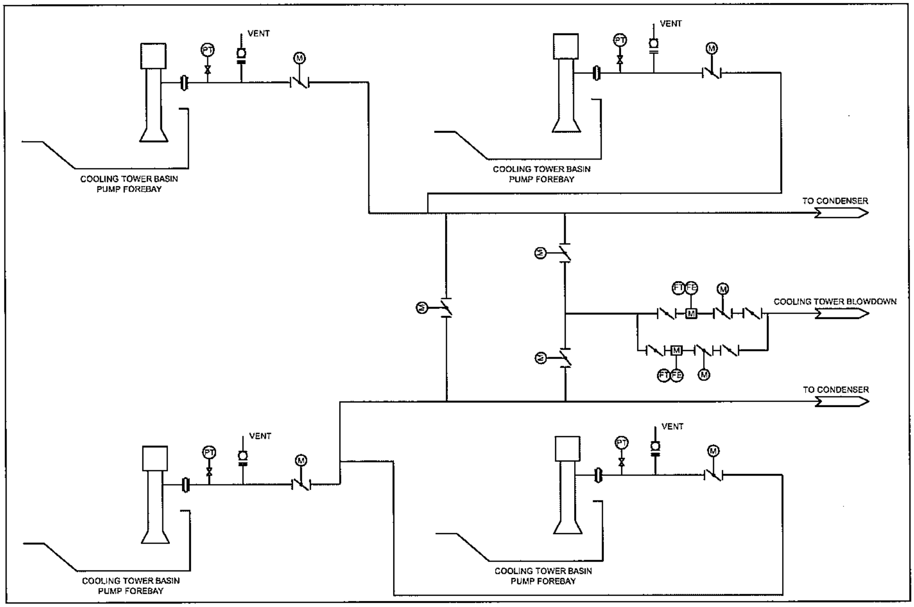
** This capacity is for condenser cooling and blowdown at design temperature of 37.8°C (100°F).

*** If the Normal Power Heat Sink does not maintain temperatures above the minimum temperature, then the minimum temperature is maintained by warm water recirculation and cooling tower bypass.

NAPS CDI

Figure 10.4-201 Circulating Water Pumps

15017



NAPS CDI

Figure 10.4-202 Dry Cooling Tower Array

1S017

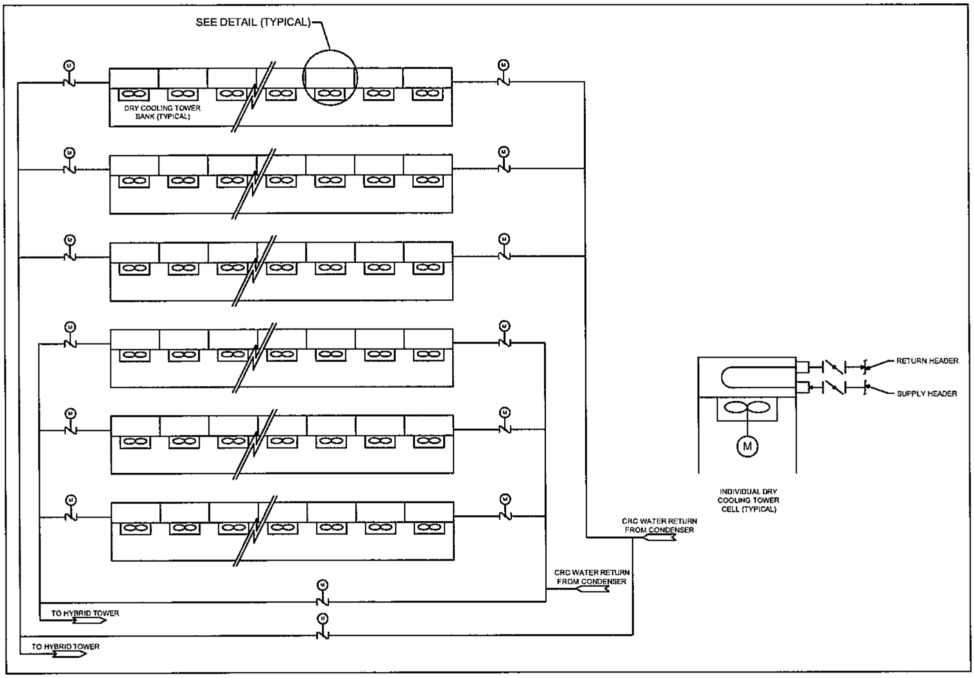
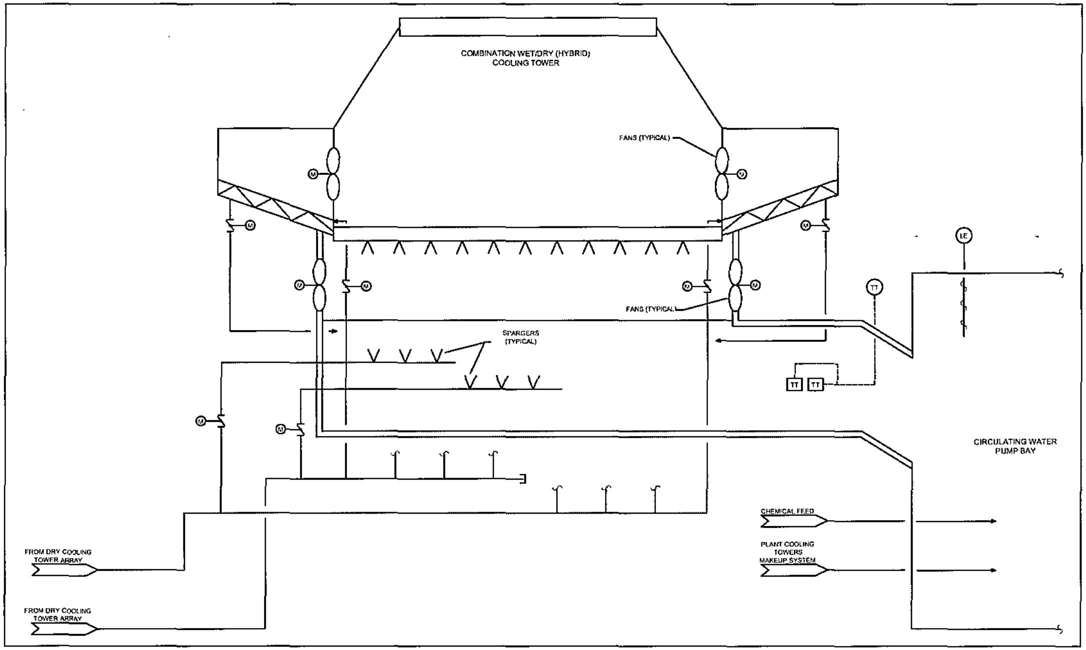


Figure 10.4-203 Hybrid Cooling Tower

1①



① S017

Chapter 11 Radioactive Waste Management

11.1 Source Terms

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

11.2 Liquid Waste Management System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements. 15029

11.2.1 Design Basis

Safety Design Bases

Add the following at the end of this section.

NAPS SUP 11.2-1 RG 1.110 methodology was applied to satisfy the cost-benefit analysis requirements of 10 CFR 50, Appendix I, Section II.D, for the system augments compatible with BWR plant design features. Cost parameters used to calculate the Total Annual Cost (TAC) for each applicable radwaste treatment system augment listed in RG 1.110 are taken without exception from RG 1.110, Appendix A. These costs are Annual Operating Cost (AOC) (Table A-2), Annual Maintenance Cost (AMC) (Table A-3), 11.02-1 Direct Cost of Equipment and Materials (DCEM) (Table A-1), and Direct Labor Cost (DLC) (Table A-1). 11.03-2 Other cost parameters used to determine TAC are as follows:

- Capital Recovery Factor (CRF) - Obtained from RG 1.110, Table A-6, this factor reflects the cost of money for capital expenditures. A cost-of-money value of 7 percent per year is assumed in this analysis, consistent with "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs" (OMB Circular A-94) (Reference 11.2-202). Based on a 30-year service life, Table A-6 gives a CRF of 0.0806.
- Indirect Cost Factor (ICF) - Obtained from RG 1.110, Table A-5, this factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site). Because this is a single ESBWR unit site, this analysis is for a single unit, which gives an ICF of 1.75.

- Labor Cost Correction Factor (LCCF) - Obtained from RG 1.110, Table A-4, this factor takes into account the relative labor cost differences among geographical regions. A factor of 1 (the lowest value) is assumed in this analysis.

A value of $1,000 per person-rem is prescribed in 10 CFR 50, Appendix I.

If it is conservatively assumed that each radwaste treatment system augment is a "perfect" technology that reduces the effluent dose by 100 percent, the annual cost of the augment can be determined and the lowest annual cost can be considered a threshold value. The lowest-cost option for augments is a 20 gpm cartridge filter at $11,380 per year, which yields a threshold value of 11.38 person-rem whole body or thyroid dose from liquid effluents. 11.02-1

The total body and thyroid doses to the population for the liquid effluents from Unit 3 are given in Section 12.2.2.4.2. None of the augments provided in RG 1.110 is found to be cost beneficial in reducing the annual population doses of 1.0 person-rem total body and 0.69 person-rem thyroid.

The lowest cost liquid radwaste augment is $11,380/year. Implementing this augment would cost $11,380 per person-rem in total body dose reduction, which exceeds the $1,000 per total body person-rem criterion prescribed in 10 CFR 50, Appendix I. Also, implementing this augment would cost $16,500 per person-rem in thyroid dose reduction which exceeds the $1,000 per person-thyroid-rem criterion prescribed in 10 CFR 50, Appendix I. Therefore, even this lowest-cost augment is not cost beneficial.

11.2.2.3 Detailed System Component Description

11.2.2.3.3 Processing Systems

Replace the first two paragraphs with the following. 15049

STD COL 11.2-1-A Specific equipment connection configuration and plant sampling procedures are used to implement the guidance in Inspection and Enforcement (IE) Bulletin 80-10 (DCD Reference 11.2-10). The permanent and mobile/portable non-radioactive systems, which are connected to radioactive or potentially radioactive portions of process LWMS, are protected from contamination with an arrangement of double 15029 check valves in each line. The configuration of each line is also equipped with a tell-tale connection, which permits periodic checks to confirm the integrity of the line and its check valve arrangement. Plant procedures describe sampling of non-radioactive systems that could become contaminated by cross-connection with systems that contain radioactive material. In accordance with the guidance in RG 1.109, exposure pathways that may arise due to unique conditions are considered for incorporation into the plant-specific ODCM if they are likely to contribute significantly to the total dose. 11.02-2

STD COL 11.2-2-A Section 12.6 discusses how ESBWR design features and procedures for operation will minimize contamination of the facility and environment, facilitate decommissioning, and minimize the generation of radioactive wastes, in compliance with 10 CFR 20.1406. Section 13.5 describes the requirement for procedures for operation of radioactive waste processing system. Operating procedures for LWMS process systems required by Section 12.4, Section 12.5, and Section 13.5 address the requirements of 10 CFR 20.1406. S029

11.2.6 COL Information

11.2-1-A Implementation of IE Bulletin 80-10

STD COL 11.2-1-A This COL item is addressed in Section 11.2.2.3.

11.2-2-A Implementation of Part 20.1406

STD COL 11.2-2-A This COL item is addressed in Section 11.2.2.3.

11.2.7 References

11.2-201 [Deleted] 11.02-1

11.2-202 OMB Circular A-94, “Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs,” October 29, 1992, Office of Management and Budget. 11.02-1

11.3 Gaseous Waste Management System

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

11.3.1 Design Basis

Add the following at the end of this section. 11.03-0

NAPS ESP COL 11.1-1 The methodology for performing cost-benefit analysis for the radwaste system is presented in Section 11.2.1.

The annual costs for augments for the gaseous radwaste treatment system were determined and the lowest annual cost was considered a threshold value. The lowest-cost option for a gaseous radwaste treatment system augment that applies to BWRs is the 1000 cfm Charcoal/HEPA Filtration System at $7,960 per year, which yields a threshold value of 7.96 person-rem whole body or thyroid from gaseous effluents for BWRs. 11.03-0

As shown in Table 12.2-204, the Unit 3 annual whole body dose from gaseous effluents is 7.7 person-rem/yr, which is below the 7.96 person-rem/yr threshold value. Based on this comparison, no gaseous radwaste treatment system augment is cost-beneficial in reducing annual whole body dose and the cost-benefit analysis demonstrates compliance with 10 CFR 50, Appendix I, Section II.D, for this type of dose. 11.03-0 11.03-0

As shown in the table below, the Unit 3 thyroid dose from gaseous effluents is 28 person-rem/yr, which exceeds the 7.96 person-rem/yr threshold value for a BWR. Because the Unit 3 estimate exceeds this threshold value, further analysis is provided below. 11.03-0

Source	Thyroid Dose (person-rem/year)	% of Total	
Iodines	20	72.9	11.03-0
Particulates	0.65	2.3	11.03-0
Noble gases	1.5	5.4	11.03-0
C-14	5.1	18.6	11.03-0
H-3	0.20	0.7	11.03-0
Total	28	100.0	11.03-0

The cost-benefit analysis described in Section 11.2.1 is based on RG 1.110, which provides the gaseous radwaste augments applicable to a BWR to be considered for Unit 3. Based on the estimated 28 person-rem/year thyroid dose, those augments with a TAC less than 11.03-0 11.03-2 11.03-2

$28,000 are considered below. In some cases, the system augments less 11.03-2 than $28,000 per year have insufficient capacity. System augments with greater capacities were considered but eliminated because they had TAC values greater than $28,000. The gaseous radwaste system augments in RG 1.110 applicable to a BWR were considered.

15,000 and 30,000 cfm HEPA Filtration System (If in Auxiliary Building) 11.03-2

For Unit 3, the gaseous effluent releases "from the Auxiliary Building" were considered as follows because an ESBWR does not have an Auxiliary Building. Two ventilation systems that service contaminated air in the Reactor Building are combined: the Contaminated Area HVAC Subsystem (CONAVS) and the Refueling and Pool Area HVAC 11.03-0 Subsystem (REPAVS). Per DCD Figure 9.4-10, the normal flow through the CONAVS exhaust fan is 19,950 l/sec (42,272 cfm). Per DCD Figure 9.4-11, the normal flow through the REPAVS exhaust fan is 32,050 l/sec (67,910 cfm). In both cases, the normal flow rates exceed the proposed 7079 l/sec (15,000 cfm) HEPA filtration system. Therefore, this augment is not effective for Unit 3 and is eliminated from further consideration. The 14,158 l/sec (30,000 cfm) Charcoal/HEPA Filtration 11.03-0 System is also not effective and with a TAC of $56,330/yr, also exceeds 11.03-2 the $28,000/yr TAC threshold.

15,000 and 30,000 cfm HEPA Filtration System (If in Turbine Building)

The Turbine Building HVAC System (TBVS) services the Turbine Building. DCD Figure 9.4-8 shows that the Turbine Building exhaust goes through the Turbine Building Air Exhaust Subsystem (TBE). Per DCD Table 9.4-15, the 100 percent capacity flow through TBE is 11.03-0 52,800 l/sec (111,877 cfm). Based on this design capacity, it is assumed 11.03-2 that the normal flow exceeds 7079 l/sec (15,000 cfm), which is 13 percent of the design capacity. Therefore, this augment is not effective for Unit 3 and is eliminated from further consideration. The 14,158 l/sec (30,000 cfm) Charcoal/HEPA Filtration System is also not effective and with a TAC of $54,220/yr, also exceeds the $28,000/yr TAC threshold.

3-Ton Charcoal Adsorber

Per DCD Table 11.3-1, the total mass of charcoal in the offgas system is 237 metric tons (523,000 lb), or approximately 262 tons. Addition of a 2.7 metric ton (3-ton) charcoal adsorber only provides an additional 1.1 percent capacity to the existing offgas system. DCD Table 12.2-16

shows that the annual airborne releases from the offgas system
represent only about 4 percent of the total annual airborne releases from 11.03-0
Unit 3. Additional charcoal adsorbers would improve the holdup times of
the noble gases and C-14, but those only contribute approximately
24 percent to the thyroid dose. Therefore, additional charcoal adsorber
material could make a maximum improvement of 0.96 percent of the
28 person-rem/year thyroid dose, or 0.27 person-rem/year. The 11.03-0
$9,450/year cost of the 3-ton charcoal adsorber augment divided by the 11.03-2
annual dose reduction of 0.27 person-rem/year, results in an estimated
cost of over $35,000/person-rem saved. This augment exceeds the
cost-benefit ratio of $1000/person-rem prescribed in 10 CFR 50,
Appendix I, and is eliminated from further consideration.

Main Condenser Vacuum Pump (MCVP) Charcoal/HEPA Filtration System

DCD Table 12.2-16 shows that the annual airborne iodine releases from
the MCVP represent approximately 0.7 percent of the total annual 11.03-0
airborne iodine releases from Unit 3. Because the iodines contribute
about 73 percent to the 28 person-rem/year thyroid dose, this represents 11.03-0
a maximum improvement of 0.5 percent to the thyroid dose, or
0.14 person-rem-year. The $8,170/year cost of the MCVP HEPA filtration 11.03-0
system augment divided by the annual dose reduction of
0.14 person-rem/year, results in an estimated cost of over
$58,000/person-rem saved. This augment exceeds the cost-benefit ratio 11.03-0
of $1000/person-rem prescribed in 10 CFR 50, Appendix I, and is
eliminated from further consideration.

600-ft^3 Gas Decay Tank

It is assumed that the gas decay tank is an augment to the offgas system.
The flow rate through the offgas system is 54 m^3/hr (31.8 cfm) per
DCD Table 12.2-15. As a result, the average residence time in a 600 ft^3
gas decay tank is approximately 19 minutes. While this decay time will
have a negligible effect on iodines, particulates, C-14, and H-3, it will 11.03-2
mitigate the dose consequences of short-lived noble gases. Because the
noble gases contribute 1.5 person-rem/year to the thyroid dose, even
complete elimination of the noble gases represents a maximum
improvement in the thyroid dose of only 1.5 person-rem/year. The
$8,040/year cost of the 600 ft^3 gas decay tank augment divided by the
annual dose reduction of 1.5 person-thyroid-rem/year results in an
estimated cost of over $5,000/person-thyroid-rem saved. This augment

exceeds the cost-benefit ratio of $1000/person-thyroid-rem prescribed in 10 CFR 50, Appendix I, and is eliminated from further consideration.

1000 cfm Charcoal/HEPA Filtration System

As discussed above for 15,000 cfm HEPA filtration systems, the Unit 3 building exhaust system flow rates greatly exceed 472 l/sec (1000 cfm). Therefore, this augment is not effective for Unit 3 and is eliminated from further consideration. 11.03-0 11.03-0

Conclusion

None of the gaseous radwaste augments are cost-beneficial in reducing the annual thyroid dose from gaseous effluents for Unit 3.

11.4 Solid Waste Management System

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

11.4.1 SWMS Design Bases

S120
11.04-1A

Add the following after the second paragraph.

STD SUP 11.4-1 The LWMS offsite dose calculations, which are described in Section 12.2.2.4, include the offsite doses from the SWMS liquid effluents, as they are processed by the LWMS. Similarly, the GWMS offsite dose calculations, which are described in Section 12.2.2.2, include the offsite doses from the SWMS gaseous effluents, as they are inputs processed by the GWMS. The cost-benefit analyses in Section 11.2.1 for the LWMS and in Section 11.3.1 for the GWMS address the liquid and gaseous effluents that are generated from solid waste processing by the SWMS. Because these two cost-benefit analyses include the liquid and gaseous effluents from the SWMS, the augments considered for the LWMS and GWMS apply to the SWMS, which provides inputs to those systems. As described in Sections 11.2.1 and 11.3.1, no augments are needed for the LWMS and GWMS to comply with 10 CFR 50, Appendix I, Section II.D. Therefore, no augments are needed for the SWMS to comply with 10 CFR 50, Appendix I, Section II.D. 11.04-1A

Add the following to the seventh bullet.

STD COL 11.4-4-A The site does not utilize any temporary storage facilities to support plant operation.

Replace the fourth sentence of the fifth paragraph with the following:

STD COL 11.4-5-A Section 12.6 discusses how the ESBWR design features and procedures for operation will minimize contamination of the facility and environment, facilitate decommissioning, and minimize the generation of radioactive wastes, in compliance with 10 CFR 20.1406. Section 13.5 describes the requirement for procedures for operation of the radioactive waste processing system. Operating procedures for mobile/portable SWMS required by Sections 12.4, 12.5, and 13.5 address requirements of 10 CFR 20.1406.

11.4.2.3 Detailed System Component Description

11.4.2.3.5 SWMS Processing Subsystem

S029
S120

Replace the last three sentences of the second paragraph with the following.

11.04-2

STD COL 11.4-1-A Testing of the SWMS includes testing specified in Table 1 of RG 1.143. Implementation of the programs described in Section 12.1, for maintaining occupational dose ALARA, and Section 12.5, Radiation Protection Program, ensure that operation, maintenance, and testing of the SWMS satisfy the guidance contained in RG 8.8.

S029

STD COL 11.4-2-A Specific equipment connection configuration and plant sampling procedures are used to implement the guidance in Inspection and Enforcement (IE) Bulletin 80-10 (DCD Reference 11.4-19). The permanent and mobile/portable non-radioactive systems, which are connected to radioactive or potentially radioactive portions of SWMS, are protected from contamination with an arrangement of double check valves in each line. The configuration of each line is also equipped with a tell-tale connection, which permits periodic checks to confirm the integrity of the line and its check valve arrangement. Plant procedures describe sampling of non-radioactive systems that could potentially become contaminated by cross-connection with systems that contain radioactive material. In accordance with the guidance in RG 1.109, exposure pathways that may arise due to unique conditions are considered for incorporation into the plant-specific ODCM if they are likely to contribute significantly to the total dose.

11.04-2

STD COL 11.4-3-A Waste classification and process controls are described in the PCP. NEI 07-10, "Generic FSAR Template Guidance for Process Control

Program (PCP)," which is under review by the NRC, is incorporated by reference. (Reference 11.4-201) The milestone for development and implementation of the PCP is addressed in Section 13.4. S107

11.4.6 COL Information

11.4-1-A SWMS Processing Subsystem Regulatory Guide Compliance S029 S120

STD COL 11.4-1-A This COL item is addressed in Section 11.4.2.3.5. S120

11.4-2-A Compliance with IE Bulletin 80-10

STD COL 11.4-2-A This COL item is addressed in Section 11.4.2.3.5. S120

11.4-3-A Process Control Program

STD COL 11.4-3-A This COL item is addressed in Section 11.4.2.3.5. S120

11.4-4-A Temporary Storage Facility

STD COL 11.4-4-A This COL item is addressed in Section 11.4.1.

11.4-5-A Compliance with Part 20.1406

STD COL 11.4-5-A This COL item is addressed in Section 11.4.1.

11.4.7 References

11.4-201 NEI 07-10, Generic FSAR Template Guidance for Process Control Program (PCP). S107

11.5 Process Radiation Monitoring System

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

Add the following paragraph at the end of this section.

STD COL 11.5-3-A Replace text references to DCD Table 11.5-5 with Table 11.5-201.

11.5.4.4 Setpoints

Replace the first sentence in this section with the following.

STD COL 11.5-2-A The derivation of setpoints used for offsite dose monitors are described in the ODCM. Refer to Section 11.5.4.5 for a discussion regarding ODCM development and implementation.

11.5.4.5 Offsite Dose Calculation Manual

Replace this section with the following.

STD COL 11.5-2-A

The methodology and parameters used for calculation of offsite dose and monitoring are described in the ODCM. NEI 07-09, Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description, which is under review by the NRC, is incorporated by reference. (Reference 11.5-201) The milestone for development and implementation of the ODCM is addressed in Section 13.4. The provisions for sampling liquid and gaseous waste streams identified in Table 11.5-201 and DCD Table 11.5-6 will be included in the ODCM.

11.5.4.6 Process and Effluent Monitoring Program

Replace this section with the following.

STD COL 11.5-3-A

The program for process and effluent monitoring and sampling is described in the ODCM. Refer to Section 11.5.4.5 for a discussion regarding ODCM development and implementation. S057

11.5.4.7 Sensitivity or Subsystem Lower Limit of Detection

S057

Replace this section with the following.

STD COL 11.5-1-A

The ODCM describes the methodology for deriving the lower limit of detection for each effluent monitor. Refer to Section 11.5.4.5 for a discussion regarding ODCM development and implementation. The estimated sensitivities (i.e., the dynamic detection ranges) of process radiation monitors are described in DCD Tables 11.5-2 and 11.5-4. The bases for these values are provided in DCD Table 11.5-9. These ranges are adjusted according to unique plant configurations and radiation background in accordance with written procedures. The processes described in these procedures are consistent with the bases defined in DCD Table 11.5-9. If changes to the values in DCD Tables 11.5-2 or 11.5-4 are necessary, the FSAR is updated to reflect these new values. S057

11.5.4.8 Site Specific Offsite Dose Calculation

Replace this section with the following.

STD COL 11.5-4-A 10 CFR 50, Appendix I guidelines are addressed in the ODCM. Refer to Section 11.5.4.5 for a discussion regarding ODCM development and implementation.

Site-specific evaluations for dose to members of the public are addressed in Section 12.2.

11.5.4.9 Instrument Sensitivities

Replace this section with the following.

STD COL 11.5-5-A The sensitivities, sampling and analytical frequencies and bases for each gaseous and liquid sample are described in the ODCM. Refer to Section 11.5.4.5 for a discussion regarding ODCM development and implementation. IS093

11.5.5.8 Setpoints

Replace this section with the following:

STD COL 11.5-2-A Refer to Section 11.5.4.4.

Replace DCD Table 11.5-5 with Table 11.5-201.

11.5.7 COL Information

11.5-1-A Sensitivity or Subsystem Lower Limit of Detection

IS057

STD COL 11.5-1-A This COL item is addressed in Section 11.5.4.7.

11.5-2-A Offsite Dose Calculation Manual

STD COL 11.5-2-A This COL item is addressed in Sections 11.5.4.4, 11.5.4.5, and 11.5.5.8. IS025

11.5-3-A Process and Effluent Monitoring Program

STD COL 11.5-3-A This COL item is addressed in Sections 11.5 and 11.5.4.6, and Table 11.5-201.

11.5-4-A Site Specific Offsite Dose Calculation

STD COL 11.5-4-A This COL item is addressed in Section 11.5.4.8.

11.5-5-A Instrument Sensitivities

STD COL 11.5-5-A This COL item is addressed in Section 11.5.4.9.

11.5.8 References

11.5-201 NEI 07-09, "Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description"

DCD Table 11.5-2

Replace the ** note with the following. S057

STD COL 11.5-3-A Activity levels are expected to be at the subsystem's lower limit of detection (LLD). Applicable values are included in the plant-specific ODCM. See Section 12.2 for expected activity of various processes and effluents. S057

DCD Table 11.5-4

Replace the ** note with the following. S057

STD COL 11.5-3-A Activity levels are expected to be at the subsystem's LLD. Applicable values are included in the plant-specific ODCM. See Section 12.2 for expected activity of various processes and effluents. S057

STD COL 11.5-3-A

Table 11.5-201 Provisions for Sampling Liquid Streams

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process	In Effluent	
			Grab Notes 2 & 7	Grab Notes 2 & 7	Continuous Notes 2 & 7
1.	Liquid Radwaste (Batch) Effluent System Note 3	Equipment (Low Conductivity Drain Subsystem Floor (High Conductivity) Drain Subsystem Detergent Drain Subsystem	S&A	S&A, H3 Note 4	-
2.	Service Water System and/or Circulating Water System	Plant Service Water System and Circulating Water System	-	S&A, H3 Note 9	-
3.	Component Cooling Water System	Reactor Component Cooling Water System	S&A	S&A H3	(S&A) Notes 6 & 8
4.	Spent Fuel Pool Treatment System	Spent Fuel Pool Treatment System	S&A	S&A H3	(S&A) Notes 6 & 8
5.	Equipment & Floor Drain Collection and Treatment Systems	LCW Drain Subsystem HCW Drain Subsystem Detergent Drain Subsystem Chemical Waste Drain Subsystem Reactor Component Cooling Water System (RCCWS) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
6.	Phase Separator Decant & Holding Basin Systems	Equipment (Low Conductivity) Drain Subsystem Floor (High) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
7.	Chemical & Regeneration Solution Waste Systems	Chemical Waste Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
8.	Laboratory & Sample System Waste Systems	Chemical Waste Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8

① 11.05-2

STD COL 11.5-3-A

Table 11.5-201 Provisions for Sampling Liquid Streams

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process	In Effluent		
			Grab Notes 2 & 7	Grab Notes 2 & 7	Continuous Notes 2 & 7	
9.	Laundry & Decontamination Waste Systems	Detergent Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8	
10.	Resin Slurry, Solidification & Baling Drain Systems	Equipment (Low Conductivity) Drain Subsystem, Floor (High) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8	
11.	Storm & Underdrain Water System	Storm Drains	-	S&A, H3 Notes 3 & 10	-	|①
12.	Tanks and Sumps Inside Reactor Building	Equipment (Low Conductivity) Drain Subsystem Floor (High) Drain Subsystem Chemical Waste Drain Subsystem Detergent Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8	
13.	Ultrasonic Resin Cleanup Waste Systems	Note 5	-	Note 5	Note 5	
14.	Non-Contaminated Waste Water System	Sanitary Waste Discharge System	-	S&A, H3 Note 11	-	|①
15.	Liquid Radioactive Waste Processing Systems (Includes Reverse Osmosis Systems)	Liquid Radioactive Waste Processing Systems (Includes Reverse Osmosis Systems)	S&A	(S&A, H3)	(S&A) Notes 6 & 8	|②

① 11.05-2
② S029

STD COL 11.5-3-A

Table 11.5-201 Provisions for Sampling Liquid Streams

Notes for Table 11.5-201:

1. Table 11.5-201 addresses sampling provisions for ESBWRs, as recommended in Table 2 of SRP 11.5 for BWRs. For process systems identified for BWRs in SRP 11.5 Table 2, but not shown in Table 11.5-201, those systems are not applicable to ESBWR. In some cases, there are multiple subsystems that are used to perform the overall equivalent SRP function and are listed as such in the column. S121
2. S&A = Sampling & Analysis of radionuclides, to include gross radioactivity, identification and concentration of principal radionuclides and concentration of alpha emitters; R = Gross radioactivity (beta radiation, or total beta plus gamma); H3 = Tritium
3. Liquid Radwaste is processed on a batch-wise basis. The Liquid Waste Management System sample tanks can be sampled for analysis of the batch. See DCD Section 11.2.2.2 for more information on Liquid Radwaste Management.
4. Monitoring of effluents from the Equipment, Floor, and Detergent Drain Subsystems is included in the Offsite Dose Calculation Manual. 11.05-2
5. The ESBWR does not include ultrasonic resin cleanup waste system at this time. Should one be installed, the Liquid Waste Management System would provide sampling and monitoring provisions.
6. The use of parenthesis indicates that these provisions are required only for the systems not monitored, sampled, or analyzed (as indicated) prior to release by downstream provisions.
7. The sensitivity of detection, also defined here as the Lower Limit of Detection (LLD), for each indicated measured variable, is based on the applicable radionuclide (or collection of radionuclides as applicable) as given in ANSI/IEEE N42.18.
8. Processed through radwaste Liquid Waste Management System (LWMS) prior to discharge. Therefore, this process system is monitored, sampled, or analyzed prior to release by downstream provisions. See Note 6 above. Depending on Utility's discretion, additional sampling lines may be installed. Continuous Effluent sampling is not required per Standard Review Plan 11.5 Draft Rev. 4, April 1996, Table 2 for this system function.
9. Grab samples can be obtained from a cooling tower basin. See Section 9.2.1.2 for the PSWS cooling tower basin and Section 10.4.5.2.3 for the Circulating Water System cooling tower basin.
10. Grab samples can be obtained from the Condensate Storage Tank (CST) basin sump. See DCD Section 9.2.6.2. 11.05-2
11. Grab samples can be obtained from the sewage treatment plant. See Section 9.2.4.2.

Chapter 12 Radiation Protection

12.1 Ensuring That Occupational Radiation Exposures Are ALARA

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

Add the following at the beginning of this section. 5061

STD SUP 12.1-1 The ALARA program is addressed in Appendices 12AA and 12BB.

12.1.1.3.1 Compliance with Regulatory Guide 8.8

Replace the first paragraph of this section with the following. 5061

STD COL 12.1-4-A Compliance with Regulatory Guide 8.8 is addressed in Appendix 12BB. 5061

12.1.1.3.2 Compliance with Regulatory Guide 8.10 5061

Replace this section with the following. 5061

STD COL 12.1-1-A Compliance with Regulatory Guide 8.10 is addressed in Appendix 12BB. 5061

12.1.1.3.3 Compliance with Regulatory Guide 1.8

Replace this section with the following. 5061

STD COL 12.1-2-A Compliance with Regulatory Guide 1.8 is addressed in Appendix 12BB. 5061

12.1.3 Operational Considerations 5061

Replace this section with the following. 5061

STD COL 12.1-3-A ALARA program implementation is addressed in Appendix 12BB. 5061

12.1.4 COL Information

12.1-1-A Regulatory Guide 8.10

STD COL 12.1-1-A This COL item is addressed in Section 12.1.1.3.2 and Appendix 12BB. 5061

12.1-2-A Regulatory Guide 1.8

STD COL 12.1-2-A This COL item is addressed in Section 12.1.1.3.3 and Appendix 12BB. 5061

12.1-3-A **Operational Considerations** S061

STD COL 12.1-3-A This COL item is addressed in Section 12.1.3 and Appendix 12BB. S061

12.1-4-A **Regulatory Guide 8.8**

STD COL 12.1-4-A This COL item is addressed in Section 12.1.1.3.1 and Appendix 12BB. S061

12.2 Plant Sources

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

12.2.1.5 **Other Contained Sources** S099

Replace this section with the following. S099

STD COL 12.2-4-A In addition to the contained sources identified above, additional contained sources which contain by-product, source, or special nuclear materials may be maintained on site. These contained sources are used as calibration, check, or radiography sources. These sources are not part of the permanent plant design, and their control and use are governed by plant procedures. The procedures consider the guidance provided in RG 8.8 to ensure that occupational doses from the control and use of the sources are as low as is reasonably achievable (ALARA). S099 12.02-4 12.02-6

Various types and quantities of radioactive sources are employed to calibrate the process and effluent radiation monitors, the area radiation monitors, and portable and laboratory radiation detectors. Check sources that are integral to the area, process, and effluent monitors consist of small quantities of by-product material and do not require special handling, storage, or use procedures for radiation protection purposes. The same consideration applies to solid and liquid radionuclide sources of exempt quantities or concentrations which are used to calibrate or check the portable and laboratory radiation measurement instruments.

Instrument calibrators are normally used for calibrating gamma dose rate instrumentation. These may be self-contained, heavily shielded, multiple source calibrators. Beta and alpha radiation sources are also available for instrument calibration. Calibration sources are traceable to the National Institute of Standards and Technology, or equivalent.

Radiography sources are surveyed upon entry to the site. Radiation protection personnel maintain copies of the most recent leak test records for owner-controlled sources. Contractor radiography personnel provide copies of the most recent leak test records upon radiation protection personnel request. Radiography is conducted in accordance with approved procedures.

12.2.2.1 Airborne Releases Offsite

Replace this section with the following.

NAPS COL 12.2-2-A Design basis noble gas, iodine, and other fission product concentrations are taken from the tables in Chapter 11. Airborne sources for normal operating releases are calculated using the source terms given in DCD Section 11.1.

The bases for the airborne sources calculations are provided in Table 12.2-15R. The bases include values used in calculating the annual airborne release source terms provided in DCD Table 12.2-16. The methodology of NUREG-0016 was used in determining the annual airborne release values presented in DCD Table 12.2-16.

Annual Releases

Based on the inputs and criteria described above, the annual airborne releases for Unit 3 normal operations and the Unit 3 airborne concentrations at the site boundary are provided in Table 12.2-17R. This table also shows the maximum activity concentration for each nuclide at the site boundary from the combined operation of Units 1, 2, and 3, and the corresponding concentration limit for the NAPS site from 10 CFR 20, Appendix B, Table 2, Column 1.

12.2.2.2 Airborne Dose Evaluation Offsite

Replace this section with the following.

NAPS COL 12.2-2-A The bases for the calculation of Unit 3-specific airborne offsite doses are provided in Table 12.2-18aR. The annual gaseous pathway doses are provided in Table 12.2-18bR. The methodology of RG 1.109 was used in determining the annual airborne dose values. The bases include values that are default parameters in RG 1.109 and other values that are Unit 3 site-specific inputs.

The results of the Unit 3 gaseous pathway dose analysis are given in Table 12.2-18bR.

12.2.2.2.1 Compliance with 10 CFR 50, Appendix I, Sections II.B and II.C

Table 12.2-201 demonstrates that offsite doses due to Unit 3 radioactive airborne effluents comply with the regulatory dose limits in 10 CFR 50, Appendix I, Sections II.B and II.C.

NAPS ESP COL 11.1-1

12.2.2.2.2 Compliance with 10 CFR 50, Appendix I, Section II.D

Population dose is determined for the gaseous effluent releases from Unit 3 for both total body dose and thyroid dose. The total body dose is 7.7 person-rem/yr as shown in Table 12.2-204. The thyroid dose is 28 person-rem/yr. The cost-benefit analysis performed to consider gaseous radwaste augments to reduce doses due to gaseous effluents is presented in Section 11.3. Based on the results from the cost-benefit analysis, no augments are cost-beneficial. Therefore, Unit 3 complies with 10 CFR 50, Appendix I, Section II.D.

12.02-1

12.2.2.2.3 Compliance with 10 CFR 20, Appendix B, Table 2, Column 1

Table 12.2-17R provides the gaseous effluent concentrations in comparison to the 10 CFR 20, Appendix B, Table 2, Column 1 limits. The Unit 3 gaseous effluent concentrations comply with 10 CFR 20, Appendix B, Table 2, Column 1.

12.2.2.2.4 Compliance with 10 CFR 20.1301 and 20.1302

Compliance with 10 CFR 20.1301 and 20.1302 is demonstrated in Sections 12.2.2.4.4 and 12.2.2.4.5, respectively.

NAPS ESP COL 11.1-1

12.2.2.2.5 Comparison of ESP Application to Unit 3 Gaseous Effluent Concentrations

As described in Section 12.2.2.1, the radioactive gaseous effluent concentrations for Unit 3 are provided in Table 12.2-17R.

The radioactive gaseous effluent concentrations for the ESPA are included in ESP-ER Table 5.4-7. That table presents the composite annual release activities and activity concentrations of gaseous effluents for a single unit, but is based on a composite of possible radionuclide releases from many reactor designs. The values in that table are the maximum annual activity and corresponding concentration for each radionuclide from the many reactor designs considered.

While ESP-ER Table 5.4-7 contains more radionuclides than Table 12.2-17R due to the use of the composite set of nuclides, the calculated radioactive gaseous effluent concentration for each Unit 3 radionuclide is bounded by the concentration for that nuclide in the ESP-ER. Not only is each radionuclide bounded, the total gaseous effluent release activity for Unit 3 is much less than the total composite release activity considered in the ESP-ER.

12.2.2.2.6 Comparison of ESPA to Unit 3 Gaseous Effluent Doses

As described in Section 12.2.2.2, the calculated radioactive gaseous effluent doses for Unit 3 are provided in Table 12.2-18bR.

The radioactive gaseous effluent doses for the ESP Application are included in ESP-ER Table 5.4-9. The results from that table are reproduced in Table 12.2-18bR.

For both the composite releases used in the ESP-ER, and the Unit 3 normal operating releases, Table 12.2-18bR presents doses to the maximally exposed adult, teenager, child, and infant for the following pathways:

- Nearest site boundary
- Nearest vegetable garden
- Nearest residence
- Nearest meat cow

For the milk pathway, no milk animals are within 8 km (5 miles) of Unit 3.

As noted in Section 2.3.5, the distance to the site boundary has been measured using GIS and although it is known to be farther than the value used in the ESP-ER, the ESP-ER value is conservatively used in calculating Unit 3 gaseous effluent doses at the site boundary.

The locations of the nearest vegetable garden, residence, and meat cow were updated since the ESP-ER and closer locations than addressed in the ESP-ER were identified. For these pathways, the closest location from all three of the pathways was used for the distance to the MEI for each pathway.

While the total activity in the gaseous radioactive effluents for Unit 3 is much less than that estimated in the ESP-ER, the calculated doses for
some of the pathways shown in Table 12.2-18bR are not lower due to the | 12.02-1
reductions in the distances to the MEI receptor locations as described
NAPS ESP VAR 12.2-1 above. Values in Table 12.2-18bR in bold print indicate pathways for

which the estimated Unit 3 ESBWR dose to the MEI is larger than the corresponding ESP-ER composite release dose to the MEI.

Although some pathways in Table 12.2-18bR show slight increases in total body and thyroid doses to the MEI from the changes in MEI locations, Table 12.2-18bR summarizes the annual total body, thyroid, and skin doses to the MEI for the garden, residence, and meat cow pathways, and Table 12.2-201 shows that the Unit 3 doses are lower than those calculated and presented in ESP-ER Table 5.4-10. 12.02-1

12.02-1

12.2.2.4 Liquid Doses Offsite

Replace this section with the following.

NAPS COL 12.2-3-A

Liquid pathway doses were calculated based on the criteria specified in DCD Section 12.2.2.3 for compliance with 10 CFR 50, Appendix I. Dose conversion factors and methodologies consistent with RGs 1.109 and 1.113 were used as described in DCD References 12.2-7 and 12.2-4, respectively.

The liquid effluent pathway offsite dose calculation bases are provided in Table 12.2-20aR. The bases include values that are default parameters in RG 1.109 and other values that are Unit 3 site-specific inputs.

Based on the annual liquid release offsite values in DCD Table 12.2-19b, which are repeated in Table 12.2-19bR, the Unit 3 annual liquid release concentrations were calculated based upon the criteria specified in DCD Section 12.2.2.3 and the Unit 3-specific input values shown in Table 12.2-20aR. Table 12.2-19bR also shows the maximum activity concentration for each nuclide at the end of the discharge canal from the combined operation of Units 1, 2, and 3, and the corresponding concentration limit for the NAPS site from 10 CFR 20, Appendix B, Table 2, Column 2.

The LADTAPII code is used to perform the liquid effluent dose analysis (DCD Reference 12.2-3). The results of the dose calculation are given in Table 12.2-20bR.

12.2.2.4.1 Compliance with 10 CFR 50, Appendix I, Section II.A

Table 12.2-202 demonstrates that offsite doses due to Unit 3 radioactive liquid effluents comply with the regulatory dose limits in 10 CFR 50, Appendix I, Section II.A.

NAPS ESP COL 11.1-1

12.2.2.4.2 Compliance with 10 CFR 50, Appendix I, Section II.D

Population dose is determined for the liquid effluent releases from Unit 3 for both total body dose and thyroid dose. The total body dose is 1.0 person-rem/yr as shown in Table 12.2-204. The thyroid dose is 0.69 person-rem/yr. The cost-benefit analysis performed to consider liquid radwaste augments to reduce doses due to liquid effluents is presented in Section 11.2. Based on the above liquid effluent dose estimate values and the threshold value from the cost-benefit analysis, no augments are cost-beneficial. Therefore, Unit 3 complies with 10 CFR 50, Appendix I, Section II.D.

12.02-1

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12.2.2.4.3 Compliance with 10 CFR 20, Appendix B, Table 2, Column 2

Compliance with 10 CFR 20, Appendix B, Table 2, Column 2 is demonstrated in Table 12.2-19bR.

12.2.2.4.4 Compliance with 10 CFR 20.1301 and 20.1302

This section demonstrates that offsite doses due to Unit 3, combined with offsite doses due to Units 1 and 2 and the NAPS independent spent fuel storage installation (ISFSI), comply with the regulatory limits in 10 CFR 20.1301 for doses to members of the public.

Using the Unit 3-specific gaseous effluent release activities identified in Table 12.2-17R, and the Unit 3-specific liquid effluent release activities identified in Table 12.2-19bR, the total annual doses to the MEI and the population resulting from Unit 3 liquid and gaseous effluents are calculated and presented in Tables 12.2-203 and 12.2-204, respectively.

The direct radiation contribution from operation of Unit 3 is negligible. The direct dose contribution from Unit 3 at two distances is provided in DCD Table 12.2-21. That table shows the annual dose at 1000 m (0.62 mi) to be 1.66E-06 mSv/yr (1.66E-04 mrem/yr). Section 9.3.9 shows that Unit 3 uses hydrogen water chemistry, and DCD Section 12.2.1.3 explains that the direct dose contribution takes into account hydrogen water chemistry. The distance from Unit 3 to the nearest residence is 1191 m (0.74 mi) in the NW direction, as shown in

12.02-2

Table 2.3-15R. The distance from Unit 3 to the location on the site boundary with the highest gaseous effluent annual dose is 1416 m (0.88 mile) in the ESE direction. This is the distance from Unit 3 to the site boundary, that is, the exclusion area boundary (EAB) in the direction of maximum annual χ/Q, as shown in Table 2.3-16R. These distances from Unit 3 to each type of receptor location are greater than those presented in the DCD, so the Unit 3 direct radiation dose rate at each location us even lower than the very low rate cited above for 1000 m (0.62 mi).

12.02-2
12.02-2

The total annual doses to the MEI resulting from North Anna Units 1 and 2 liquid and gaseous effluents are provided in Table 12.2-203. The values shown are representative based on review of Units 1 and 2 annual radiological environmental operating reports (e.g., Reference 12.2-203).

12.02-1

The direct radiation contribution from operation of Units 1 and 2 is negligible. An evaluation of operating plants by the NRC states that:

> "...because the primary coolant of an LWR is contained in a heavily shielded area, dose rates in the vicinity of light water reactors are generally undetectable and are less than 1 mrem/year at the site boundary."

The NRC concludes that the direct radiation from normal operation results in "small contributions at site boundaries" (Reference 12.2-204, Section 4.6.1.2). For the NAPS site, the nearest residence is at a distance typical of a site boundary evaluated by NRC. An assumed value of 1 mrem/yr is included in Table 12.2-203 to account for the dose to the MEI at the nearest residence from operation of Units 1 and 2.

12.02-2

Discharged fuel assemblies from NAPS Units 1 and 2 are stored in the NAPS ISFSI (Reference 12.2-205). The direct radiation contribution from operation of the NAPS ISFSI is small, both at the residence nearest to the ISFSI, which is south and slightly east of the ISFSI at about 870 m (0.54 mi), and at the closest point to the site boundary, which is south and slightly west of the ISFSI at approximately 760 m (0.47 mi). The annual contribution at the site boundary from the ISFSI is no more than 3.6E-02 mSv/yr (3.6 mrem/yr). This value is based on a conservatively estimated peak dose rate from a fully-filled ISFSI with 84 casks/modules containing NAPS Units 1 and 2 fuel assemblies and the distance from the ISFSI to the site boundary, which is shorter than that to the residence nearest the ISFSI. This ISFSI dose contribution is then conservatively

12.02-12
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12.02-12

applied to the MEI for the nearest residence from Unit 3, which is 1191 m (0.74 mi) in the NW direction and even further from the ISFSI. 12.02-2

Table 12.2-203 shows that the total NAPS site doses resulting from the normal operation of Units 1, 2, and 3 and applied at the nearest residence are well within the regulatory limits of 40 CFR 190. These doses are applied at the distance to the nearest residence from Unit 3, that is, 1191 m (0.74 mi), but in the direction of the maximum annual χ/Q, that is, in the ESE direction, and using the maximum D/Q, which is from the NNE direction. These doses bound those at the site boundary. 12.02-2

Table 12.2-204 shows the total body doses from liquid and gaseous effluents doses attributable to Unit 3 for the population within 50 miles of the NAPS site.

12.2.2.4.5 Compliance with 10 CFR 20.1302

Surveys of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas are conducted to demonstrate compliance with the dose limits given in 10 CFR 20.1302 for individual members of the public.

Compliance with the annual dose limit in 10 CFR 20.1302 is demonstrated by showing that the calculated total effective dose equivalent to the individual likely to receive the highest dose does not exceed the annual dose limit.

NAPS ESP COL 11.1-1

12.2.2.4.6 Comparison of ESPA to NAPS Site with Unit 3 Liquid Effluent Concentrations

As described in Section 12.2.2.4, the radioactive liquid effluent concentrations for Unit 3 are provided in Table 12.2-19bR. This table also shows the maximum activity concentration for each nuclide at the end of the discharge canal from the combined operation of Units 1, 2, and 3, and the corresponding concentration limit for the NAPS site.

The radioactive liquid effluent concentrations for the NAPS site from the combined operation of the two new units and the existing units as presented in the ESPA are included in ESP-ER Table 5.4-6. That table presents the composite annual release activities of liquid effluents for a single new unit, but based on a composite of possible radionuclide releases from many reactor designs. For all isotopes except tritium, the maximum annual activity for each radionuclide is the maximum from the many different types of reactor designs considered. ESP-ER Table 5.4-6 contains more radionuclides than Table 12.2-19bR due to the use of the composite set of nuclides in the ESP-ER.

NAPS ESP VAR 12.2-3 For most radionuclides in the Unit 3 liquid effluent, the maximum activity is bounded by the activity for that nuclide in the ESP-ER. Annual release activities in bold print in Table 12.2-19bR indicate those 12 radionuclides for which the estimated Unit 3 release activity is slightly greater than the composite release activity as presented in the ESP-ER.

Although not every radionuclide is bounded, the total liquid effluent release activity of Unit 3 is less than the total composite release activity presented in the ESP-ER.

Table 12.2-19bR shows the total activity concentrations at the site release point for the nuclides in radioactive liquid effluent for Units 1, 2, and 3. For every nuclide, the maximum activity concentration is equal to or less than the corresponding value in ESP-ER Table 5.4-6.

12.2.2.4.7 Comparison of ESPA to Unit 3 Liquid Effluent Doses

As described in Section 12.2.2.4, the calculated radioactive liquid effluent doses for Unit 3 are provided in Table 12.2-20bR.

The radioactive liquid effluent doses for the ESPA are included in ESP-ER Table 5.4-8. The results from that table are reproduced in Table 12.2-20bR. The dose for each liquid radioactive effluent pathway for Unit 3 is less than the corresponding estimate in the ESP-ER. Table 12.2-202 summarizes the annual total body and bone doses to the MEI and shows that the Unit 3 doses are lower than those calculated and presented in ESP-ER Table 5.4-10.

As indicated in Tables 12.2-203 and 12.2-204, the annual total site doses to the MEI and the population within 50 miles of Unit 3 are lower than those calculated and presented in ESP-ER.

12.2.4 COL Information

12.2-2-A Airborne Effluents and Doses

NAPS COL 12.2-2-A This COL item is addressed in Sections 12.2.2.1, 12.2.2.2, and Table 2.0-201.

12.2-3-A Liquid Effluents and Doses

NAPS COL 12.2-3-A This COL item is addressed in Section 12.2.2.4.

12.2-4-A Other Contained Sources

S099 12.02-4

STD COL 12.2-4-A This COL item is addressed in Section 12.2.1.5.

S099 12.02-4

12.2.5 References

N025a

12.2-201 [Deleted]

12.2-202 [Deleted]

12.2-203 Virginia Electric and Power Company, North Anna Units 1 & 2 and Independent Spent Fuel Storage Installation (ISFSI) Annual Radiological Environmental Operating Report, April 17, 2006.

12.2-204 NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, U. S. Nuclear Regulatory Commission, May 1996.

12.2-205 Virginia Electric and Power Company, North Anna Independent Spent Fuel Storage Installation, Final Safety Analysis Report, Revision 6, Docket No. 72-16, License No. 2507, June 2008.

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- For Information Only -

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1

Table 12.2-15R Airborne Sources Calculation

Calculation Bases

Methodology	**DCD Appendix 12B**	12.02-7 12.02-11
Noble Gas Source at t=30 min	740 MBq/sec (20,000 μCi/sec)	
I^{131} Release Rate	3.7 MBq/sec (100 μCi/sec)	
Directions and distances from site to receptor locations	See Table 2.3-16R	N102b
Meteorology χ/Q	See Table 2.3-16R	
Meteorology D/Q	See Table 2.3-16R	
Plant Availability Factor	0.92	
Offgas System		
Offgas stream temperature	100°F	
Flow rate at 100°F	54 m^3/hr	N102b
K_d (Kr)	18.5 cm^3/g	12.02-1
K_d (Xe)	330 cm^3/g	
K_d (Ar)	6.4 cm^3/g	12.02-1
Guard tank charcoal mass	7,500 kg (single tank)	
Adsorber tank charcoal mass	27,750 kg (each)	
Adsorber tank arrangement	2 parallel trains of 4 tanks each	
Turbine Gland Sealing System Exhaust		
I-131 release	0.81 Ci/yr per μCi/g of I-131 in coolant	
I-133 release	0.22 Ci/yr per μCi/g of I-133 in coolant	12.02-1

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit

12.02-1

12.02-3

	Unit 3 Annual Release		Unit 3 Concentration		Units 1, 2 & 3 Concentration	ECL	Units 1, 2, & 3 Fraction of ECL
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
Kr-83m	8.5E+01	2.3E-03	1.0E-05	2.7E-16	2.7E-16	5.0E-05	5.4E-12
Kr-85m	6.6E+05	1.8E+01	7.7E-02	2.1E-12	7.2E-11	1.0E-07	7.2E-04
Kr-85	5.2E+06	1.4E+02	6.1E-01	1.6E-11	1.3E-09	7.0E-07	1.8E-03
Kr-87	1.4E+06	3.8E+01	1.6E-01	4.4E-12	4.4E-11	2.0E-08	2.2E-03
Kr-88	2.1E+06	5.7E+01	2.5E-01	6.7E-12	1.3E-10	9.0E-09	1.5E-02
Kr-89	1.4E+07	3.8E+02	1.6E+00	4.4E-11	4.4E-11	1.0E-09	4.4E-02
Xe-131m	1.5E+05	4.1E+00	1.8E-02	4.8E-13	2.3E-12	2.0E-06	1.1E-06
Xe-133m	1.9E+02	5.1E-03	2.2E-05	6.0E-16	1.0E-10	6.0E-07	1.7E-04
Xe-133	4.1E+07	1.1E+03	4.8E+00	1.3E-10	9.3E-09	5.0E-07	1.9E-02
Xe-135m	2.2E+07	5.9E+02	2.6E+00	7.0E-11	7.7E-11	4.0E-08	1.9E-03
Xe-135	2.8E+07	7.6E+02	3.3E+00	8.9E-11	3.0E-10	7.0E-08	4.3E-03
Xe-137	2.8E+07	7.6E+02	3.3E+00	8.9E-11	8.9E-11	1.0E-09	8.9E-02
Xe-138	2.3E+07	6.2E+02	2.7E+00	7.3E-11	9.5E-11	2.0E-08	4.7E-03
I-131	8.4E+03	2.3E-01	9.9E-04	2.7E-14	2.6E-13	2.0E-10	1.3E-03
I-132	5.8E+04	1.6E+00	6.8E-03	1.8E-13	2.3E-13	2.0E-08	1.1E-05
I-133	4.2E+04	1.1E+00	4.9E-03	1.3E-13	4.2E-13	1.0E-09	4.2E-04
I-134	1.1E+05	3.0E+00	1.3E-02	3.5E-13	3.7E-13	6.0E-08	6.1E-06
I-135	5.9E+04	1.6E+00	6.9E-03	1.9E-13	3.0E-13	6.0E-09	5.0E-05

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit

	Unit 3 Annual Release		Unit 3 Concentration		Units 1, 2 & 3 Concentration	ECL	Units 1, 2, & 3 Fraction of ECL
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
H-3	2.8E+06	7.6E+01	3.3E-01	8.9E-12	8.9E-12	1.0E-07	8.9E-05
C-14	5.3E+05	1.4E+01	6.2E-02	1.7E-12	1.7E-12	3.0E-09	5.6E-04
Na-24	5.4E+00	1.5E-04	6.3E-07	1.7E-17	1.7E-17	7.0E-09	2.4E-09
P-32	1.3E+00	3.5E-05	1.5E-07	4.1E-18	4.1E-18	5.0E-10	8.2E-09
Ar-41	1.4E+03	3.8E-02	1.6E-04	4.4E-15	4.4E-15	1.0E-08	4.4E-07
Cr-51	1.8E+02	4.9E-03	2.1E-05	5.7E-16	5.7E-16	3.0E-08	1.9E-08
Mn-54	1.5E+02	4.1E-03	1.8E-05	4.8E-16	4.8E-16	1.0E-09	4.8E-07
Mn-56	1.1E+01	3.0E-04	1.3E-06	3.5E-17	3.5E-17	2.0E-08	1.7E-09
Fe-55	4.7E+01	1.3E-03	5.5E-06	1.5E-16	1.5E-16	3.0E-09	5.0E-08
Fe-59	2.0E+01	5.4E-04	2.3E-06	6.3E-17	6.3E-17	5.0E-10	1.3E-07
Co-58	4.0E+01	1.1E-03	4.7E-06	1.3E-16	1.3E-16	1.0E-09	1.3E-07
Co-60	3.2E+02	8.6E-03	3.8E-05	1.0E-15	1.0E-15	5.0E-11	2.0E-05
Ni-63	4.7E-02	1.3E-06	5.5E-09	1.5E-19	1.5E-19	1.0E-09	1.5E-10
Cu-64	6.9E+00	1.9E-04	8.1E-07	2.2E-17	2.2E-17	3.0E-08	7.3E-10
Zn-65	3.2E+02	8.6E-03	3.8E-05	1.0E-15	1.0E-15	4.0E-10	2.5E-06
Rb-89	2.0E-01	5.4E-06	2.3E-08	6.3E-19	6.3E-19	2.0E-07	3.2E-12
Sr-89	1.5E+02	4.1E-03	1.8E-05	4.8E-16	4.8E-16	2.0E-10	2.4E-06
Sr-90	1.0E+00	2.7E-05	1.2E-07	3.2E-18	3.2E-18	6.0E-12	5.3E-07

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12.02-3

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit

	Unit 3 Annual Release		Unit 3 Concentration		Units 1, 2 & 3 Concentration	ECL	Units 1, 2, & 3 Fraction of ECL
Nuclide	MBq/yr	Ci/yr	Bq/m^3	µCi/ml	µCi/ml	µCi/ml	
Y-90	8.1E-02	2.2E-06	9.5E-09	2.6E-19	2.6E-19	9.0E-10	2.9E-10
Sr-91	6.7E+00	1.8E-04	7.9E-07	2.1E-17	2.1E-17	5.0E-09	4.2E-09
Sr-92	4.6E+00	1.2E-04	5.4E-07	1.5E-17	1.5E-17	9.0E-09	1.6E-09
Y-91	1.7E+00	4.6E-05	2.0E-07	5.4E-18	5.4E-18	2.0E-10	2.7E-08
Y-92	3.7E+00	1.0E-04	4.3E-07	1.2E-17	1.2E-17	1.0E-08	1.2E-09
Y-93	7.2E+00	1.9E-04	8.4E-07	2.3E-17	2.3E-17	3.0E-09	7.6E-09
Zr-95	4.4E+01	1.2E-03	5.2E-06	1.4E-16	1.4E-16	4.0E-10	3.5E-07
Nb-95	2.4E+02	6.5E-03	2.8E-05	7.6E-16	7.6E-16	2.0E-09	3.8E-07
Mo-99	1.7E+03	4.6E-02	2.0E-04	5.4E-15	5.4E-15	2.0E-09	2.7E-06
Tc-99m	2.2E+00	5.9E-05	2.6E-07	7.0E-18	7.0E-18	2.0E-07	3.5E-11
Ru-103	1.0E+02	2.7E-03	1.2E-05	3.2E-16	3.2E-16	9.0E-10	3.5E-07
Rh-103m	3.5E-03	9.5E-08	4.1E-10	1.1E-20	1.1E-20	2.0E-06	5.5E-15
Ru-106	1.4E-01	3.8E-06	1.6E-08	4.4E-19	4.4E-19	2.0E-11	2.2E-08
Rh-106	4.5E-06	1.2E-10	5.3E-13	1.4E-23	1.4E-23	1.0E-09	1.4E-14
Ag-110m	1.0E-01	2.7E-06	1.2E-08	3.2E-19	3.2E-19	1.0E-10	3.2E-09
Sb-124	5.3E+00	1.4E-04	6.2E-07	1.7E-17	1.7E-17	3.0E-10	5.6E-08
Te-129m	1.6E+00	4.3E-05	1.9E-07	5.1E-18	5.1E-18	3.0E-10	1.7E-08
Te-131m	5.5E-01	1.5E-05	6.5E-08	1.7E-18	1.7E-18	1.0E-09	1.7E-09
Te-132	1.4E-01	3.8E-06	1.6E-08	4.4E-19	4.4E-19	9.0E-10	4.9E-10

12.02-1

12.02-3

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1

Table 12.2-17R Comparison of Airborne Release Concentrations with 10 CFR 20 Limit

	Unit 3 Annual Release		Unit 3 Concentration		Units 1, 2 & 3 Concentration	ECL	Units 1, 2, & 3 Fraction of ECL
Nuclide	**MBq/yr**	**Ci/yr**	**Bq/m^3**	**µCi/ml**	**µCi/ml**	**µCi/ml**	
Cs-134	1.8E+02	4.9E-03	2.1E-05	5.7E-16	5.7E-16	2.0E-10	2.9E-06
Cs-136	1.5E+01	4.1E-04	1.8E-06	4.8E-17	4.8E-17	9.0E-10	5.3E-08
Cs-137	2.7E+02	7.3E-03	3.2E-05	8.6E-16	8.6E-16	2.0E-10	4.3E-06
Cs-138	8.5E-01	2.3E-05	1.0E-07	2.7E-18	2.7E-18	8.0E-08	3.4E-11
Ba-140	7.8E+02	2.1E-02	9.2E-05	2.5E-15	2.5E-15	2.0E-09	1.2E-06
La-140	1.3E+01	3.5E-04	1.5E-06	4.1E-17	4.1E-17	2.0E-09	2.1E-08
Ce-141	2.6E+02	7.0E-03	3.1E-05	8.2E-16	8.2E-16	8.0E-10	1.0E-06
Ce-144	1.3E-01	3.5E-06	1.5E-08	4.1E-19	4.1E-19	2.0E-11	2.1E-08
Pr-144	1.6E-04	4.3E-09	1.9E-11	5.1E-22	5.1E-22	2.0E-07	2.5E-15
W-187	1.3E+00	3.5E-05	1.5E-07	4.1E-18	4.1E-18	1.0E-08	4.1E-10
Np-239	8.3E+01	2.2E-03	9.7E-06	2.6E-16	2.6E-16	3.0E-09	8.8E-08
Total w/o H-3	1.7E+08	4.5E+03	2.0E+01	5.3E-10	1.2E-08	NA	1.8E-01
Total w/ H-3	1.7E+08	4.6E+03	2.0E+01	5.4E-10	1.2E-08	NA	1.8E-01

Note: Concentrations for Units 1 and 2 are based on the activity releases in NAPS UFSAR Table 11.3-2. Effluent concentration limits (ECLs) are from 10 CFR 20, Appendix B, Table 2, Column 1.

12.02-1

12.02-3

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1

Table 12.2-18aR Airborne Offsite Dose Calculation Bases

IN102b

NAPS COL 12.2-2-A	Meteorology χ/Q	Table 2.3-16R	
NAPS COL 12.2-2-A	Meteorology D/Q	Table 2.3-16R	
	Airborne Release Source Term	DCD Table 12.2-16	
	Calculation Methodology	RG 1.109	
	Computer Code Utilized	GASPAR II (NUREG/CR-4653)	
	Individual Consumption Rates	Table E-5 of RG 1.109	
	Misc. Calculation Inputs (other than RG 1.109 default values):		
NAPS COL 12.2-2-A	Midpoint of plant operating life	20 years	
NAPS COL 12.2-2-A	Fraction of year that leafy vegetables are grown	0.5	
NAPS COL 12.2-2-A	Fraction of year that animals graze on pasture	0.67	
NAPS COL 12.2-2-A	Fraction of daily feed that is pasture grass when the animal grazes on pasture	1.0	
NAPS COL 12.2-2-A	Animal milk considered for milk pathway	None – no milk animal within 8 km (5 mi)	
NAPS COL 12.2-2-A	Annual Average Doses from Airborne Releases	Table 12.2-18bR	IN102b

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1
NAPS ESP VAR 12.2-1

Table 12.2-18bR Gaseous Pathway Doses to the MEI (mrem/yr)

12.02-1

		ESP			Unit 3		
Location	**Pathway**	**Total Body**	**Thyroid**	**Skin**	**Total Body**	**Thyroid**	**Skin**
Site Boundary (1416 m (0.88 mi) ESE for ESP-ER and FSAR)	Plume	2.1E+00	NA	6.2E+00	1.6E+00	**1.6E+00**	4.0E+00
	Inhalation						
	Adult	3.0E-01	1.6E+00	NA	9.1E-03	6.8E-01	NA
	Teen	3.1E-01	2.0E+00	NA	9.7E-03	8.9E-01	NA
	Child	2.7E-01	2.3E+00	NA	9.1E-03	1.1E+00	NA
	Infant	1.6E-01	2.0E+00	NA	5.5E-03	9.8E-01	NA
Nearest Garden (1513 m (0.94 mi) NE for ESP-ER; 1191 m (0.74 mi) ESE for FSAR)	Vegetable						
	Adult	4.4E-01	4.9E+00	NA	3.7E-01	4.0E+00	NA
	Teen	5.7E-01	6.6E+00	NA	**5.8E-01**	5.5E+00	NA
	Child	1.1E+00	1.3E+01	NA	**1.3E+00**	1.1E+01	NA
Nearest Residence (1545 m (0.96 mi) NNE for ESP-ER; 1191 m (0.74 mi) ESE for FSAR)	Plume	1.4E+00	NA	4.0E+00	3.2E-01	**3.2E-01**	6.5E-01
	Inhalation						
	Adult	2.0E-01	1.0E+00	NA	9.9E-03	7.2E-01	NA
	Teen	2.0E-01	1.3E+00	NA	1.0E-02	9.3E-01	NA
	Child	1.8E-01	1.5E+00	NA	9.6E-03	1.1E+00	NA
	Infant	1.0E-01	1.3E+00	NA	5.8E-03	1.0E+00	NA
Nearest Meat Cow (2205 m (1.37 mi) SE for ESP-ER; 1191 m (0.74 mi) ESE for FSAR)	Meat						
	Adult	6.7E-02	1.5E-01	NA	**1.3E-01**	**2.6E-01**	NA
	Teen	4.9E-02	1.1E-01	NA	**1.1E-01**	**2.0E-01**	NA
	Child	7.9E-02	1.7E-01	NA	**2.0E-01**	**3.4E-01**	NA

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1
NAPS ESP VAR 12.2-1

12.02-1

Table 12.2-18bR Gaseous Pathway Doses to the MEI (mrem/yr)

		ESP			Unit 3		
Location	**Pathway**	**Total Body**	**Thyroid**	**Skin**	**Total Body**	**Thyroid**	**Skin**
Nearest Garden/ Residence/ Meat Cow (Varies for ESP-ER; 1191 m (0.74 mi) ESE for FSAR)	All						
	Adult	1.6E+00	4.9E+00	4.0E+00	8.3E-01	**5.3E+00**	6.5E-01
	Teen	1.6E+00	6.6E+00	4.0E+00	1.0E+00	**7.0E+00**	6.5E-01
	Child	1.6E+00	1.3E+01	4.0E+00	**1.9E+00**	1.3E+01	6.5E-01
	Infant	1.5E+00	1.3E+00	4.0E+00	3.3E-01	**1.4E+00**	6.5E-01

Notes:

1. There are no infant doses for the vegetable and meat pathways because infants do not consume these foods.
2. "NA" denotes "not applicable."
3. 1 mrem = 0.01 msv
4. For Unit 3, the doses shown for "nearest garden/residence/meat cow" location are the sum of garden, residence, and meat cow doses at 1191m ESE. For ESP, these doses are the maximum of garden, residence, and meat cow doses at 1513m NE, 1545 m NNE, and 2205m SE, respectively. The site boundary and residence plume doses include ground shine contribution.
5. The maximum (child) bone dose for Unit 3 from all gaseous effluent pathways is shown in Table 12.2-203.

N130R1
12.02-10

12.02-11

Table 12.2-19bR Comparison of Annual Liquid Release Concentrations with 10 CFR 20 Limit

NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1
NAPS ESP VAR 12.2-3

	Unit 3 Annual Release		Unit 3 Concentration		Units 1, 2 & 3 Concentration	ECL	Units 1, 2, & 3 Fraction of ECL
Nuclide	MBq/yr	Ci/yr	Bq/ml	µCi/ml	µCi/ml	µCi/ml	
I-131	1.55E+02	4.2E-03	7.8E-07	2.1E-11	5.6E-08	1.0E-06	5.6E-02
I-132	3.03E+01	8.2E-04	1.5E-07	4.1E-12	8.5E-09	1.0E-04	8.5E-05
I-133	7.77E+02	2.1E-02	4.1E-06	1.1E-10	6.2E-08	7.0E-06	8.9E-03
I-134	1.48E+00	4.0E-05	7.4E-09	2.0E-13	1.2E-09	4.0E-04	3.0E-06
I-135	2.00E+02	5.4E-03	1.0E-06	2.7E-11	3.6E-09	3.0E-05	1.2E-04
H-3	5.18E+05	1.4E+01	4.4E-03	1.2E-07	5.6E-06	1.0E-03	5.6E-03
Na-24	**1.89E+02**	**5.1E-03**	9.6E-07	2.6E-11	2.6E-11	5.0E-05	5.1E-07
P-32	1.55E+01	4.2E-04	7.8E-08	2.1E-12	2.1E-12	9.0E-06	2.3E-07
Cr-51	4.81E+02	1.3E-02	2.4E-06	6.6E-11	8.9E-11	5.0E-04	1.8E-07
Mn-54	5.92E+00	1.6E-04	3.7E-08	1.0E-12	4.0E-11	3.0E-05	1.3E-06
Mn-56	4.81E+01	1.3E-03	2.4E-07	6.5E-12	6.5E-12	7.0E-05	9.3E-08
Fe-55	8.51E+01	2.3E-03	6.3E-07	1.7E-11	1.7E-11	1.0E-04	1.7E-07
Fe-59	2.59E+00	7.0E-05	1.3E-08	3.6E-13	2.6E-11	1.0E-05	2.6E-06
Co-58	1.63E+01	4.4E-04	8.9E-08	2.4E-12	7.4E-10	2.0E-05	3.7E-05
Co-60	3.33E+01	9.0E-04	2.7E-07	7.2E-12	6.7E-11	3.0E-06	2.2E-05
Cu-64	**4.81E+02**	**1.3E-02**	2.4E-06	6.5E-11	6.5E-11	2.0E-04	3.3E-07
Zn-65	1.67E+01	4.5E-04	1.0E-07	2.8E-12	2.8E-12	5.0E-06	5.6E-07
Zn-69m	**3.40E+01**	**9.2E-04**	1.7E-07	4.6E-12	4.6E-12	6.0E-05	7.7E-08
Br-83	**3.33E+00**	**9.0E-05**	1.7E-08	4.5E-13	4.5E-13	9.0E-04	5.0E-10

12.02-3

Table 12.2-19bR Comparison of Annual Liquid Release Concentrations with 10 CFR 20 Limit

NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1
NAPS ESP VAR 12.2-3

12.02-3

	Unit 3 Annual Release		**Unit 3 Concentration**		**Units 1, 2 & 3 Concentration**	**ECL**	**Units 1, 2, & 3 Fraction of ECL**
Nuclide	**MBq/yr**	**Ci/yr**	**Bq/ml**	**µCi/ml**	**µCi/ml**	**µCi/ml**	
Sr-89	8.14E+00	2.2E-04	4.4E-08	1.2E-12	1.1E-10	8.0E-06	1.4E-05
Sr-90	7.40E-01	2.0E-05	6.3E-09	1.7E-13	1.2E-11	5.0E-07	2.4E-05
Sr-91	**4.44E+01**	**1.2E-03**	2.2E-07	6.0E-12	2.5E-11	2.0E-05	1.3E-06
Y-91	5.18E+00	1.4E-04	2.7E-08	7.4E-13	1.3E-10	8.0E-06	1.6E-05
Sr-92	1.07E+01	2.9E-04	5.6E-08	1.5E-12	1.5E-12	4.0E-05	3.6E-08
Y-92	**4.07E+01**	**1.1E-03**	2.0E-07	5.5E-12	5.5E-12	4.0E-05	1.4E-07
Y-93	**4.44E+01**	**1.2E-03**	2.2E-07	6.0E-12	6.0E-12	2.0E-05	3.0E-07
Zr-95	7.40E-01	2.0E-05	4.1E-09	1.1E-13	2.1E-11	2.0E-05	1.1E-06
Nb-95	7.40E-01	2.0E-05	3.7E-09	1.0E-13	2.2E-11	3.0E-05	7.4E-07
Mo-99	1.11E+02	3.0E-03	5.6E-07	1.5E-11	9.9E-08	2.0E-05	5.0E-03
Tc-99m	**2.04E+02**	**5.5E-03**	1.0E-06	2.8E-11	8.5E-08	1.0E-03	8.5E-05
Ru-103	1.48E+00	4.0E-05	7.8E-09	2.1E-13	2.1E-13	3.0E-05	6.9E-09
Ru-105	**6.29E+00**	**1.7E-04**	3.1E-08	8.5E-13	8.5E-13	7.0E-05	1.2E-08
Te-129m	3.33E+00	9.0E-05	1.7E-08	4.6E-13	4.6E-13	7.0E-06	6.6E-08
Te-131m	3.70E+00	1.0E-04	1.9E-08	5.0E-13	5.0E-13	8.0E-06	6.3E-08
Te-132	7.40E-01	2.0E-05	3.7E-09	1.0E-13	4.8E-09	9.0E-06	5.3E-04
Cs-134	2.52E+01	6.8E-04	1.9E-07	5.0E-12	1.8E-08	9.0E-07	2.0E-02
Cs-136	1.52E+01	4.1E-04	7.8E-08	2.1E-12	2.6E-09	6.0E-06	4.3E-04
Cs-137	6.66E+01	1.8E-03	5.6E-07	1.5E-11	1.2E-07	1.0E-06	1.2E-01

Table 12.2-19bR Comparison of Annual Liquid Release Concentrations with 10 CFR 20 Limit

NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1
NAPS ESP VAR 12.2-3

	Unit 3 Annual Release		Unit 3 Concentration		Units 1, 2 & 3 Concentration	ECL	Units 1, 2, & 3 Fraction of ECL
Nuclide	**MBq/yr**	**Ci/yr**	**Bq/ml**	**µCi/ml**	**µCi/ml**	**µCi/ml**	
Ba-139	**1.48E+00**	**4.0E-05**	7.4E-09	2.0E-13	2.0E-13	2.0E-04	1.0E-09
Ba-140	3.03E+01	8.2E-04	1.5E-07	4.1E-12	9.6E-11	8.0E-06	1.2E-05
Ce-141	2.59E+00	7.0E-05	1.3E-08	3.6E-13	3.6E-13	3.0E-05	1.2E-08
La-142	**1.11E+00**	**3.0E-05**	5.6E-09	1.5E-13	1.5E-13	1.0E-04	1.5E-09
Ce-143	1.11E+00	3.0E-05	5.6E-09	1.5E-13	1.5E-13	2.0E-05	7.5E-09
Pr-143	3.33E+00	9.0E-05	1.7E-08	4.5E-13	4.5E-13	2.0E-05	2.3E-08
W-187	**8.88E+00**	**2.4E-04**	4.4E-08	1.2E-12	1.2E-12	3.0E-05	4.0E-08
Np-239	4.07E+02	1.1E-02	2.0E-06	5.5E-11	5.5E-11	2.0E-05	2.8E-06
Total w/o H-3	3.62E+03	9.80E-02	1.9E-05	5.1E-10	4.6E-07	NA	2.1E-01
Total w/ H-3	5.22E+05	1.41E+01	4.5E-03	1.2E-07	6.1E-06	NA	2.2E-01

Note: Concentrations for Units 1 and 2 are obtained from NAPS UFSAR Table 11.2-14. ECLs are from 10 CFR 20, Appendix B, Table 2, Column 2.

12.02-3

NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1

Table 12.2-20aR Liquid Pathway Offsite Dose Calculation Bases

	Calculation Methodology	RG 1.109
	Computer Code Utilized	LADTAP II (NUREG/CR-4013)
	Individual Consumption/Exposure Rates	Table E-5 of RG 1.109
	Site Water Type	Freshwater
NAPS COL 12.2-3-A	Liquid Effluent Discharge Rate	3.8E+02 liters/min (0.223 ft^3/sec)
NAPS COL 12.2-3-A	Shore-Width Factor	0.3
NAPS COL 12.2-3-A	Dilution Factor	1000
NAPS COL 12.2-3-A	Transit times from discharge to the receiving water body to exposure location	All pathways: instantaneous
NAPS COL 12.2-3-A	Irrigation rate	None - lake water is not used for irrigation
NAPS COL 12.2-3-A	Fraction of year that leafy vegetables are grown	Not used in liquid pathway dose calculation
NAPS COL 12.2-3-A	Fraction of year that animals graze on pasture	Not used in liquid pathway dose calculation
NAPS COL 12.2-3-A	Fraction of daily feed that is pasture grass when the animal grazes on pasture	Not used in liquid pathway dose calculation
NAPS COL 12.2-3-A	Animal milk considered for milk pathway	Not used in liquid pathway dose calculation
NAPS COL 12.2-3-A	Liquid Pathway Offsite Annual Doses	Table 12.2-20bR

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NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1

Table 12.2-20bR Liquid Pathway Doses from Unit 3 for Maximally Exposed Individuals at Lake Anna

12.02-3

	ESP-ER Dose (mrem/yr)			Unit 3 Dose (mrem/yr)		
Pathway	**Total Body**	**Thyroid**	**Bone**	**Total Body**	**Thyroid**	**Bone**
Fish	5.1E-01	NA	2.3E-00	7.8E-02	NA	1.2E-00
Invertebrate	6.6E-02	NA	1.5E-01	8.3E-03	NA	6.5E-02
Drinking	2.0E-01	6.5E-01	2.7E-02	4.1E-03	1.8E-01	5.6E-03
Shoreline	3.0E-02	3.0E-02	3.0E-02	3.0E-03	3.0E-03	3.0E-03
Swimming	3.2E-04	3.2E-04	3.2E-04	1.2E-04	1.2E-04	1.2E-04
Boating	4.0E-04	4.0E-04	4.0E-04	1.5E-04	1.5E-04	1.5E-04
Total	8.1E-01	6.8E-01	2.5E-00	9.4E-02	1.8E-01	1.3E-00
Age group receiving maximum dose	Adult	Infant	Child	Adult	Infant	Child

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Notes: 1. Bone of the child is the organ receiving the maximum dose.
2. There are no infant doses for the fish and invertebrate pathways because infants do not consume these foods.
3. "NA" denotes "not applicable."
4. 1 mrem = 0.01 mSv

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NAPS COL 12.2-2-A
NAPS
ESP COL 11.1-1

Table 12.2-201 Comparison of Annual Doses to the MEI from Gaseous Effluents Per Unit

Type of Dose	Location	ESP (Single Unit)	Unit 3	10 CFR 50 Limit	
Gamma Air (mrad/yr)	Site Boundary	3.2	2.2	10	12.02-1
Beta Air (mrad/yr)	Site Boundary	4.8	2.5	20	12.02-1
Total Body (mrem/yr)	Site Boundary	2.4	1.6	5	
Skin (mrem/yr)	Site Boundary	6.2	4.0	15	
Iodines and Particulates - Thyroid (mrem/yr)	Garden/ Residence/ Meat Cow	12	11	15	S027

1 mrad = 0.01 mGy
1 mrem = 0.01 mSv

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NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1

Table 12.2-202 Comparison of Annual Doses to MEI from Liquid Effluents Per Unit

Type of Dose	Location	ESP (Single Unit)	Unit 3	10 CFR 50 Limit
Total Body (mrem/yr)	Lake Anna	0.81	0.094	3
Bone (mrem/yr)	Lake Anna	2.5	1.3	10

1 mrem = 0.01 msv

NAPS COL 12.2-2-A
NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1
NAPS ESP VAR 12.2-4

Table 12.2-203 Comparison of Site Doses to the MEI

Type of Dose	ESP Site Total(1)	Unit 3 (ESBWR) Liquid	Gaseous	Total (5)	Existing Units(2)	Site Total(3)	40 CFR 190 Limit	12.02-10 12.02-12
Total Body (mrem/yr)	6.8	0.094	1.9	2.0	**5.0**	**6.9**	25	①
Thyroid (mrem/yr)	27	0.18	13	13	**5.1**	18	75	①
Bone (mrem/yr)	12	1.3	8.0	9.2	**5.1**	**14**	25	①

Notes:

1. The ESP site total doses are for two new units and two existing units, and do not include a dose contribution from the ISFSI.
2. The doses from existing units include ISFSI contribution and an assumed dose of 1 mrem/yr due to direct radiation from the existing units. 12.02-10
3. This site total dose includes the Unit 3 total dose and the dose from the existing units.
4. 1 mrem = 0.01 mSv 12.02-12
5. Unit 3 total annual doses include a Turbine Building skyshine contribution of less than 1.66E-04 mrem/yr.

① N117, 12.02-1, 12.02-2, 12.02-10

NAPS COL 12.2-2-A
NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1

Table 12.2-204 Collective Total Body (Population) Doses Within 50 Miles

	Units in person-rem/yr	
	ESP (Single Unit)	**Unit 3**
Liquid	8.6	1.0
Noble Gases (Gaseous)	3.5	1.5
Iodines and Particulates (Gaseous)	1.4	0.88
H-3 and C-14 (Gaseous)	14	5.3
Gaseous Total	19	7.7
Total	28	8.7

12.02-1

Notes:
1. 1 rem = 0.01 Sv
2. ESP doses are based on data from ESP-ER Tables 2.5-8, 5.4-1, and 5.4-3.
3. The corresponding collective thyroid doses for Unit 3 are 0.69 person-rem/year from liquid effluents and 28 person-rem/year from gaseous effluents.
4. The long-term χ/Q and D/Q values used in deriving Unit 3 collective doses from routine gaseous effluent releases within 50 miles of the plant are shown in Tables 2.3-208 to 2.3-215.

12.02-11

12.3 Radiation Protection

IS027

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

12.3.1.3 Radiation Zoning

Replace the last sentence with the following.

STD COL 12.3-3-H Access to "Very High Radiation Areas" is discussed in Section 12.5. IS098

12.3.4 Area Radiation and Airborne Radioactivity Monitoring Instrumentation

Replace the last bullet with the following.

STD COL 12.3-2-A The radiation instrumentation that monitors airborne radioactivity is classified as nonsafety-related. Airborne radiation monitoring operational considerations, such as the procedures for operation and calibration of the monitors, as well as the placement of the portable monitors, are discussed in Section 12.5.

12.3.7 COL Information

12.3-2-A Operational Considerations

STD COL 12.3-2-A This COL item is addressed in Section 12.3.4.

12.3-3-H Controlled Access

IS098

STD COL 12.3-3-H This COL item is addressed in Section 12.3.1.3. IS098

12.4 Dose Assessment

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

12.4.7.1 Annual Doses to Construction Workers

IN067

NAPS SUP 12.4-1 Doses to construction workers were addressed in ESP-ER Section 4.5 and associated impacts were resolved as SMALL in FEIS Section 4.9.

The ESP-ER analysis has been reviewed to evaluate the following more recent information:

- The current locations and readings for TLDs located closest to the Unit 3 site.
- The most recent effluent release data for Units 1 and 2 as reported in the 2006 Annual Radioactive Effluent Release Report (Reference 12.4-201).
- Spent fuel cask types planned for the onsite Independent Spent Fuel Storage Installation have changed.
- The estimated peak number of construction workers is now 2500-3000 (versus 5000 in the ESP-ER).

Based on the results of this review, it is concluded that the 120 person-rem calculated in the ESP-ER remains a conservative estimate of the maximum annual collective dose to the construction work force.

12.4.9 References

IS127

12.4-201 Annual Radioactive Effluent Release Report, January 1, 2006 – December 31, 2006, Dominion Virginia Power.

12.5 Operational Radiation Protection Program

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

12.5.3 Operational Considerations

Replace this section with the following.

STD COL 12.5-1-A
STD COL 12.5-2-A
STD COL 12.5-3-A

The operational program for radiation protection is addressed in Appendix 12BB.

12.5.4 COL Information

12.5-1-A Equipment, Instrumentation, and Facilities

STD COL 12.5-1-A This COL item is addressed in Appendix 12BB.

12.5-2-A Compliance with 10 CFR Part 50.34(f)(2)(xxvii) and NUREG-0737 Item III.D.3.3

IS076
12.03-12.04-
9

STD COL 12.5-2-A This COL item is addressed in Appendix 12BB.

12.5-3-A Radiation Protection Program

STD COL 12.5-3-A This COL item is addressed in Appendix 12BB.

12.6 Minimization of Contamination and Radwaste Generation

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

12.6.1 Minimization of Contamination to Facilitate Decommissioning

Add the following at the end of this section.

STD SUP 12.6-1 In addition to design features, measures are implemented in operating procedures to minimize contamination. Appendix 12BB establishes contamination control measures to ensure compliance with 10 CFR 20.1406. Practical measures to prevent the spread of contamination are employed, including:

- Engineering controls, such as portable ventilation or filtration units to reduce concentrations of radioactivity in air or fluids, are used where practical
- Criteria for selecting tools, material, and equipment for use in contaminated areas include minimizing the use of porous or other materials that are difficult to decontaminate
- Leaks and spills are contained promptly and repaired or cleaned up as soon as practical
- Containments, caches, and enclosures are used during maintenance, repairs, and testing, when practical, to contain spills or releases
- Contaminated tools and equipment are segregated from clean tools and equipment
- Potentially contaminated systems, equipment, and components are surveyed for the presence of contamination when opened or prior to removal
- Procedures ensure that equipment performs and is operated in accordance with the design requirements

- Temporary and permanent design modifications require compensatory measures be taken to prevent and limit the spread of contamination

Appendix 12A Calculation of Airborne Radionuclides

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

Appendix 12B Calculation of Airborne Releases

This section of the referenced DCD is incorporated by reference with no departures or supplements. S012

STD SUP 12.1-1

Appendix 12AA ALARA Program

NEI 07-08, Generic FSAR Template Guidance for Ensuring that Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA), which is currently under review by the NRC staff, is incorporated by reference. (Reference 12AA-201)

12AA.1 References

12AA-201 Nuclear Energy Institute (NEI), Generic FSAR Template Guidance for Ensuring that Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA), NEI 07-08.

STD COL 12.1-1-A
STD COL 12.1-2-A
STD COL 12.1-3-A
STD COL 12.1-4-A
STD COL 12.5-1-A
STD COL 12.5-2-A
STD COL 12.5-3-A

Appendix 12BB Radiation Protection

NEI 07-03, Generic FSAR Template Guidance for Radiation Protection Program Description, which is currently under review by the NRC staff, is incorporated by reference with the following supplemental information. (Reference 12BB-201) 12.03-12.04-2

12.5.2.4 Radiation Protection Technicians

S122
12.05-2

Delete the third paragraph.

12.5.3.1 Facilities

Delete the first and second paragraphs.

12.5.3.2 Monitoring Instrumentation and Equipment

Delete the third paragraph.

12.5.3.3 Personal Protective Clothing and Equipment

S122

Delete the last sentence in the first paragraph.

12.5.4.2 Methods to Maintain Exposures ALARA

Delete the second paragraph.

12.5.4.4 Access Control

Isometric drawings of the Very High Radiation Areas (VHRA) are included in DCD Section 12.3.

Physical access controls include postings, barricades, physical barriers, and the use of locks that are keyed so only keys designated as VHRA can open the locks. Additionally, entry into a VHRA is allowed only with a specific (Special) radiation work permit.

12.5.4.12 Quality Assurance

S115c

Replace the bracketed text in the first paragraph with Section 17.5.

12BB.1 References

12BB-201 Nuclear Energy Institute (NEI), Generic FSAR Template Guidance for Radiation Protection Program Description, NEI 07-03.

Chapter 13 Conduct of Operations

The introductory paragraph of this chapter of the referenced DCD is incorporated by reference with no departures or supplements.

13.1 Organizational Structure of Applicant

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

DCD Section 13.1.1, Combined License Information, is renumbered in this FSAR as Section 13.1.4 for administrative purposes to allow section numbering to be consistent with RG 1.206 and the Standard Review Plan.

Replace the first paragraph with the following.

NAPS COL 13.1-1-A This section describes the organization of Unit 3. The organizational structure is described in this section and is consistent with the Human System Interface (HSI) design assumptions used in the design of the ESBWR as described in DCD Chapter 18. The organizational structure is consistent with the ESBWR HFE design requirements and complies with the requirements of 10 CFR 50.54(i) through (m). N03 1b

13.1.1 Management and Technical Support Organization

Dominion has over 35 years of experience in the design, construction, and operation of nuclear generating stations. Dominion and its affiliates currently operates seven nuclear units at four sites located in Virginia, Connecticut, and Wisconsin.

Corporate offices provide support for the nuclear stations. Figure 13.1-205 illustrates the relationship of the nuclear organization to other divisions of Dominion. This support includes executive level management to provide strategic and financial support for plant initiatives, coordination of functional efforts division-wide, and functional level management in areas such as training, security, emergency planning, and engineering analysis. N121c

Figure 13.1-204 provides a high-level illustration of the nuclear organization. More detailed charts and position descriptions, including qualification requirements and staffing numbers for corporate support staff, are maintained in corporate offices. ①

① 13.01.01-3

Changes to the organization described herein are reviewed under the provisions of 10 CFR 50.54(a) to ensure that any reduction in commitments in the QAPD (as accepted by the NRC) are submitted to, and approved by the NRC, prior to implementation. 17.05-7

13.1.1.1 Design, Construction, and Operating Responsibilities

The chief nuclear officer (CNO) has overall responsibility for functions involving planning, design, construction, and operation of Dominion's nuclear units. Line responsibilities for those functions are passed to the executives in charge of nuclear operations, engineering and technical services, planning, development, and oversight, who maintain direct control of nuclear plant activities.

The first priority and responsibility of each member of the nuclear staff throughout the life of the plant is nuclear safety. Decision making for station activities is performed in a conservative manner with expectations of this core value regularly communicated to appropriate personnel by management interface, training, and station directives.

Lines of authority and communication clearly and unambiguously establish that utility management directs the project.

At key project milestones, including beginning of construction, fuel load, and commercial operation, senior management will determine if there are sufficient numbers of qualified personnel available to move the project forward.

The construction management organization is shown in Figure 13.1-201. ①

13.1.1.1.1 Design and Construction Responsibilities

This section is included in Appendix 13AA for future designation as historical information.

13.1.1.2 Technical Support for Plant Operations

This section describes the functional groups that will be activated before fuel load. The site vice president will establish the organization of managers, functional managers, supervisors, and staff sufficient to perform required functions for support of safe plant operation. These functions include the following: N103a

- Nuclear, mechanical, structural, electrical, thermal-hydraulic, metallurgical and material, and instrumentation and controls engineering

① 13.01.01-3

- Plant chemistry
- Radiation protection
- Fueling and refueling operations support
- Maintenance support
- Operations support
- Quality assurance
- Training
- Safety review
- Fire protection
- Emergency organization
- Outside contractual assistance

In the event that station personnel are not qualified to deal with a specific problem, the services of qualified individuals from other functions within the company or outside consultants are engaged. Figure 13.1-204 illustrates the nuclear operating organization. Table 13.1-201 shows the estimated number of positions required for each function. ①

13.1.1.2.1 **Engineering**

The site engineering department consists of system engineering, design engineering, component engineering, project engineering, and engineering programs. These groups are responsible for performing the classical design activities as well as providing engineering expertise for programs such as reactor engineering, fire protection, inservice inspection (ISI), inservice testing (IST), snubbers, and maintenance rule. Corporate engineering provides support for engineering projects, safety and engineering analysis, and nuclear fuels engineering. They are responsible for probabilistic safety assessment and other safety issues, plant system reliability analysis, performance and technical support, core management, and periodic reactor testing. N103a N103a ①

Each of the site engineering groups has a functional manager who reports to the site director of nuclear engineering. N103a

The engineering organization is responsible for:

- Support of plant operations in the engineering areas of mechanical, structural, electrical, thermal-hydraulic, metallurgy and materials, electronic, instrument and control, and fire protection. Priorities for ②

① 13.01.01-3
② 13.01.02- 13.01.03-1

support activities are established based on input from the plant manager with emphasis on issues affecting safe operation of the plant.

- Support of procurement, chemical and environmental analysis, and maintenance activities in the plant as requested by the plant manager
- Performance of design engineering of plant modifications
- Maintaining the design basis by updating the record copy of design documents as necessary to reflect the actual as-built configuration of the plant
- Accident and transient analyses
- Human Factors Engineering design process

Reactor engineering, led by the functional manager in charge of reactor engineering, provides technical assistance in the areas of core operations, core thermal limits, and core thermal hydraulics.

Design work may be contracted to and performed by outside companies in accordance with Appendix 17AA, Sections 2 and 2.2.

N121a ①

13.1.1.2.2 **Plant Chemistry**

A chemistry program is established to monitor and control the chemistry of various plant systems such that corrosion of components and piping is minimized and radiation from corrosion by-products is kept to levels that allow operations and maintenance with radiation doses as low as is reasonably achievable.

The functional manager in charge of chemistry is responsible for maintaining chemistry programs and for monitoring and maintaining the water chemistry of plant systems. The staff of the chemistry department consists of laboratory technicians, support personnel, and supervisors who report to the functional manager in charge of chemistry.

13.1.1.2.3 **Radiation Protection**

A radiation protection (RP) program is established to protect the health and welfare of the surrounding public and personnel working at the plant. The RP program is described in Chapter 12.

The RP department is staffed by radiation protection technicians, support personnel, and supervisors who report to the radiation protection manager. To provide sufficient organizational freedom from operating

Ⓕ 13.01.01-1

pressures, the radiation protection manager reports directly to the director responsible for facility safety and licensing.

Personnel resources of the RP organization are shared between units. A single management organization oversees RP for the units.

13.1.1.2.4 **Fueling and Refueling Operations Support**

The function of fueling and refueling is performed by a combination of personnel from various departments including operations, maintenance, radiation protection, engineering, and reactor technology vendor or other contractor staff. Initial fueling is a function of the startup management organization discussed in Appendix 13AA. Refueling operations are a function of the operations organization.

13.1.1.2.5 **Maintenance Support**

The maintenance department includes mechanical maintenance, electrical maintenance, and instrumentation and control (I&C) groups. Each group includes supervisors, foremen, and technicians in sufficient numbers to provide for the safe and efficient operation of the plant during all phases of plant life.

In support of maintenance activities, planners, schedulers, and parts specialists prepare work packages, acquire proper parts, and develop procedures that provide for the successful completion of maintenance tasks. Maintenance tasks are integrated into the station schedule for evaluation of operating or safe shutdown risk elements and to provide for efficient and safe performance. Functional managers in charge of planning and scheduling report to outage and planning management.

13.1.1.2.6 **Operations Support**

The operations support function is provided under the direction of the operations manager, and includes the following programs:

- Operations procedures
- Operations surveillances
- Equipment tagging preparation
- Fuel handling

13.1.1.2.7 Quality Assurance

Safety-related activities associated with the operation of the plant are governed by the quality assurance (QA) program established in Chapter 17. QA includes:

- Maintenance of the QAPD
- Coordinating the development of audit schedules
- Audit, surveillance, and evaluation of Nuclear Division suppliers
- Quality control (QC) inspection/testing activities

QA management is independent of the station management line organization. The manager of QA reports to the corporate-stationed director of oversight.

Personnel resources of the QA organization are shared between units. A single management organization oversees the QA group for the site.

13.1.1.2.8 Training

The training department is responsible for providing training programs that are established, maintained, and implemented in accordance with applicable plant administrative directives, regulatory requirements, and company operating policies so that station personnel can meet the performance requirements of their jobs in operations, maintenance, technical support, emergency response, and other areas. The training department's responsibilities encompass operator initial license training, requalification training, and plant staff training as well as the plant access training (general employee training) course and radiation worker training. To maintain independence from operating pressures, the manager of training reports to the corporate training organization. Nuclear plant training programs are described in Section 13.2.

To the extent practicable given the differences between plant designs, personnel resources of the training department are shared between units. A single management organization provides oversight of station training activities.

13.1.1.2.9 Safety Review

Review and audit activities are addressed in Chapter 17.

Oversight of station programs, procedures, and activities is performed by the Facilities Safety Review Committee (FSRC), a corporate safety review committee, and Station Nuclear Safety (SNS) department, which | N103a is responsible for corrective actions and assessments. The supervisor in charge of SNS ultimately reports to the site vice president. N103a

Personnel resources of the SNS organization are shared between units. A single management organization oversees the site SNS organization.

In the event of an unplanned reactor trip or significant power reduction, the FSRC is responsible for determining the circumstances, analyzing the cause, and determining that operations can proceed safely before the reactor is returned to power. N103a

13.1.1.2.10 **Fire Protection**

The station is committed to maintaining a fire protection program as described in DCD Section 9.5.1.15. The site executive in charge of plant management has overall responsibility for the fire protection program. Assigning the responsibility at that level provides the authority to obtain the resources and assistance necessary to meet fire protection program objectives, resolve conflicts, and delegate appropriate responsibility to fire protection staff. Fire protection for the facility is organized and administered by fire protection engineer. The fire protection engineer is responsible for development and implementation of the fire protection program, including development of fire protection procedures, and inspections of fire protection systems and functions. The fire protection engineer reports to the functional manager in charge of engineering programs. Functional descriptions for all responsible positions are included in appropriate procedures. Station personnel are responsible for adhering to the fire protection/prevention requirements detailed in Section 9.5.1. The fire brigade is described in Section 13.1.2.1.5. ①

During construction: N121b ①

- The site construction executive is ultimately responsible for fire protection on Unit 3.
- Construction workers will receive fire protection training as part of their indoctrination to the site.
- Periodic fire drills will be conducted on Unit 3.

13.1.1.2.11 **Emergency Organization**

The emergency organization is a matrixed organization composed of personnel who have the experience, training, knowledge, and ability necessary to implement actions to protect the public in the case of emergencies. Managers and station personnel assigned to positions in

① 13.02.02-1

the emergency organization are responsible for supporting the emergency preparedness organization and the emergency plan as required. The staff members of the emergency planning organization administer and orchestrate drills and training to maintain qualification of station staff members, and develop procedures to guide and direct the emergency organization during an emergency. The emergency preparedness manager reports to the corporate-stationed executive in charge of emergency planning via the corporate emergency manager. The site emergency plan organization is described in the Emergency Plan.

13.1.1.2.12 Outside Contractual Assistance

Contract assistance with vendors and outside suppliers is provided by the materials, procurement, and contracts organization. The functional manager in charge of materials, procurement, and contracts reports to the corporate stationed senior manager in charge of materials, purchasing, and contracts.

Resources and management of the materials, procurement, and contracts organization are shared between units.

13.1.1.3 Organizational Arrangement

Organizational arrangement for corporate offices and site organizations reporting directly to corporate offices is presented below.

13.1.1.3.1 Executive/Management Organization

Executive management is ultimately responsible for execution of activities and functions for Unit 3. Executive management establishes expectations such that a high level of quality, safety, and efficiency is achieved in aspects of plant operations and support activities through an effective management control system and an organization selected and trained to meet the above expectations. The executives with direct line of authority for activities associated with the design, construction, and operation of the plant are shown in Figure 13.1-204. Responsibilities of those executives are discussed below. ①

13.1.1.3.1.1 Chief Nuclear Officer

The CNO has the ultimate responsibility for the safe and reliable operation of each nuclear station owned and/or operated by the utility. It is the responsibility of the CNO to provide guidance and direction such that safety-related activities under his/her direction including engineering,

① 13.01.01-2

construction, operations, operations support, maintenance, and planning are performed following the guidelines of the quality assurance program.

The CNO delegates authority and responsibility for operation and support of the site through the senior vice president of nuclear operations, the vice president of engineering, the vice president of support services, the vice president of nuclear development, and the director of nuclear oversight. The CNO has no ancillary responsibilities that might detract attention from nuclear safety matters.

13.1.1.3.1.2 Senior Vice President of Nuclear Operations

The senior vice president of nuclear operations is responsible for the operation of all nuclear plants owned and/or managed by the utility. The senior vice president of nuclear operations maintains direct control of nuclear plant operations through the site vice president. The senior vice president of nuclear operations reports to the CNO.

13.1.1.3.1.3 Vice President of Nuclear Engineering

The vice president of nuclear engineering is responsible for engineering activities associated with operating nuclear plants in the system. The vice president of nuclear engineering performs these functions through managers who are responsible for the functions and programs discussed in Section 13.1.1.2.1. The vice president of nuclear engineering reports to the CNO. ①

13.1.1.3.1.4 Vice President of Support Services

The vice president of support services is responsible for ensuring that nuclear regulatory requirements for operating plants are implemented, and for maintaining lines of communication with the nuclear regulatory authority. The vice president of support services is also responsible for the operating plant support functions of emergency planning, training and development, and security. The direct reports of the vice president of support services include managers responsible for security, training, emergency preparedness, and licensing for the operating plants. The vice president of support services reports to the CNO.

13.1.1.3.1.5 Vice President of Nuclear Development

The vice president of nuclear development is responsible for the preparation, submission, and defense of license applications for new nuclear units before the nuclear regulatory authority and for the implementation of regulatory requirements and license conditions upon

① 13.01.01-2

issuance of the license up to commencement of commercial operations. The vice president of nuclear development is also responsible for engineering oversight and project activities, and for site activities associated with new nuclear units prior to commencement of commercial operations. The direct reports to the vice president of nuclear development include managers responsible for new nuclear projects, new nuclear plant, organizational effectiveness, and licensing and regulatory interface. N121b

13.1.1.3.1.6 **Director of Nuclear Oversight**

The director of nuclear oversight is responsible for the verification of effective company and supplier QA program development, documentation, and implementation. This position is independent of cost and scheduling concerns associated with construction, operations, maintenance, modification, and decommissioning activities for performing quality assurance program verification. Where implementation of any or all of these functions is delegated to suppliers, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, this senior management position retains responsibility for the scope and effective implementation of the quality assurance program for those functions. ①

This management position has the necessary authority and responsibility for verifying quality achievement; identifying quality problems, recommending solutions and verifying implementation of the solutions, and escalating quality problems to higher management levels. This position has the authority to suspend unsatisfactory work and control further processing or installation of non-conforming materials. The authority to stop work delegated to Nuclear Oversight personnel is delineated in procedures. The director of nuclear oversight reports to the chief nuclear officer.

13.1.1.3.1.7 **Director of Nuclear Analysis and Fuel**

The director of nuclear analysis and fuel is responsible for providing nuclear fuel and related business and technical support consistent with the operational needs of the plant. The director of nuclear analysis and fuel is assisted by functional managers of fuel procurement, safety analysis, core design, probabilistic risk assessment, spent fuel storage and handling, fuel performance, and reactor engineering. The director of N103a

① 13.01.01-2

nuclear analysis and fuel reports to the vice president of nuclear engineering.

13.1.1.3.1.8 **Director of Nuclear Engineering, Corporate**

The director of nuclear engineering, corporate, is responsible for providing engineering support to the nuclear stations in the areas of design, projects, and programs, including the fire protection program. This position is supported by the functional managers responsible for design engineering, project engineering, and engineering programs.

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13.1.1.3.1.9 **Fire Protection Engineer**

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The fire protection engineer is responsible for:

- Fire Protection Program requirements, including consideration of potential hazards associated with postulated fires, knowledge of building layout, and system design.
- Post-fire shutdown capability.
- Design, maintenance, surveillance, and quality assurance of fire protection features (e.g., detection systems, suppression systems, barriers, dampers, doors, penetration seals, and fire brigade equipment.
- Fire prevention activities (administrative controls).
- Pre-fire planning, including review and updating of pre-fire plans at least every two years.

The fire protection engineer reports to the site vice president through the corporate director of nuclear engineering. Additionally, the fire protection engineer works with the operations department to coordinate activities and program requirements. In accordance with RG 1.1.89, the fire protection engineer is an individual who has been delegated authority commensurate with the responsibilities of the position, and who has available staff personnel knowledgeable in fire protection and nuclear safety.

13.1.1.3.2 **Site Organization (Operating)**

This position is supported by functional managers responsible for design engineering, project engineering, and engineering programs.

13.1.1.3.2.1 **Site Vice President**

The site vice president reports to the senior vice president of nuclear operations. The site vice president is directly responsible for

① 13.01.02- 13.01.03-1

management and direction of activities associated with the efficient, safe, and reliable operation of the nuclear station, except for those functions delegated to the vice president of nuclear engineering, the vice president of support services, and the director of nuclear oversight. The site vice president is assisted in management and technical support activities by the plant manager and the director in charge of nuclear safety and licensing. The site vice president is responsible for the site fire protection program through the fire protection engineer.

13.1.1.3.2.2 Site Director of Nuclear Engineering

The site director of nuclear engineering is the on-site lead position for engineering and reports to the vice president of nuclear engineering. The site director of nuclear engineering is responsible for engineering activities related to design engineering, system engineering, project engineering, program engineering, and component engineering. The site director of nuclear engineering directs functional managers responsible for each of these engineering areas.

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13.1.1.3.2.2.1 Functional Managers in Charge of System Engineering

The functional managers in charge of system engineering supervise a technical staff of engineers and other engineering specialists and coordinate their work with that of other groups. System engineering staff includes reactor engineering. The functional manager in charge of system engineering reports to the site director of nuclear engineering and is responsible for providing direction and guidance to system engineers as follows:

- Monitoring the efficiency and proper operation of balance of plant and reactor systems.
- Planning programs for improving equipment performance, reliability, or work practices.
- Conducting operational tests and analyzing the results.
- Identification of plant spare parts for systems within his/her cognizance.

① 13.01.01-2

13.1.1.3.2.2.2 Functional Managers in Charge of Design Engineering

The functional managers in charge of design engineering report to the site director of nuclear engineering and are responsible for:

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- Resolution of design issues.
- On-site development of design related change packages and plant modifications.
- Management of contractors who may perform modification or construction activities.
- Maintaining configuration control program.

13.1.1.3.2.2.3 Functional Managers in Charge of Engineering Programs

The functional managers in charge of engineering programs report to the site director of nuclear engineering and are responsible for programs such as:

- Materials engineering
- Performance/ISI engineering
- Valve engineering
- Maintenance rule tracking and trending
- Piping erosion corrosion
- In-service testing
- Fire protection
- Predictive Analysis

13.1.1.3.2.2.4 Functional Manager in Charge of Projects

The functional manager in charge of projects reports to the site director of nuclear engineering and is responsible for:

- Development of maintenance programs and specifications of selected plant equipment.
- Planned upgrades to equipment such as turbine rotors and major component replacement.
- Implementation of effective project management of contractors.
- Implementation of effective project management methods and procedures, including cost controls, for implementation of modifications and construction activities.

① 13.01.01-2

13.1.1.3.2.2.5 Functional Manager in Charge of Component Engineering

The functional manager in charge of component engineering reports to the site director of nuclear engineering. This position is supported by a staff of experts in specialized areas including pumps, AOVs, MOVs, and safety and relief valves. The staff provides support to the maintenance department and to other engineering groups.

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13.1.1.3.2.3 Manager of Organizational Effectiveness

The responsibilities of the manager of organizational effectiveness include establishing processes and procedures to facilitate identification and correction of conditions adverse to quality and implementing corrective actions. The functional manager in charge of corrective actions and assessments reports to the director of nuclear safety and licensing.

13.1.1.3.2.4 Functional Manager in Charge of Plant Licensing

The functional manager in charge of plant licensing is responsible for providing a coordinated focus for interface with the NRC, and for technical direction and administrative guidance to the licensing staff for the following activities:

- Developing licensee event reports (LERs) and responding to notices of violations.
- Preparing/submitting license amendments and updating the FSAR.
- Tracking commitments and answering generic letters.
- Analyzing operating experience data and monitoring industry issues.
- Preparing the station for special NRC inspections, interfacing with NRC inspectors, and interpreting NRC regulations.
- Maintaining the licensing basis.

The functional manager in charge of plant licensing reports to the director of nuclear safety and licensing.

13.1.1.3.2.5 Functional Manager in Charge of Emergency Preparedness

The functional manager in charge of emergency preparedness is responsible for:

- Coordinating and implementing the plant emergency response plan with state and local emergency plans.
- Developing, planning, and executing emergency drills and exercises.

① 13-01.01-2

- Emergency action level development.
- NRC reporting associated with 10 CFR 50.54(q).

The functional manager in charge of emergency preparedness reports to the vice president of nuclear support services through the corporate emergency planning and support management.

13.1.1.3.2.6 **Manager of Nuclear Training**

The manager of nuclear training is responsible for training programs at the site required for the safe and proper operation and maintenance of the plant as described in Section 13.1.1.2.8. The manager of nuclear training supervises a staff of training supervisors who coordinate the development, preparation, and presentation of training programs for nuclear plant personnel and reports through corporate-training and development to the vice president of nuclear support services.

13.1.1.3.2.7 **Functional Manager of Supply Chain Services**

The functional manager of supply chain services is responsible for ① providing sufficient and proper materials to support the material needs of ② the plant and performing related activities including:

- Procedure development
- Materials storage
- Supply system database maintenance
- Meeting quality assurance and internal audit requirements

The functional manager of supply chain services is also responsible for site purchasing. This position reports to the vice president of nuclear support services through the corporate supply chain organization.

13.1.1.3.2.8 **Manager of Nuclear Protection**

The manager of nuclear protection is responsible for:

- Implementation and enforcement of security directives, procedures, and instructions received from appropriate authorities.
- Day-to-day supervision of the security guard force.
- Administration of the security program.
- Training the security force.
- Implementing the fitness-for-duty program.

① 13.01.01-2
② 13.01.02-13.01.03-1

- For Information Only -

The manager of nuclear protection reports to the vice president of support services via corporate security management.

13.1.1.3.2.9 Manager of Nuclear Oversight

The manager of nuclear oversight is responsible for those functions listed in Section 13.1.1.2.7. The manager of nuclear oversight reports to corporate oversight management. ①

13.1.1.4 Qualifications of Technical Support Personnel

Personnel of the technical support organization meet the education and experience qualifications for those described in ANSI/ANS-3.1 (Reference 13.1-201) as endorsed and amended by RG 1.8.

13.1.2 Operating Organization

13.1.2.1 Plant Organization

The plant management, technical support, and plant operating organizations are shown in Figure 13.1-204. The operating organization is described in Sections 13.1.1.3 and 13.1.2. The on-shift organization is shown in Figure 13.1-203. Additional personnel are required to augment normal staff during outages. ②

Nuclear plant employees are responsible for reporting problems with plant equipment and facilities. They are required to identify and document equipment problems in accordance with the QA program. QA program requirements as they apply to the operating organization are described in Section 17.5.

Rules of practice are met through administrative controls as described in Section 17.5. These controls include:

- Establishment of a quality assurance program for the operational phase
- Preparation of procedures necessary to carry out an effective quality assurance program
- A program for review and audit of activities affecting plant safety
- Programs and procedures for rules of practice

Managers and supervisors within the plant operating organization are responsible for establishing goals and expectations for their organization and to reinforce behaviors that promote radiation protection. Specifically,

① 13.01.01-2
② 13.01.02- 13.01.03-3

managers and supervisors are responsible for the following, as applicable to their position within the plant organization:

- Interfacing directly with radiation protection staff to integrate radiation protection measures into plant procedures and designing documents into the planning, scheduling, conduct, and assessment of operations and work.
- Notifying radiation protection personnel promptly when radiation protection problems occur or are identified, taking corrective actions, and resolve deficiencies associated with operations, procedures, systems, equipment, and work practices.
- Training site personnel on radiation protection and providing periodic retraining in accordance with 10 CFR 19 so that personnel are properly instructed and briefed for entry into restricted areas.
- Periodically observing and correcting, as necessary, radiation worker practices.
- Supporting radiation protection management in implementing the radiation protection program.
- Maintaining exposures to site personnel ALARA.

13.1.2.1.1 Site Vice President

① N103a

The site vice president reports to the senior vice president of nuclear operations. The site vice president is directly responsible for management and direction of activities associated with the efficient, safe, and reliable operation of the nuclear station, except for those functions delegated to the vice president of nuclear engineering, the vice president of nuclear support services, and the director of nuclear oversight. The site vice president is assisted in management and technical support activities by the plant manager and the plant safety and licensing (S&L) director. Executive management establishes expectations such that a high level of quality, safety, and efficiency is achieved in aspects of plant operations and support activities through an effective management control system and an organization selected and trained to meet the above objectives.

N103a

Additionally, the site vice president has overall responsibility for occupational and public radiation safety. Radiation protection

N103a

① 13.01.02-13.01.03-1

responsibilities of the site vice president are consistent with the guidance in RG 8.8 and RG 8.10, including the following: N103a

- Providing management radiation protection policy throughout the plant organization
- Providing an overall commitment to radiation protection by the plant organization
- Interacting with and supporting the manager in charge of radiation protection on implementation of the radiation protection program
- Supporting identification and implementation of cost-effective modifications to plant equipment, facilities, procedures and processes to improve radiation protection controls and reduce exposures
- Establishing plant goals and objectives for radiation protection
- Maintaining exposures to site personnel ALARA
- Supporting timely identification, analysis, and resolution of radiation protection problems (e.g., through the plant corrective action program)
- Providing training to site personnel on radiation protection in accordance with 10 CFR 19
- Establishing an ALARA Committee with delegated authority from the site that includes the managers in charge of operations, maintenance, engineering, and radiation protection to help provide for effective implementation of line organization responsibilities for maintaining worker doses ALARA

The site vice president is responsible for the site fire protection program through the fire protection engineer. ① N103a

The succession of responsibility for overall plant instructions or special orders in the event of absences, incapacitation of personnel, or other emergencies is as follows, unless otherwise designated in writing:

1. The site vice president
2. The plant manager N103a
3. The manager of nuclear operations

The succession of authority includes the authority to issue standing or special orders as required.

① 13.01.02-13.01.03-1

13.1.2.1.1.1 Plant Manager

The plant manager reports to the site vice president, is responsible for safe operation of the plant, and has control over onsite activities necessary for safe operation and maintenance of the plant including the following: N103a

- Operations
- Maintenance and modification
- Outage and planning management N103a

13.1.2.1.1.2 Director of Nuclear Safety & Licensing

The director of nuclear safety and licensing reports to the site vice president, is responsible for safe operation of the plant, and has control over onsite activities necessary for safe operation and maintenance of the plant including the following: N103a

- Procedures
- Licensing
- Radiation protection
- Chemistry and radiochemistry
- Organizational effectiveness

13.1.2.1.1.3 Maintenance Manager

Maintenance of the plant is performed by the maintenance department mechanical, electrical, and instrumentation and control disciplines. The functions of this department are to perform preventive and corrective maintenance, equipment testing, and to implement modifications as necessary.

The manager in charge of plant maintenance is responsible for the performance of preventive and corrective maintenance and modification activities required to support operations, including compliance with applicable standards, codes, specifications, and procedures. The maintenance manager is responsible for the development of maintenance programs. The maintenance manager reports to the plant manager and provides direction and guidance to the maintenance discipline functional managers and maintenance support staff. ①

① 13.01.01-4

13.1.2.1.1.4 Maintenance Discipline Functional Managers

The functional managers of each maintenance discipline (mechanical, electrical, instrumentation and control, and support) are responsible for maintenance activities within their discipline including plant modifications. They provide guidance in maintenance planning and craft supervision. They establish the necessary manpower levels and equipment requirements to perform both routine and emergency type maintenance activities, seeking the services of others in performing work beyond the capabilities of the plant maintenance group. Each discipline functional manager is responsible for liaison with other plant staff organizations to facilitate safe operation of the station. These functional managers report to the maintenance manager.

13.1.2.1.1.5 Maintenance Discipline Supervisors

The maintenance discipline supervisors and assistant supervisors (mechanical, electrical, and instrumentation and control) supervise maintenance activities, assist in the planning of future maintenance efforts, and guide the efforts of the craft within their discipline. The maintenance discipline supervisors report to the appropriate maintenance discipline functional managers.

13.1.2.1.1.6 Maintenance Mechanics, Electricians, and Instrumentation and Control Technicians

The discipline craft perform electrical and mechanical maintenance and I&C tasks as assigned by the discipline supervisors. They troubleshoot, inspect, repair, maintain, and modify plant equipment and perform Technical Specification surveillances on equipment for which they have cognizance. They perform these tasks in accordance with approved procedures and work packages.

13.1.2.1.1.7 Outage and Planning Manager

The outage and planning manager is responsible for the support functions described in Section 13.1.1.2.5. This manager safely fulfills the responsibilities of planning and scheduling all plant work through a staff which includes a functional manager in each area of planning, scheduling, and outages. The outage and planning manager reports to the plant manager.

13.1.2.1.1.8 Manager of Radiation Protection and Chemistry

N103a

The manager radiation protection and chemistry has the direct responsibility for providing adequate protection of the health and safety of personnel working at the plant and members of the public during activities covered within the scope and extent of the license. This manager's radiation protection responsibilities are consistent with the guidance in RG 8.8 and RG 8.10. They include:

- Managing the radiation protection organization
- Establishing, implementing, and enforcing the radiation protection program
- Providing radiation protection input to facility design and work planning
- Tracking and analyzing trends in radiation work performance and taking necessary actions to correct adverse trends
- Supporting the plant emergency preparedness program and assigning emergency duties and responsibilities within the radiation protection organization
- Delegating authority to appropriate radiation protection staff to stop work or order an area evacuated (in accordance with approved procedures) when, in his or her judgment, the radiation conditions warrant such an action and such actions are consistent with plant safety
- Managing the radioactive waste programs

The manager radiation protection and chemistry reports to the director of safety and licensing and is assisted by the supervisors in charge of radiation protection and the functional manager in charge of chemistry.

N103a

13.1.2.1.1.9 Supervisors in Charge of Radiation Protection

The supervisors in charge of radiation protection are responsible for carrying out the day-to-day operations and programs of the radiation protection department as listed in Section 13.1.1.2.3, to promote safe and efficient plant operation.

Supervisors in charge of radiation protection report to the manager of radiation protection and chemistry.

13.1.2.1.1.10 **Radiation Protection Technicians**

Radiation protection technicians (RPTs) directly carry out responsibilities defined in the radiation protection program and procedures. In accordance with Technical Specifications, an RPT is on site whenever there is fuel in the vessel.

The following are some of the duties and responsibilities of the RPTs:

- In accordance with authority delegated by the manager in charge of radiation protection, stop work or order an area evacuated (in accordance with approved procedures) when, in his or her judgment, the radiation conditions warrant such an action and such actions are consistent with plant safety
- Provide coverage and monitor radiation conditions for jobs potentially involving significant radiation exposure
- Conduct surveys, assess radiation conditions, and establish radiation protection requirements for access to and work within restricted, radiation, high radiation, very high radiation, airborne radioactivity areas, and areas containing radioactive materials
- Provide control over the receipt, storage, movement, use, and shipment of licensed radioactive materials
- Review work packages, proposed design modifications, and operations and maintenance procedures to facilitate integration of adequate radiation protection controls and dose-reduction measures
- Review and oversee implementation of plans for the use of process or other engineering controls to limit the concentrations of radioactive materials in the air
- Provide personnel monitoring and bioassay services
- Maintain, prescribe, and oversee the use of respiratory protection equipment
- Perform assigned emergency response duties.

13.1.2.1.1.11 **Functional Manager in Charge of Chemistry**

The functional manager in charge of chemistry is responsible for development, implementation, and direction and coordination of the chemistry, radiochemistry, and non-radiological environmental monitoring programs. This area includes overall operation of the hot lab, cold lab, emergency offsite facility lab, and non-radiological environmental monitoring. The functional manager in charge of chemistry is responsible for the development, administration, and implementation of procedures and programs which provide for effective compliance with environmental regulations. The functional manager in charge of chemistry reports to the director of safety and licensing via the manager of radiation protection and chemistry and directly supervises the chemistry supervisors. N103a

The functional manager in charge of chemistry is responsible for assuring that a chemistry technician is on site whenever the unit is in modes other than cold shutdown or refueling.

13.1.2.1.1.12 [Deleted] ①

13.1.2.1.2 Operations Department

All operations activities are conducted with safety of personnel, the public, and equipment as the overriding priority. Management personnel of the operations department are responsible for:

- Operation of station equipment
- Monitoring and surveillance of safety- and non-safety-related equipment
- Fuel loading
- Providing the nucleus of emergency and fire-fighting teams

The operations department maintains sufficient licensed and senior licensed operators to staff the MCR continuously using a crew rotation system. The operations department is under the authority of the manager in charge of operations who, through the supervisor in charge of shift operations, directs the day-to-day operation of the plant.

Specific duties, functions, and responsibilities of key shift members are discussed in Section 13.1.2.1.2.5 through Section 13.1.2.1.2.9 and in plant administrative procedures and the Technical Specifications. The minimum shift manning requirements are shown in Table 13.1-202. Expected staffing levels are provided in Table 13.1-201. N103a N103a

For activities that do not require an operator's license, resources of the operations organization may be shared between units. These activities may include administrative functions and tagging. To operate or supervise the operation of more than one unit, an operator (SRO or RO) must hold an appropriate, current license for each unit. A single management organization oversees the operations group for the station units. N103a

① 13.01.02- 13.01.03-1

The Operations Support Section is staffed with sufficient personnel to provide support activities for the operating shifts and overall operations department. The following is an overview of the operations organization.

13.1.2.1.2.1 Manager of Nuclear Operations

The manager of nuclear operations has overall responsibility for the day-to-day operation of the plant. The manager of nuclear operations reports to the plant manager and is assisted by the functional managers of nuclear shift operations, operations support, and operations maintenance support. Either the manager of nuclear operations or the functional manager of nuclear shift operations is SRO licensed.

N103a

13.1.2.1.2.2 Functional Manager of Nuclear Shift Operations

The functional manager of nuclear shift operations, under the direction of the manager of nuclear operations, is responsible for:

- Shift plant operations in accordance with the operating license, Technical Specifications, and written procedures
- Providing supervision of operating shift personnel for operational shift activities including those of emergency and firefighting teams
- Coordinating with the functional manager of operations support and other plant staff sections N103a
- Verifying that nuclear plant operating records and logs are properly prepared, reviewed, evaluated and turned over to the functional manager of operations support ① N103a

The functional manager of nuclear shift operations is assisted in these areas by the on-shift operations manager who directs the operating shift personnel. The functional manager of nuclear shift operations may assume the duties of the manager of nuclear operations in the event of an absence. N103a

13.1.2.1.2.3 Functional Manager of Operations Support

The functional manager of operations support, under the direction of the manager of nuclear operations is responsible for: N103a

- Directing and guiding plant operations support activities in accordance with the operating license, Technical Specifications, and written procedures
- Providing supervision of operating support personnel and operations support activities, and coordination of support activities

① 13.05.02.01-2

- Providing for nuclear plant operating records and logs to be turned over to the nuclear records group for maintenance as quality records
- Supervising operating procedure maintenance ①

The supervisor of operations support is assisted by the supervisors of work management, radwaste operations, operations procedures group, and other support personnel. In the absence of the operations manager, the supervisor of operations support may assume the duties and responsibilities of this position.

13.1.2.1.2.4 **Functional Manager of Operations Maintenance Support**

The functional manager of nuclear operations maintenance support is a licensed SRO reporting directly to the manager of nuclear operations. Responsibilities of this position include:

- Valve lineups for maintenance and testing activities.
- Equipment tagging ②
- Review and authorization of maintenance, surveillance, or other work or testing.
- Keeping the operations shift manager and other operations personnel informed of activities for which they need to be cognizant.
- Verifying that work and testing is safe and appropriate for the existing conditions of the plant.
- Tracking the work and testing to provide assurance that any LCOs or other requirements will not be exceeded.

13.1.2.1.2.5 **Operations Shift Manager**

The operations shift manager is a licensed senior reactor operator (SRO) responsible for the control room command function, and is the plant manager's direct management representative for the conduct of operations. The operations shift manager has the responsibility and authority to direct the activities and personnel onsite as required to:

- Protect the health and safety of the public, the environment, and personnel on the plant site
- Prevent damage to site equipment and structures
- Comply with the operating license

① 13.05.02.01-2

② 13.01.02-13.01.03-1

The operations shift manager retains this responsibility and authority until formally relieved of operating responsibilities by a licensed SRO. Additional responsibilities of the operations shift manager include:

- Directing nuclear plant employees to report to the plant for response to potential and real emergencies
- Seeking the advice and guidance of the shift technical advisor and others in executing his duties whenever in doubt as to the proper course of action
- Promptly informing responsible supervisors of significant actions affecting their responsibilities
- Participating in operator training, retraining, and requalification activities from the standpoint of providing guidance, direction, and instruction to shift personnel

The operations shift manager is assisted in carrying out the above duties by the on-shift unit supervisors and the operating shift personnel. As shown on Figure 13.1-203, the shift operations manager reports to the functional manager of nuclear shift operations. N103a

13.1.2.1.2.6 **On-Shift Unit Supervisor**

The on-shift unit supervisor is a licensed SRO. The main functions of the on-shift unit supervisor are to administratively support the operations shift manager such that the “command function” is not overburdened with administrative duties and to supervise the licensed and non-licensed operators in carrying out the activities directed by the operations shift manager. Other duties and responsibilities include:

- Being aware of maintenance and testing performed during the shift
- Directing reactor shutdown if conditions warrant this action
- Informing the operations shift manager and other station management in a timely manner of conditions which may affect public safety, plant personnel safety, plant capacity or reliability, or cause a hazard to equipment
- Initiating immediate corrective action as directed by the operations shift manager in any upset situation until assistance, if required, arrives
- Participating in operator training, retraining, and requalification activities from the standpoint of providing guidance, direction, and instruction to shift personnel

- Responding conservatively to instrument indications unless they are proved to be incorrect
- Adhering to the plant's technical specifications
- Reviewing routine operating data to assure safe operation

As shown on Figure 13.1-203, the on-shift unit supervisor reports directly to the operations shift manager. IN103a

13.1.2.1.2.7 Reactor Operator

Reactor operators (RO) are licensed personnel and normally report to the on-shift unit supervisor. They are responsible for routine plant operations and performance of major evolutions at the direction of the on-shift unit supervisor. The RO duties and responsibilities include:

- Monitoring control room instrumentation
- Responding to plant or equipment abnormalities in accordance with approved plant procedures
- Directing the activities of non-licensed operators
- Documenting operational activities, plant events, and plant data in shift logs
- Responding conservatively to instrument indications unless they are proved to be incorrect
- Adhering to the plant's technical specifications
- Reviewing routine operating data to assure safe operation
- Initiating plant shutdowns or scrams or other compensatory actions when:
  - Observation of plant conditions indicates a nuclear safety hazard exists
  - Approved procedures so direct
  - The operator determines that the safety of the reactor is in jeopardy
  - Operating parameters exceed any of the reactor protection system setpoints and automatic shutdown does not occur

Whenever there is fuel in the reactor vessel, at least one reactor operator is in the control room monitoring the status of the unit at the main control panel. The RO assigned to the main control panel is designated the Operator-At-The Controls (OATC) and conducts monitoring and operating activities in accordance with the guidance set forth in RG 1.114, which is further described in Section 13.1.2.1.3.

13.1.2.1.2.8 **Non-Licensed Operator**

The non-licensed operators perform routine duties outside the control room as necessary for continuous, safe plant operation including:

- Assisting in plant startup, shutdown, surveillance, and emergency response by manually or remotely changing equipment operating conditions, placing equipment in service, or securing equipment from service at the direction of the RO
- Performing assigned tasks in procedures and checklists such as valve manipulations for plant startup or data sheets on routine equipment checks, and making accurate entries according to the applicable procedure, data sheet, or checklist
- Assisting in training of new employees and improving and upgrading their own performance by participating in the applicable sections of the training program

13.1.2.1.2.9 **Shift Technical Advisor**

The station is committed to meeting NUREG-0737 TMI Action Plan item I.A.1.1 for shift technical advisors (STAs). The STA reports directly to the shift manager and provides advanced technical assistance to the operating shift complement during normal and abnormal operating conditions. The STA's responsibilities are detailed in plant administrative procedures as required by TMI Action Plan I.A.1.1 and NUREG-0737, Appendix C. These responsibilities include:

- Monitoring core power distribution and critical parameters
- Assisting the operating shift with technical expertise during normal and emergency conditions
- Evaluating technical specifications, special reports, and procedural issues

The STA contributes to operations safety by independently observing plant status and advising shift supervision of conditions that could compromise plant safety. During transients or accident situations, the STA independently assesses plant conditions and provides technical assistance and advice to mitigate the incident and minimize the effect on personnel, the environment, and plant equipment.

An SRO on shift who meets the qualifications for the combined SRO/STA position specified for Option 1 of Generic Letter 86-04 (Reference 13.1-202) may also serve as the STA. If this option is used for a shift, the separate STA position may be eliminated for that shift.

13.1.2.1.3 **Conduct of Operations**

Station operations are controlled and coordinated through the control room. Maintenance activities, surveillances, and removal from/return to service of SSCs affecting the operation of the plant may not commence without the authority of senior control room personnel. The rules of practice for control room activities, as described by administrative procedures, which are based on RG 1.114, address the following:

- Position/placement of the workstation for the operator at the controls and the expected area of the control room where the supervisor/manager in charge on shift should spend the majority of on-shift time
- Definition and outline of "surveillance area" and requirement for continuous surveillance by the operator at the controls
- Relief requirements for operator at the controls and the supervisor/manager in charge on shift

In accordance with 10 CFR 50.54 (i), (j), (k), (l), and (m):

- Reactivity controls may be manipulated only by licensed operators and senior operators except as allowed for training under 10 CFR 55
- Apparatus and mechanisms other than controls which may affect reactivity or power level of the reactor shall be operated only with the consent of the operator at the controls or the manager/supervisor in charge on-shift
- An operator or senior operator shall be present at the controls at all times during the operation of the facility
- For each shift, operations management designates one or more SROs to be responsible for directing the licensed activities of licensed operators
- An SRO shall be present at the facility or readily available on call at all times during its operation, and shall be present at the facility during initial start-up and approach to power, recovery from an unplanned or unscheduled shut-down or significant reduction in power, and refueling, or as otherwise prescribed in the facility license

- Minimum shift staffing for operations personnel is shown in Table 13.1-202
- With the unit in modes other than cold shutdown or refueling, there shall be one SRO in the control room at all times. In addition, there shall be one RO or one SRO at the controls whenever there is fuel in the reactor vessel

13.1.2.1.4 Operating Shift Crews

Plant administrative procedures implement the required shift staffing. These provisions establish crews with sufficient qualified plant personnel to staff the operational shifts and be readily available in the event of an abnormal or emergency situation. The objective is to operate the plant with the required staff and to develop work schedules that minimize overtime for plant staff members who perform safety-related functions. Work hour limitations and shift manning requirements defined by TMI Action Plan I.A.1.3 are addressed in station procedures. Shift crew staffing plans may be modified during refueling outages to accommodate safe and efficient completion of outage work in accordance with work hour limitations established in administrative procedures.

The minimum composition of an operating shift depends on the operational mode, as shown in Table 13.1-202. Reporting relationships for these positions are shown in Figure 13.1-203.

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13.1.2.1.5 Fire Brigade ①②

The plant is designed, and the fire brigade organized, to be self-sufficient with respect to fire fighting activities. The fire brigade is organized to deal with fires and related emergencies that could occur. It consists of a fire brigade leader and a sufficient number of team members to be consistent with the equipment that must be put in service during a fire emergency. A sufficient number of trained and physically qualified fire brigade members are available on site during each shift. The fire brigade consists of at least five members on each shift. Members of the fire brigade are knowledgeable of building layout and system design. The assigned fire brigade members for any shift do not include the operations shift manager nor any other members of the minimum shift operating crew necessary for safe shutdown of the unit, nor do they include any other personnel required for other essential functions during a fire emergency. Fire brigade members for a shift are designated in accordance with

① 13.01.02-13.01.03-1
② 9.05.01-12

established procedures at the beginning of the shift. The fire brigade for Unit 3 does not include personnel assigned to Units 1 and 2.

The brigade leader and at least two brigade members have sufficient training in, or knowledge of, plant systems to understand the effects of fire and fire suppressents on safe-shutdown capability. The brigade leader has training or experience necessary to assess the potential safety consequences of a fire and advise control room personnel, as evidenced by possession of an operator's license or equivalent knowledge of plant systems. The qualification of fire brigade members includes an annual physical examination to determine their ability to perform strenuous firefighting activities. ①

13.1.3 Qualification Requirements of Nuclear Plant Personnel

13.1.3.1 Minimum Qualification Requirements

Qualifications of managers, supervisors, operators, and technicians of the operating organization meet the requirements for education and experience described in ANSI/ANS-3.1 (Reference 13.1-201), as endorsed and amended by RG 1.8. For operators and SROs, these requirements are modified in Section 13.2.

13.1.3.2 Qualification Documentation

Resumes and other documentation of qualification and experience of initial appointees to appropriate management and supervisory positions are available for review by regulators upon request after position vacancies are filled.

13.1.4 COL Information

13.1-1-A Organizational Structure

NAPS COL 13.1-1-A This COL item is addressed in Sections 9.5.1.15.3, 13.1.1 through 13.1.3. IS035

13.1.5 References

13.1-201 American Nuclear Society, "American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plant," ANSI/ANS -3.1.

13.1-202 U.S. Nuclear Regulatory Commission, "Generic Letter 86-04, Policy Letter, Engineering Expertise on Shift."

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Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Function Position (ANS-3.1-1993 section)	Nuclear Plant Position (Site-Specific)	Estimated Numbers of Full Time Equivalents*			
			Design Review Phase	Construction Phase	Pre-op Phase	Operational Phase
Executive management	chief nuclear officer (n/a)	CNO Dominion	1**	1**	1**	1**
	senior executive, nuclear operations (n/a)	Senior Vice President, Nuclear Operations	1**	1**	1**	1**
	site executive	Site Vice President - NAPS	1***	1***	1***	1***
Nuclear support	executive, operations support (n/a)	Vice President - Nuclear Support Services	1**	1**	1**	1**
	executive, construction (n/a)	Vice President - Nuclear Development	1**	1**	1**	
	executive, engineering and technical services (n/a)	Vice President - Engineering	1**	1**	1**	1**
Plant management	plant manager (4.2.1)	Plant Manager			1	1
	safety and licensing manager (n/a)	Director Nuclear Station Safety & Licensing			1	1

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Table 13.1-201 Generic Position/Site Specific Position Cross Reference

			Estimated Numbers of Full Time Equivalents*			
Nuclear Function	Function Position (ANS-3.1-1993 section)	Nuclear Plant Position (Site-Specific)	Design Review Phase	Construction Phase	Pre-op Phase	Operational Phase
Operations	manager (4.2.2)	Manager, Operations			1	1
operations, plant	functional manager (4.3.8)	Operations – Shift Supervisor			1	1
operations, admin	functional manager (4.3.8)	Operations – Support Supervisor			1	1
operations, (on-shift)	functional manager (4.4.1)	Shift Manager			6	6
	supervisor (4.4.2)	Unit Supervisor			5	5
	supervisor (4.4.2)	Supervisor, Work Control			5	5
	supervisor (4.6.2)	STA****			5	5
	licensed operator (4.5.1)	Control Room Operator			15	24
	non-licensed operator (4.5.2)	Non-licensed Operator		6	24	30
	rad waste operator (4.5.2)	Rad Waste Operator			1	2
Engineering	manager (4.2.4)	Director, Nuclear Engineering	1	1	1	1
projects	functional manager (4.3.9)	Manager, Projects		1	1	1
	projects engineer (n/a)	Project Engineer	1	3	3	5
system engineering	functional manager (4.3.9)	Supervisor, System Engineering		1	4	4
	system engineer (4.6.1)	System Engineer	1	4	16	16

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Table 13.1-201 Generic Position/Site Specific Position Cross Reference

			Estimated Numbers of Full Time Equivalents*			
Nuclear Function	**Function Position (ANS-3.1-1993 section)**	**Nuclear Plant Position (Site-Specific)**	Design Review Phase	Construction Phase	Pre-op Phase	Operational Phase
design engineering	functional manager (4.3.9)	Supervisor, Design Engineering	1	1	1	1
	design engineer (4.6 – staff engineer)	Design Engineer	3	5	10	15
safety and engineering analysis	functional manager (4.3.9)	Manager, Nuclear Safety Engineering		1	1	1
	analysis engineer (4.6–staff engineer)	Analysis Engineer		1	1	1
engineering programs	functional manager (4.3.9)	Supervisor, Engineering Programs		1	1	1
	programs engineer (4.6–staff engineer)	Programs Engineer		6	12	12
reactor engineering	functional manager (4.3.9)	Supervisor, Reactor Engineering			1	1
	reactor engineer (4.6–staff engineer)	Reactor Engineer		1	3	3
Chemistry	functional manager (4.3.2)	Manager, Radiation Protection & Chemistry		1***	1***	1***
	supervisor (4.4.5)	Chemistry Supervisor		1	1	2
	technician (4.5.3.1)	Chemistry Technician		2	6	10

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① 13.01.02-13.01.03-1

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Table 13.1-201 Generic Position/Site Specific Position Cross Reference

			Estimated Numbers of Full Time Equivalents*			
Nuclear Function	Function Position (ANS-3.1-1993 section)	Nuclear Plant Position (Site-Specific)	Design Review Phase	Construction Phase	Pre-op Phase	Operational Phase
Radiation Protection	functional manager (4.3.3)	Manager, Radiation Protection & Chemistry		1***	1***	1***
	supervisor (4.4.6)	Health Physics Supervisor		2	6	8
	technician (4.5.3.2)	Health Physics Technician		4	12	18
	ALARA specialist (n/a)	ALARA Specialist		1	3	3
	decon technician (n/a)	Decon Technician		2	6	6
Maintenance	manager (4.2.3)	Manager, Maintenance			1	1
instrumentation and control	supervisor (4.4.7)	Supervisor, Instrumentation and Control		1	1	1
	supervisor (4.4.7)	Assistant Supervisor, Instrumentation and Control		2	2	2
	technician (4.5.3.3)	Instrumentation and Control Technician		4	20	30
mechanical	supervisor (4.4.9)	Supervisor, Mechanical		1	1	1
	supervisor (4.4.9)	Assistant Supervisor, Mechanical		2	2	2
	technician (4.5.7.2)	Mechanic		4	20	30
electrical	supervisor (4.4.8)	Supervisor, Electrical		1	1	1
	supervisor (4.4.8)	Assistant Supervisor, Electrical		2	2	2
	technician (4.5.7.1)	Electrician		4	20	30

NAPS COL 13.1-1-A

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

			Estimated Numbers of Full Time Equivalents*			
Nuclear Function	**Function Position (ANS-3.1-1993 section)**	**Nuclear Plant Position (Site-Specific)**	Design Review Phase	Construction Phase	Pre-op Phase	Operational Phase
Planning and scheduling and outage	manager (4.2)	Manager, Outage & Planning			1***	1***
	functional manager (4.3)	Supervisor, Outage & Planning			1	1
	functional manager (4.3)	Supervisor, Scheduling			1	1
	functional manager (4.3)	Supervisor, Planning		1	1	1
Purchasing, and contracts	functional manager (4.3)	Manager, Supply Chain Services		1***	1***	1***
	procurement engineer (n/a)	Procurement Engineer		1	2	2
Quality assurance	functional manager (QAPD)	Director, Nuclear Oversight	1***	1***	1***	1***
	QA lead auditor (QAPD)	QA Auditor	1	1	1	1
	QA internal auditor (QAPD)	QA Auditor		2	2	8***
	QC inspector (QAPD)	QC Inspector		6	6	4***
	supplier auditor (QAPD)	Nuclear Quality Inspector		2	2	1***
	vendor surveillance QC inspector (QAPD)	Vendor Surveillance QC Inspector	2	6	4	4***
	nuclear fuel inspector (QAPD)	Nuclear Fuel Inspector		3***	3***	3***

NAPS COL 13.1-1-A

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Function Position (ANS-3.1-1993 section)	Nuclear Plant Position (Site-Specific)	Estimated Numbers of Full Time Equivalents* Design Review Phase	Construction Phase	Pre-op Phase	Operational Phase
Training	functional manager (4.3.1)	Manager, Training		1***	1***	1***
	supervisor operations training (4.4.4)	Supervisor, Operations Training		1	1	1
	supervisor, simulator (4.4.4)	Supervisor, Simulator & Training Support		1	1	1
	operations training instructor (4.5.4)	Operations Training Instructor		10	10	10
	supervisor tech staff training (4.4.4)	Supervisor, Tech Training		1	1	1
	supervisor maintenance training (4.4.4)	Supervisor, Maintenance Training		1	1	1
	tech staff/maintenance instructors (4.5.4)	Tech Staff/Maintenance Instructor		7	7	7
Nuclear safety assurance	manager (4.2)	Director, Nuclear Safety & Licensing		1***	1***	1***
licensing	functional manager (4.3)	Supervisor, Licensing	1	1	1	1
	licensing engineer (n/a)	Licensing Engineer	4	4	4	2
corrective action	functional manager (4.3)	Supervisor, Station Nuclear Safety		1***	1***	1***
	corrective action engineer	Station Nuclear Safety Engineer		1	1	1

NAPS COL 13.1-1-A

Table 13.1-201 Generic Position/Site Specific Position Cross Reference

Nuclear Function	Function Position (ANS-3.1-1993 section)	Nuclear Plant Position (Site-Specific)	Estimated Numbers of Full Time Equivalents* Design Review Phase	Construction Phase	Pre-op Phase	Operational Phase
Nuclear Protection Services						
emergency preparedness	functional manager (4.3)	Manager, Emergency Planning		1**	1**	1**
	EP planner (n/a)	EP Specialist		2***	2***	2***
security	functional manager (4.3)	Manager, Security		1***	1***	1***
	first line supervisor (4.4)	Supervisor, Nuclear Security		10***	10***	10***
	security officer (n/a)	Security Officer		100***	100***	100***
Startup testing	supervisor (4.4.12)	Startup Testing Supervisor		1	3	1
	startup test engineer	Startup Test Engineer		4	10	4
	supervisor (4.4.11)	Preop Testing Supervisor		2	2	-
	preop test engineer (n/a)	Preop Test Engineer		8	8	-

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* Unless otherwise noted, the number in each block represents the estimated number of full time equivalents dedicated to the project.

** The number in this block indicates total positions in the nuclear organization.

*** Shared position with other North Anna units.

**** A senior reactor operator on shift who meets the qualifications for the combined SRO/STA position specified for Option 1 of Generic Letter 86-04 (Reference 13.1-202) may also serve as the STA. If this option is used for a shift, the separate STA position may be eliminated for that shift.

① 13.01.02-13.01.03-1

NAPS COL 13.1-1-A

Table 13.1-202 Minimum Shift Staffing for Unit 3

N031

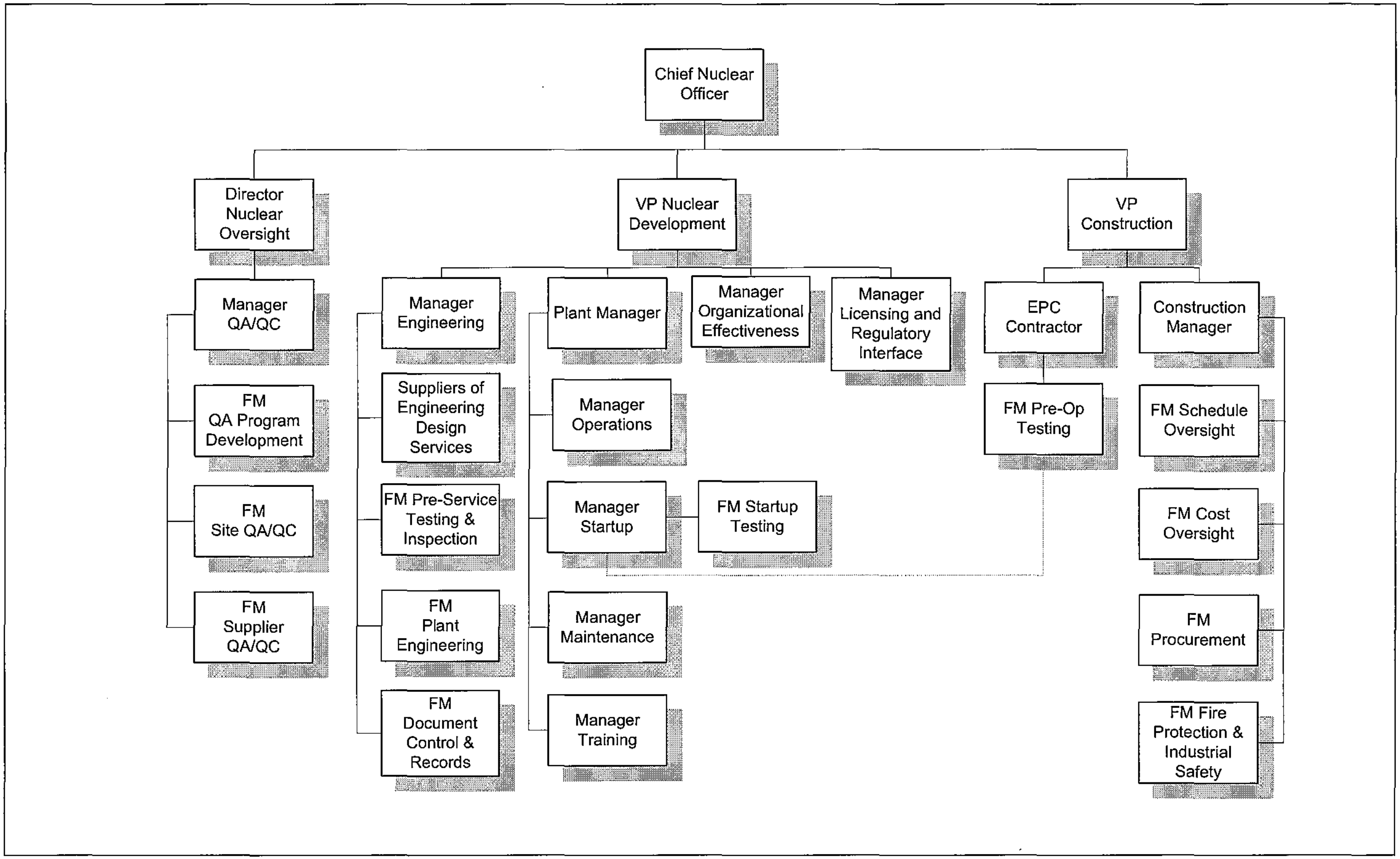
Unit Shutdown	1 SM (SRO) 1 RO 1 NLO
Unit Operating*	1 SM (SRO) 1 SRO 2 RO 2 NLO
SM – shift manager SRO – Licensed Senior Reactor Operator	RO – Licensed Reactor Operator NLO – non-licensed operator

Notes:

1) In addition, one Shift Technical Advisor (STA) is assigned during plant operation in modes other than cold shutdown or refueling. A shift manager or another SRO on shift, who meets the qualifications for the combined Senior Reactor Operator/Shift Technical Advisor (SRO/STA) position, as specified for option 1 of Generic Letter 86-04 (Reference 13.1-202), the commission's policy statement on engineering expertise on shift, may also serve as the STA. If this option is used for a shift, then the separate STA position may be eliminated for that shift.
2) In addition to the minimum shift organization above, during refueling a licensed senior reactor operator or senior reactor operator limited (fuel handling only) is required to directly supervise any core alteration activity.
3) A shift manager/supervisor (licensed SRO), is on site at all times when fuel is in the reactor.
4) A health physics technician is on site at all times where there is fuel in the reactor.
5) A chemistry technician is on site during plant operation in modes other than cold shutdown or refueling.

* Operating modes other than cold shutdown or refueling.

NAPS COL 13.1-1-A **Figure 13.1-201 Construction Organization**



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① 13.01.01-2
② N1216

NAPS COL 13.1-1-A Figure 13.1-202 Nominal Plant Staff Hiring and Training Schedule

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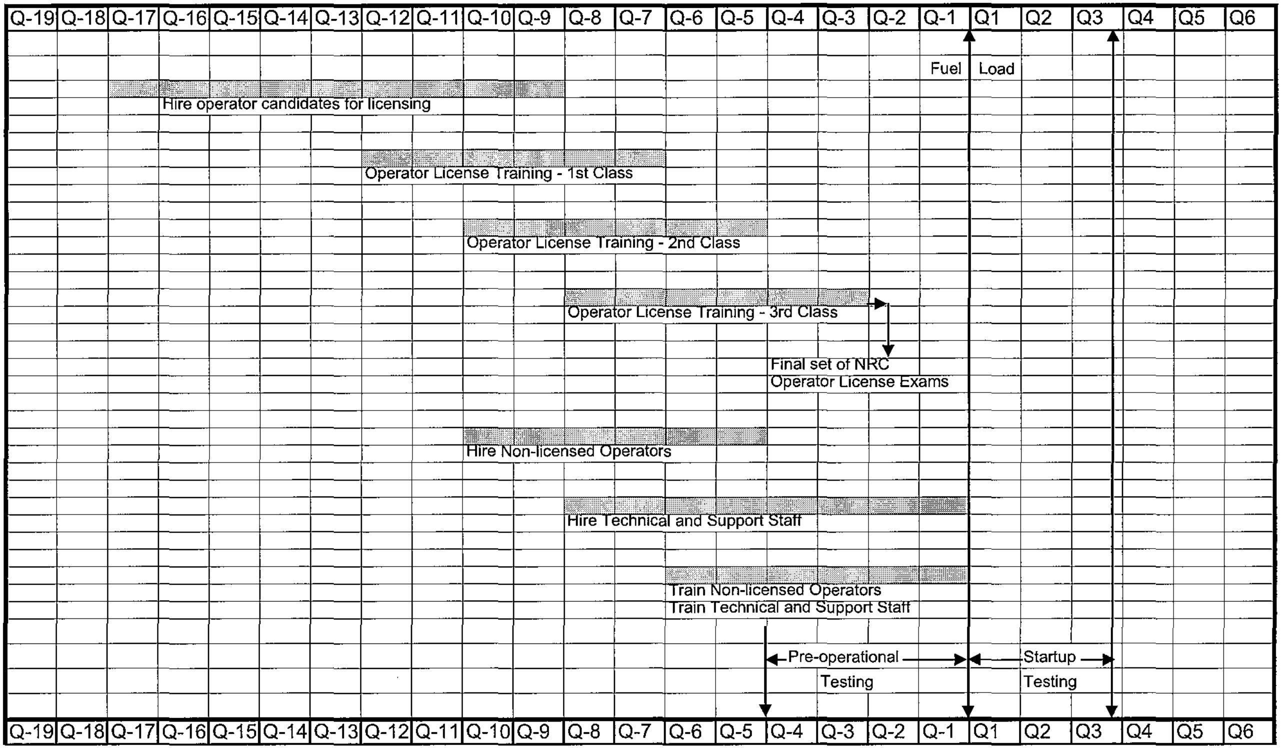
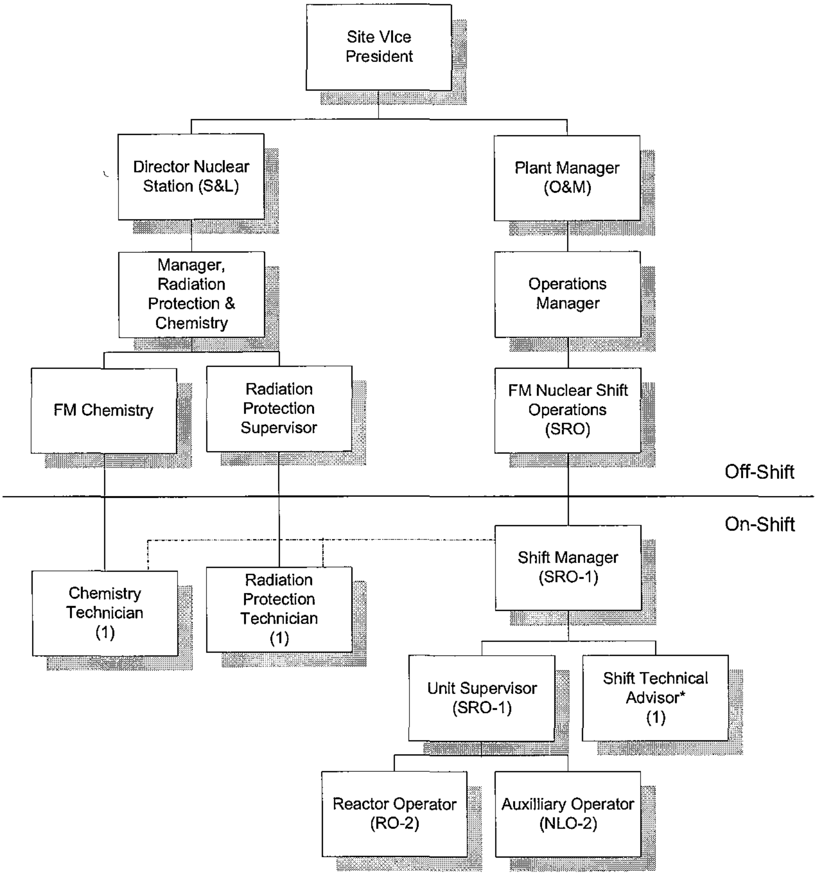


ⓘ N031

NAPS COL 13.1-1-A **Figure 13.1-203 Shift Operation**



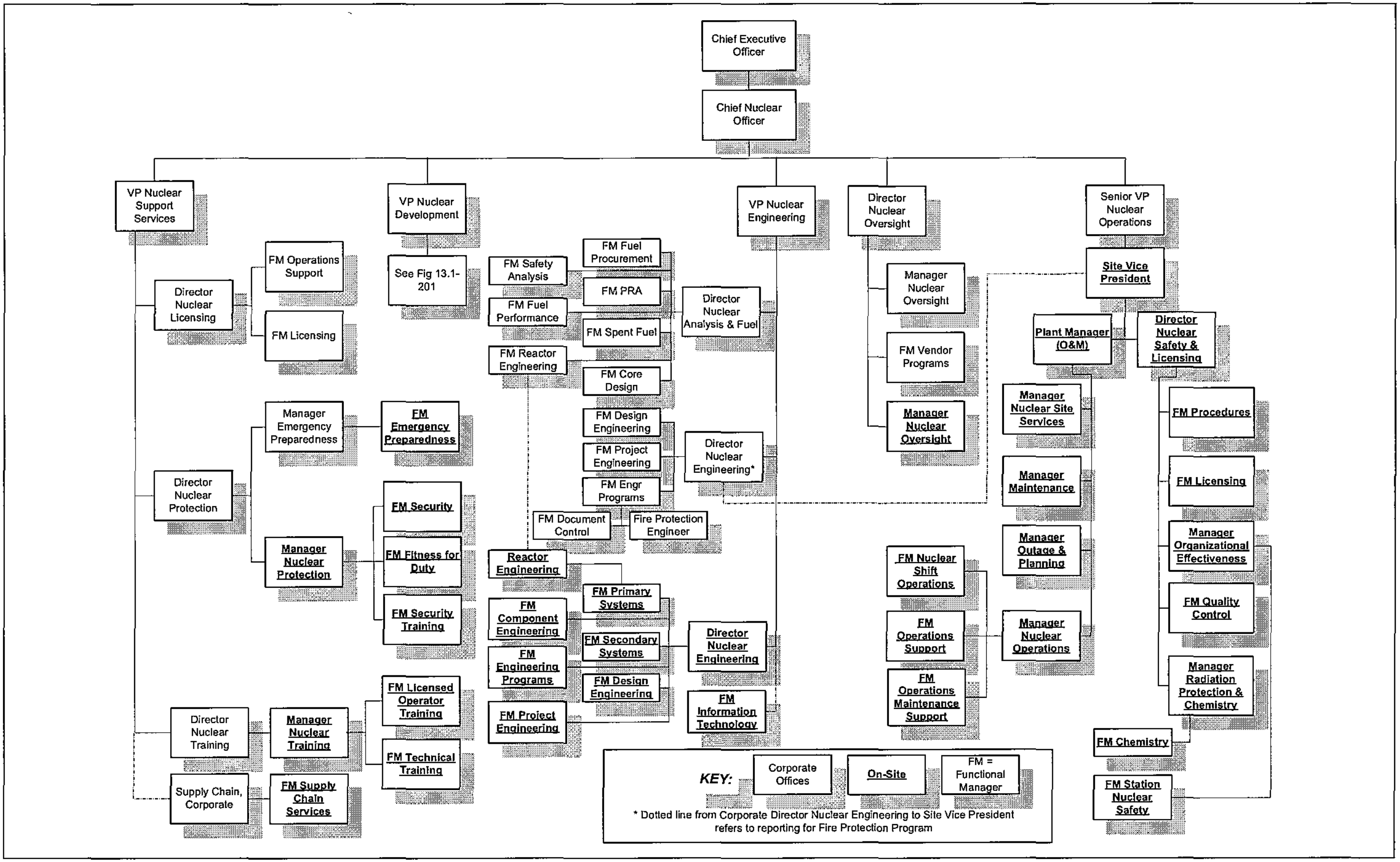
* May be met by onshift combined SRO/STA
SRO - licensed senior reactor operator
RO - licensed reactor operator
NLO - non-licensed operator

Shift Manning - 5 shifts (minimum)
(No.) - Indicates number of positions per shift

N103c

- For Information Only -

NAPS COL 13.1-1-A Figure 13.1-204 Operating Organization



* Dotted line from Corporate Director Nuclear Engineering to Site Vice President refers to reporting for Fire Protection Program

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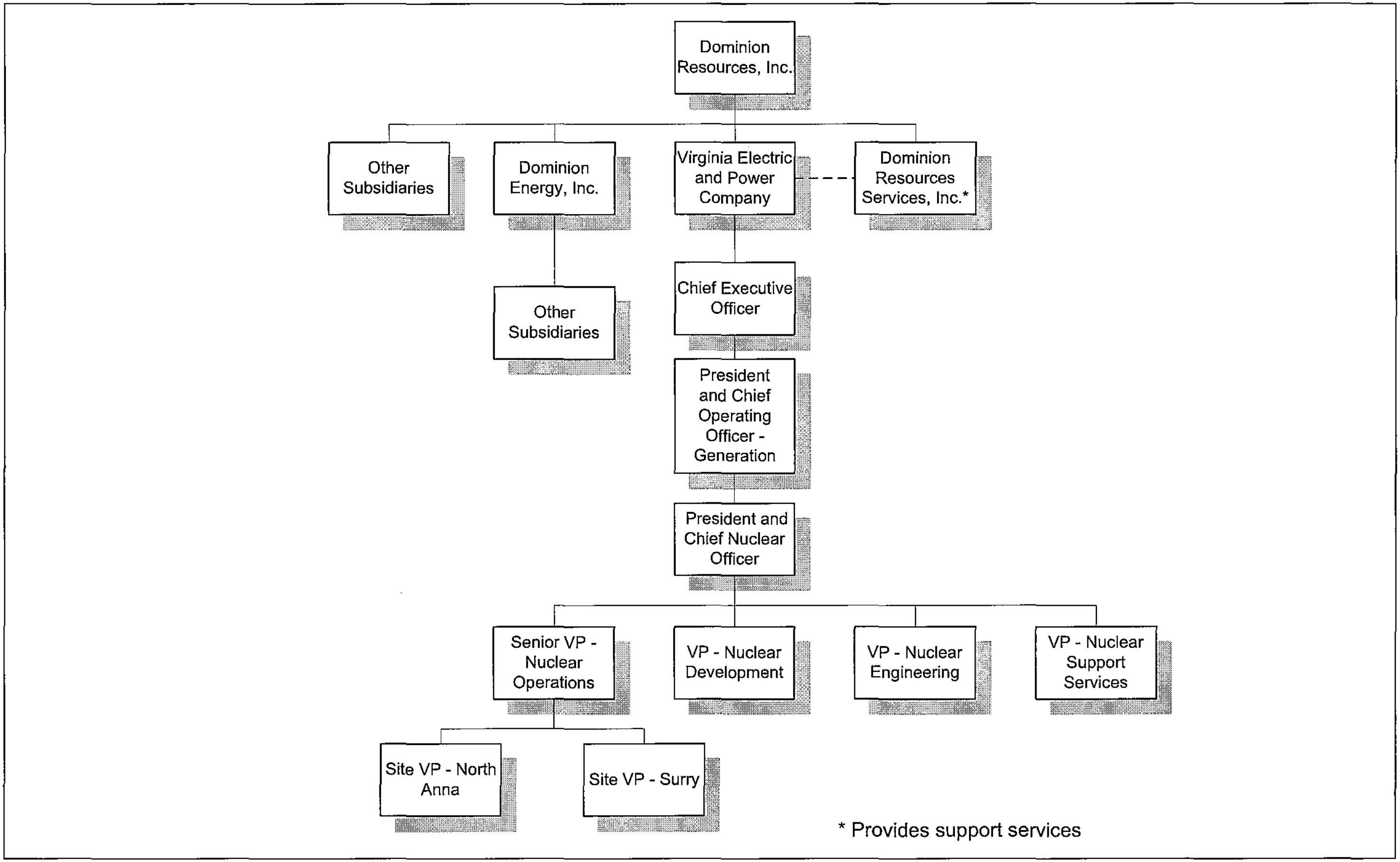
① 13.01.01-3
② 13.01.01-6
③ N1036

NAPS COL 13.1-1-A **Figure 13.1-205 Corporate Structure**



* Provides support services

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① N121C

13.2 Training

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

Add the following as introductory material under Section 13.2:

STD SUP 13.2-1 Training programs are addressed in Appendix 13BB. Implementation milestones are addressed in Section 13.4.

13.2.1 Reactor Operator Training

Replace the second sentence of the second paragraph with the following:

STD COL 13.2-1-A Descriptions of the training program and licensed operator requalification program for reactor operators and senior reactor operators are addressed in Appendix 13BB. A schedule showing approximate timing of initial licensed operator training relative to fuel loading is addressed in Section 13.1. Requalification training is implemented in accordance with Section 13.4.

13.2.2 Training for Non-Licensed Plant Staff

Replace the second sentence of the second paragraph with the following:

STD COL 13.2-2-A A description of the training program for non-licensed plant staff is addressed in Appendix 13BB. A schedule showing approximate timing of initial training for non-licensed plant staff relative to fuel load is addressed in Section 13.1.

13.2.5 COL Information

13.2-1-A Reactor Operator Training

STD COL 13.2-1-A This COL item is addressed in Section 13.2.1 and Appendix 13BB.

13.2-2-A Training for Non-Licensed Plant Staff

STD COL 13.2-2-A This COL item is addressed in Section 13.2.2 and Appendix 13BB.

13.3 Emergency Planning

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

Replace the fifth through ninth paragraphs with the following. IS087

STD COL 13.3-1-A As addressed in the emergency plan, the TSC is provided with reliable voice and data communication with the MCR and Emergency Operations Facility (EOF) and reliable voice communications with the Operational Support Center (OSC), NRC, and state and local operations centers.

The OSC communications system has at least one dedicated telephone extension to the control room, and one dedicated telephone extension to the TSC, and one telephone capable of reaching on-site and off-site locations, as a minimum.

Replace the second sentence in the tenth paragraph with the following. IS087

STD COL 13.3-3-A Supplies are provided in the service building adjacent to the main change rooms for decontamination of on-site individuals.

13.3.2 Emergency Plan

STD COL 13.3-1-A
STD COL 13.3-2-A
STD COL 13.3-3-A

The emergency plan, prepared in accordance with 10 CFR 52.79(d), is maintained as a separate document.

13.3.3 COL Information

13.3-1-A Identification of OSC and Communication Interfaces with Control Room and TSC

STD COL 13.3-1-A This COL Item is addressed in Section 13.3 and in Emergency Plan Sections II-F and II-H.

13.3-2-A Identification of EOF and Communication Interfaces with Control Room and TSC

STD COL 13.3-2-A This COL item is addressed in Section 13.3 and in Emergency Plan Sections II-F and II-H.

13.3-3-A Decontamination Facilities

STD COL 13.3-3-A This COL item is addressed in Section 13.3 and in Emergency Plan Section II-J.

13.3.5 ESP Information

SSAR Section 13.3 is incorporated by reference for historical purposes.

13.4 Operational Program Implementation

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

Replace this section with the following.

STD COL 13.4-1-A
STD COL 13.4-2-A

Table 13.4-201 lists each operational program, the regulatory source for the program, the associated implementation milestone(s), and the section of the FSAR in which the operational program is fully described as required by RG 1.206, Combined License Applications for Nuclear Power Plants (LWR edition).

13.4.1 COL Information

13.4-1-A Operation Programs

STD COL 13.4-1-A

This COL item is addressed in Section 13.4.

13.4-2-A Implementation Milestones

STD COL 13.4-2-A

This COL item is addressed in Section 13.4.

13.4.2 References

13.4-201 American Society of Mechanical Engineers (ASME), "Boiler and Pressure Vessel Code (B&PVC), Rules for Inservice Inspection of Nuclear Power Plant Components," BPVC Section XI.

13.4-202 American Society of Mechanical Engineers (ASME), "Code for the Operation and Maintenance of Nuclear Power Plants," OM Code.

STD COL 13.4-1-A
STD COL 13.4-2-A

Table 13.4-201 Operational Programs Required by NRC Regulations

Item	Program Title	Program Source (Required by)	Section	Implementation		
				Milestone	Requirement	
1.	Inservice Inspection Program	10 CFR 50.55a(g) 10 CFR 50.55a(b)(3)(v)	5.2.4 6.6 3.8.1.7.3	Prior to commercial service	10 CFR 50.55a(g) ASME XI IWA 2430(b) (Reference 13.4-201)	② ③
	Flow-Accelerated Corrosion Program	10 CFR 50.55a(g)(6)(ii)	6.6.7	Prior to commercial service	License Condition	①
2.	Inservice Testing Program	10 CFR 50.55a(f)	3.9.6	After generator online on nuclear heat	10 CFR 50.55a(f) ASME OM Code (Reference 13.4-202)	② ③
3.	Environmental Qualification Program	10 CFR 50.49(a)	3.11	Prior to fuel load	License Condition	
4.	Preservice Inspection Program	10 CFR 50.55a(g)	5.2.4 6.6 3.8.1.7.3	Completion prior to initial plant startup	10 CFR 50.55a(g) ASME Code Section XI IWB/IWC/IWD/IWF-2200(a) (Reference 13.4-201)	② ③
						③
5.	Reactor Vessel Material Surveillance Program	10 CFR 50.60 10 CFR 50, Appendix H	5.3.1	Prior to fuel load	License Condition	②
6.	Preservice Testing Program	10 CFR 50.55a(f)	3.9.6	Prior to fuel load	License Condition	② ③
7.	Containment Leakage Rate Testing Program	10 CFR 50.54(o) 10 CFR 50, Appendix J	6.2.6	Prior to fuel load	10 CFR 50, Appendix J Option B – Section III.a	②

① 10.03.06-1
② 5024
③ S110

STD COL 13.4-1-A
STD COL 13.4-2-A

Table 13.4-201 Operational Programs Required by NRC Regulations

				Implementation	
Item	Program Title	Program Source (Required by)	Section	Milestone	Requirement
8.	Fire Protection Program	10 CFR 50.48	9.5.1.15	Prior to fuel receipt for elements of the Fire Protection Program necessary to support receipt and storage of fuel onsite. Prior to fuel load for elements of the Fire Protection Program necessary to support fuel load and plant operation.	License Condition
9.	Process and Effluent Monitoring and Sampling Program:				
	Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls	10 CFR 20.1301 and 20.1302 10 CFR 50.34a 10 CFR 50.36a 10 CFR 50, Appendix I, Section II and IV	11.5.4.6	Prior to fuel load	License Condition
	Offsite Dose Calculation manual	Same as above	11.5.4.5 11.5.4.8	Prior to fuel load	License Condition
	Radiological Environmental Monitoring Program	Same as above	11.5.4.5	Prior to fuel load	License Condition
	Process Control Program	10 CFR 20.1301 and 20.1302 10 CFR 50.34a 10 CFR 61.55 and 61.56 10 CFR 71	11.4.2.3	Prior to fuel load	License Condition

STD COL 13.4-1-A
STD COL 13.4-2-A

Table 13.4-201 Operational Programs Required by NRC Regulations

Item	Program Title	Program Source (Required by)	Section	Implementation Milestone	Implementation Requirement
10.	Radiation Protection Program	10 CFR 20.1101	12.5	Prior to initial receipt of by-product, source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18) for those elements of the Radiation Protection (RP) Program necessary to support such receipt Prior to fuel receipt for those elements of the RP Program necessary to support receipt and storage of fuel onsite Prior to fuel load for those elements of the RP Program necessary to support fuel load and plant operation Prior to first shipment of radioactive waste for those elements of the RP Program necessary to support shipment of radioactive waste	License Condition
11.	Non Licensed Plant Staff Training Program	10 CFR 50.120	13.2.2	18 months prior to scheduled fuel load	10 CFR 50.120(b)

STD COL 13.4-1-A
STD COL 13.4-2-A

Table 13.4-201 Operational Programs Required by NRC Regulations

				Implementation	
Item	Program Title	Program Source (Required by)	Section	Milestone	Requirement
12.	Reactor Operator Training Program	10 CFR 55.13 10 CFR 55.31 10 CFR 55.41 10 CFR 55.43 10 CFR 55.45	13.2.1	18 months prior to scheduled fuel load	License Condition
13.	Reactor Operator Requalification Program	10 CFR 50.34(b) 10 CFR 50.54(i) 10 CFR 55.59	13.2	Within 3 months after issuance of an operating license or the date the Commission makes the finding under 10 CFR 52.103(g)	10 CFR 50.54(i-1)
14.	Emergency Planning	10 CFR 50.47 10 CFR 50, Appendix E	13.3	Full participation exercise conducted within 2 years prior to scheduled date for initial loading of fuel	10 CFR Part 50, Appendix E, Section IV.F.2.a(ii)
				Onsite exercise conducted within 1 year prior to the schedule date for initial loading of fuel	10 CFR 50, Appendix E, Section IV.F.2.a(ii)
				Applicant's detailed implementing procedures for its emergency plan submitted at least 180 days prior to scheduled date for initial loading of fuel	10 CFR 50, Appendix E, Section V

STD COL 13.4-1-A
STD COL 13.4-2-A

Table 13.4-201 Operational Programs Required by NRC Regulations

				Implementation	
Item	Program Title	Program Source (Required by)	Section	Milestone	Requirement
15.	Security Program:	10 CFR 50.34(c)			
	Physical Security Program	10 CFR 73.55 10 CFR 73.56 10 CFR 73.57	13.6	Prior to fuel receipt	License Condition
	Safeguards Contingency Program	10 CFR 50.34(d) 10 CFR 73, Appendix C	13.6	Prior to fuel receipt	License Condition
	Training and Qualification Program	10 CFR 73, Appendix B	13.6	Prior to fuel receipt	License Condition
	Fitness for Duty (Construction – Mgt & Oversight personnel)	10 CFR 26, Subparts A-H, N, and O	13.7	Prior to on-site construction of safety- or security-related SSCs	License Condition
	Fitness for Duty (Construction – Workers & First Line Supv.)	10 CFR 26 Subpart K	13.7	Prior to on-site construction of safety- or security-related SSCs	License Condition
	Fitness for Duty (Operation)	10 CFR 26	13.7	Prior to fuel receipt	License Condition
16.	Quality Assurance Program – Operation	10 CFR 50.54(a) 10 CFR 50, Appendix A (GDC 1) 10 CFR 50, Appendix B	17.5	30 days prior to scheduled date for initial loading of fuel	10 CFR 50.54(a)(1)
17.	Maintenance Rule	10 CFR 50.65	17.6	Prior to fuel load authorization per 10 CFR 52.103(g)	10 CFR 50.65(a)(1)
18.	Motor-Operated Valve Testing	10 CFR 50.55a(b)(3)(ii)	N/A	There are no safety-related MOVs	

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① S053

STD COL 13.4-1-A
STD COL 13.4-2-A

Table 13.4-201 Operational Programs Required by NRC Regulations

				Implementation		
Item	Program Title	Program Source (Required by)	Section	Milestone	Requirement	
19.	Initial Test Program	10 CFR 50.34 10 CFR 52.79(a)(28)	14.2	60 days prior to the scheduled date of the first preoperational test for the Preoperational Test Program 60 days prior to the scheduled date of initial fuel loading for the Startup Test Program	License Condition	①
20.	Snubber Testing and Inspection Program					②
	Preservice Inspection Program	10 CFR 50.55a(g) 10 CFR 50.55a(b)(3)(v)	3.9.3.7.1(3)e	Completion prior to initial plant startup	10 CFR 50.55a(g)	②
	Inservice Inspection Program	10 CFR 50.55a(g) 10 CFR 50.55a(b)(3)(v)	3.9.3.7.1(3)e	Prior to commercial service [a]	10 CFR 50.55a(g) ASME OM Code, ISTD (Reference 13.4-202)	②
	Inservice Testing Program	10 CFR 50.55a(g) 10 CFR 50.55a(b)(3)(v)	3.9.3.7.1(3)e	After generator online on nuclear heat [a]	10 CFR 50.55a(g) ASME OM Code, ISTD (Reference 13.4-202)	②
	Preservice Thermal Movement Inspection	10 CFR 50.55a(g) 10 CFR 50.55a(b)(3)(v)	3.9.3.7.1(3)e	During initial heatup and cooldown	10 CFR 50.55a(g) ASME OM Code, ISTD (Reference 13.4-202)	②
	Preservice Testing Program	10 CFR 50.55a(g) 10 CFR 50.55a(b)(3)(v)	3.9.3.7.1(3)e	Prior to fuel load	License Condition	②

Notes: a. Snubber inservice examination is initially performed not less than two months after attaining 5% reactor power operation and will be completed within 12 calendar months after attaining 5% reactor power. ②

① S109
② S110

13.5 Plant Procedures

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

STD SUP 13.5-1 This section describes the administrative and operating procedures that the operating organization (plant staff) uses to conduct routine operating, abnormal, and emergency activities in a safe manner.

STD SUP 13.5-2 The QAPD describes procedural document control, record retention, adherence, assignment of responsibilities, and changes.

STD SUP 13.5-3 Procedures are identified in this section by topic, type, or classification in lieu of the specific title, and represent general areas of procedural coverage.

STD SUP 13.5-4 Procedures are developed prior to fuel load to allow sufficient time for plant staff familiarization and to allow NRC staff adequate time to review the procedures and to develop operator licensing examinations.

NAPS COL 13.5-4-A Industry guidance for the appropriate format, content, and typical activities delineated in written procedures is implemented, as appropriate. Guidance is based on ASME NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications" (Reference 13.5-202). IS058a

STD SUP 13.5-5 The format and content of procedures are controlled by administrative procedure(s). Procedures are organized to include the following components, as necessary:

- Title Page
- Table of Contents
- Scope and Applicability
- Responsibilities
- Prerequisites
- Precautions and Limitations
- Main Body
- Acceptance Criteria
- Check-off Lists
- References

- Attachments and Data Sheets

STD SUP 13.5-6 Each procedure is sufficiently detailed for an individual to perform the required function without direct supervision, but does not provide a complete description of the system or plant process. The level of detail contained in the procedure is commensurate with the qualifications of the individual normally performing the function.

STD SUP 13.5-7 Procedures are developed consistent with guidance described in DCD Section 18.9, Procedure Development, and with input from the human factors engineering process and evaluations.

The bases for procedure development include:

- Plant design bases
- System-based technical requirements and specifications
- Task analyses results
- Risk-important human actions identified in the HRA/PRA
- Initiating events considered in the Emergency Operating Procedures (EOPs), including those events in the design bases
- Generic Technical Guidelines (GTGs) for EOPs

Procedure verification and validation includes the following activities, as appropriate:

- A review to verify they are correct and can be carried out.
- A final validation in a simulation of the integrated system as part of the verification and validation activities as described in DCD Section 18.11, Human Factors Verification and Validation.
- A verification of modified procedures for adequate content, format, and integration. The procedures are assessed through validation if a modification substantially changes personnel tasks that are significant to plant safety. The validation verifies that the procedures correctly reflect the characteristics of the modified plant and can be performed effectively to restore the plant.

STD SUP 13.5-8 Procedures for shutdown management are developed consistent with the guidance described in NUMARC 91-06, “Guidelines for Industry Actions to Assess Shutdown Management,” to reduce the potential for loss of reactor coolant system (RCS) boundary and inventory during shutdown conditions. (Reference 13.5-203)

13.5.1 Administrative Procedures

Replace the first sentence of the first paragraph with the following:

STD SUP 13.5-9 This section describes administrative procedures that provide administrative control over activities that are important to safety for the operation of the facility.

Replace the second paragraph with the following:

STD COL 13.5-1-A Administrative procedures are developed in accordance with the nominal schedule presented in Table 13.5-202.

NAPS SUP 13.5-10 Procedures outline the essential elements of the administrative programs and controls as described in ASME NQA-1 and Section 17.5. These procedures are organized such that the program elements are prescribed in documents normally referred to as administrative procedures.

Administrative procedures contain adequate programmatic controls to provide effective interface between organizational elements. This includes contractor and owner organizations providing support to the station operating organization.

NAPS SUP 13.5-11 Procedure control is discussed in the QAPD. Type and content of procedures are discussed throughout Section 13.5.

STD SUP 13.5-12 A procedure style (writer's) guide promotes the standardization and application of human factors engineering principles to procedures. The writer's guide establishes the process for developing procedures that are complete, accurate, consistent, and easy to understand and follow. The guide provides objective criteria so that procedures are consistent in organization, style, and content. The writer's guide includes criteria for procedure content and format including the writing of action steps and the specification of acceptable acronym lists and acceptable terms to be used.

STD SUP 13.5-13 Procedure maintenance and control of procedure updates are performed in accordance with the QAPD.

STD SUP 13.5-14 The administrative programs and associated procedures developed in the pre-COL phase are described in Table 13.5-201 (for future designation as historical information).

STD SUP 13.5-15

13.5.1.1 Administrative Procedures-General

This section describes those procedures that provide administrative controls with respect to procedures, including those that define and provide controls for operational activities of the plant staff.

STD SUP 13.5-16

Plant administrative procedures provide procedural instructions for the following:

- Procedures review and approval
- Procedure adherence
- Scheduling for surveillance tests and calibration
- Log entries
- Record retention
- Containment access
- Bypass of safety function and jumper control
- Communication systems
- Equipment control procedures - These procedures provide for control of equipment, as necessary, to maintain personnel and reactor safety, and to avoid unauthorized operation of equipment
- Control of maintenance and modifications
- Fire Protection Program procedures
- Crane Operation Procedures - Crane operators who operate cranes over fuel pools are qualified and conduct themselves in accordance with ANSI B30.2 (Chapter 2-3), "Overhead and Gantry Cranes" (Reference 13.5-201).
- Temporary changes to procedures
- Temporary procedure issuance and control
- Special orders of a temporary or self-canceling nature
- Standing orders to shift personnel including the authority and responsibility of the shift manager, senior reactor operator in the control room, control room operator, and shift technical advisor
- Manipulation of controls and assignment of shift personnel to duty stations per the requirements of 10 CFR 50.54 (i), (j), (k), (l), and (m) including delineation of the space designated for the "At the Controls" area of the Control Room

- Shift relief and turnover procedures
- Fitness for Duty
- Control Room access
- Working hour limitations
- Feedback of design, construction, and applicable important industry and operating experience
- Shift Manager administrative duties
- Verification of correct performance of operational activities
- A vendor interface program that provides vendor information for safety related components is incorporated into plant documentation

13.5.2 Operating and Maintenance Procedures

IS058c

Replace the third paragraph with the following:

STD COL 13.5-2-A Operating Procedures are developed in accordance with Section 13.5.2.1 and Maintenance Procedures are developed in accordance with Section 13.5.2.2.6.1.

Replace the fifth paragraph with the following:

NAPS COL 13.5-4-A A Plant Operations Procedures Development Plan is established in accordance with Section 13.5.2.1.

Replace the second sentence of “Procedures for Calibration, Inspection and Testing” with the following:

STD COL 13.5-6-H Surveillance procedures that cover safety-related logic circuitry are addressed in Section 13.5.2.2.6.3.

Replace the second paragraph with the heading “Procedures for Handling of Heavy Loads” with the following:

STD COL 13.5-5-A The scope of procedures in the Plant Operating Procedures Development Plan is addressed in Section 13.5.2.1.

Replace the last sentence of Section 13.5.2 with the following:

STD COL 13.5-3-A Emergency Procedures are developed in accordance with Section 13.5.2.1.4.

STD COL 13.5-2-A

13.5.2.1 Operating and Emergency Operating Procedures

IS058c

This section describes the operating procedures used by the operating organization (plant staff) to conduct routine operating, abnormal, and emergency activities in a safe manner.

Operating procedures are developed at least six months prior to fuel load to allow sufficient time for plant staff familiarization and to allow NRC staff adequate time to review the procedures and to develop operator licensing examinations.

STD SUP 13.5-18 The classifications of operating procedures are:

IS058c

- System Operating Procedures
- General Operating Procedures
- Abnormal (Off-Normal) Operating Procedures
- Emergency Operating Procedures
- Alarm Response Procedures

STD COL 13.5-2-A The Plant Operating Procedures Development Plan establishes:

IS058c

- A scope that includes those operating procedures defined below, which direct operator actions during normal, abnormal, and emergency operations, and considers plant operations during periods when plant systems/equipment are undergoing test, maintenance, or inspection.
- The methods and criteria for the development, verification and validation, implementation, maintenance, and revision of procedures. The methods and criteria are in accordance with NUREG-0737 TMI Items I.C.1 and I.C.9.

STD COL 13.5-5-A The following procedures are included in the scope of the Plant Operating Procedures Development Plan:

IS058c

- System operating procedures
- General operating procedures
- Abnormal (off-normal) or alarm response procedures

- Procedures for combating emergencies and other significant events
- Procedures for maintenance and modification
- Procedures for radiation monitoring and control
- Fuel handling procedures
- Temporary procedures
- Procedures for handling of heavy loads

STD COL 13.5-5-A
STD COL 13.5-6-H

- Procedures for calibration, inspection, and testing

IS058c

NAPS COL 13.5-4-A

Implementation of the Plant Operating Procedures Development Plan establishes:

IS058a

- Procedures that are consistent with the requirements of 10 CFR 50 and the TMI requirements in NUREG-0737 and Supplement 1 to NUREG-0737
- Requirements that the procedures developed include, as necessary, the elements described in the QAPD
- Bases for specifying plant operating procedures including:
    - Operator actions identified in the vendor's task analysis and PRA efforts in support of the design certification
    - Standardized plant emergency procedure guidelines
    - Consideration of plant-specific equipment selection and site specific elements such as the station water intake structure and the ultimate heat sink
- The definition of the methods through which specific operator skills and training needs, as may be considered necessary for reliable execution of the procedures, are identified and documented
- Requirements that the procedures specified above are made available for the purposes of the Human Factors V&V Implementation Plan described in GE Report NEDO-33276, ESBWR Verification & Validation Implementation Plan (DCD Reference 13.5-1).
- Procedures for the incorporation of the results of operating experience and the feedback of pertinent information into plant procedures in accordance with the provisions of TMI Item I.C.5 (NUREG-0737)

STD SUP 13.5-19

13.5.2.1.1 System Operating Procedures

IS058c

Instructions for energizing, filling, venting, draining, starting up, shutting down, changing modes of operation, returning to service following testing or maintenance (if not contained in the applicable procedure), and other instructions appropriate for operation of systems are delineated in system procedures.

System procedures contain check-off lists, where appropriate, which are prepared in sufficient detail to provide an adequate verification of the status of the system.

STD SUP 13.5-20

13.5.2.1.2 General Operating Procedures

IS058c

General operating procedures provide instructions for performing integrated plant operations involving multiple systems such as plant startup and shutdown. These procedures provide a coordinated means of integrating procedures together to change the mode of plant operation or achieve a major plant evolution. Check-off lists are used for the purpose of confirming completion of major steps in proper sequence.

Typical types of general operating procedures are described as follows:

- Startup procedures provide instruction for starting the reactor from cold or hot conditions, establishing power operation, and recovery from reactor trips.
- Shutdown procedures guide operations during and following controlled shutdown or reactor trips, and include instructions for establishing or maintaining hot standby and safe or cold shutdown conditions, as applicable.
- Power operation and load changing procedures provide instruction for steady-state power operation and load changing.

STD SUP 13.5-21

13.5.2.1.3 Abnormal (Off-Normal) Operating Procedures

IS058c

Abnormal operating procedures for correcting abnormal conditions are developed for those events where system complexity might lead to operator uncertainty. Abnormal operating procedures describe actions to be taken during other than routine operations, which if continued, could lead to either material failure, personnel harm, or other unsafe conditions.

Abnormal procedures are written so that a trained operator knows in advance the expected course of events or indications that identify an abnormal situation and the immediate action to be taken.

NAPS SUP 13.5-22

13.5.2.1.4 Emergency Operating Procedures

IS058a

EOPs are procedures that direct actions necessary for the operators to mitigate the consequences of transients and accidents that cause plant parameters to exceed reactor protection system or ESF actuation setpoints.

Emergency operating procedures include appropriate guidance for the operation of plant post-72-hour equipment, and are developed as appropriate per the guidance of:

- NUREG-0737, "Clarification of TMI Action Plan Requirements," Items I.C.1 and I.C.9
- The QAPD

STD COL 13.5-3-A

IS058c

The emergency operating procedure program (e.g., the procedures generation package (PGP)) describes the objectives of the emergency procedure development process, the program for developing EOPs and the required content of the EOPs.

The procedure development program, as described in the PGP for EOPs, is submitted to the NRC at least three months prior to the planned date to begin formal operator training on the EOPs. The PGP includes:

- GTGs, which are guidelines based on analysis of transients and accidents that are specific to the plant design and operating philosophy. The submitted documentation includes: a) a description of the process used to develop plant-specific technical guidelines (P-STGs) from the GTGs, b) identification of significant deviations from the generic guidelines (including identification of additional equipment beyond that identified in the generic guidelines), along with necessary engineering evaluations or analyses to support the adequacy of each deviation, and c) a description of the process used for identifying operator information and control requirements.

①
②
S090

- A plant-specific writer's guide (P-SWG) that details the specific methods used in preparing EOPs based on P-STGs. The writer's guide contains objective criteria that require that the emergency procedures developed are consistent in organization, style, content, and usage of terms.

①

- A description of the program for verification and validation (V&V) of EOPs.
- A description of the program for training operators on EOPs.

① 13.05.02.01 -3
② 13.05.02.01 - 4

- The objectives of the emergency procedure development.
- Discussion of any design change recommendations and/or negative implications that the current design may have on safe operation as noted during implementation of the emergency procedures development plan.

STD SUP 13.5-23

13.5.2.1.5 Alarm Response Procedures

IS058c

Procedures are provided for annunciators (alarm signals) identifying the proper operator response actions to be taken. Each of these procedures normally contains: a) the meaning of the annunciator or alarm, b) the source of the signal, c) any automatic plant responses, d) any immediate operator action, and e) the long range actions. When corrective actions are very detailed and/or lengthy, the alarm response may refer to another procedure.

NAPS SUP 13.5-24

13.5.2.1.6 Temporary Procedures

IS058c

Temporary procedures are issued during the operational phase only when permanent procedures do not exist for the following activities: to direct operations during testing, refueling, maintenance, and modifications; to provide guidance in unusual situations not within the scope of the normal procedures; and to provide orderly and uniform operations for short periods when the plant, a system, or a component of a system is performing in a manner not covered by existing detailed procedures, or has been modified or extended in such a manner that portions of existing procedures do not apply.

Temporary operating procedures are developed under established administrative guidelines. They include designation of the period of time during which they may be used and adhere to the QAPD and Technical Specifications, as applicable.

STD SUP 13.5-25

13.5.2.1.7 Fuel Handling Procedures

IS058c

Fuel handling operations, including fuel receipt, identification, movement, storage, and shipment, are performed in accordance with written procedures. Fuel handling procedures address, for example, the status of plant systems required for refueling; inspection of replacement fuel and control rods; designation of proper tools; proper conditions for spent fuel movement and storage; proper conditions to prevent inadvertent criticality; proper conditions for fuel cask loading and movement; and status of interlocks, reactor trip circuits, and mode switches. These procedures provide instructions for use of refueling equipment, actions for core alterations, monitoring core criticality status, accountability of fuel, and partial or complete refueling operations.

STD SUP 13.5-26

13.5.2.2 Maintenance and Other Operating Procedures

The QAPD provides guidance for procedural adherence.

STD SUP 13.5-27

13.5.2.2.1 Plant Radiation Protection Procedures

IS058c

The plant radiation protection program is contained in procedures. Procedures are developed and implemented for such things as: maintaining personnel exposures, plant contamination levels, and plant effluents ALARA; monitoring both external and internal exposures of workers, considering industry-accepted techniques; performing routine radiation surveys; performing environmental monitoring in the vicinity of the plant; monitoring radiation levels during maintenance and special work activities; evaluating radiation protection implications of proposed modifications; management of radioactive wastes for offsite shipment, disposal, and treatment; and maintaining radiation exposure records of workers and others. ①

STD SUP 13.5-28

13.5.2.2.2 Emergency Preparedness Procedures

IS058c

A discussion of emergency preparedness procedures can be found in the Emergency Plan. A list of implementing procedures is maintained in the Emergency Plan.

STD SUP 13.5-29

13.5.2.2.3 Instrument Calibration and Test Procedures

IS058c

The QAPD provides a description of procedural requirements for instrumentation calibration and testing.

STD SUP 13.5-30

13.5.2.2.4 Chemistry Procedures

IS058c

Procedures provided for chemical and radiochemical control activities include the nature and frequency of sampling and analyses; instructions for maintaining fluid quality within prescribed limits; the use of control and diagnostic parameters; and limitations on concentrations of agents that could cause corrosive attack, foul heat transfer surfaces or become sources of radiation hazards due to activation.

Procedures are also provided for the control, treatment, and management of radioactive wastes and control of radioactive calibration sources.

① 13.05-02.01-1

STD SUP 13.5-31

13.5.2.2.5 Radioactive Waste Management Procedures

IS058c

Procedures for the operation of the radwaste processing systems provide for the control, treatment, and management of on-site radioactive wastes. These procedures are addressed in Section 13.5.2.1.1, System Operating Procedures.

STD SUP 13.5-32
STD COL 13.5-2-A

13.5.2.2.6 Maintenance, Inspection, Surveillance, and Modification Procedures

|S058a

13.5.2.2.6.1 Maintenance Procedures

Maintenance procedures describe maintenance planning and preparation activities. Maintenance procedures are developed considering the potential impact on the safety of the plant, license limits, availability of equipment required to be operable, and possible safety consequences of concurrent or sequential maintenance, testing, or operating activities.

Maintenance procedures contain sufficient detail to permit the maintenance work to be performed correctly and safely. Procedures include provisions for conducting and recording results of required tests and inspections, if not performed and documented under separate test and inspection procedures. References are made to vendor manuals, plant procedures, drawings, and other sources, as applicable.

Instructions are included, or referenced, for returning the equipment to its normal operating status. Testing is commensurate with the maintenance that has been performed. Testing may be included in the maintenance procedure or be covered in a separate procedure.

Where appropriate sections of related documents, such as vendor manuals, equipment operating and maintenance instructions, or approved drawings with acceptance criteria, provide adequate instructions to provide the required quality of work, the applicable sections of the related documents are referenced in the procedure, or may, in some cases, constitute adequate procedures in themselves. Such documents receive the same level of review and approval as maintenance documents.

The preventive maintenance program, including preventive and predictive procedures, as appropriate, prescribes the frequency and type of maintenance to be performed. An initial program based on service conditions, experience with comparable equipment and vendor recommendations is developed prior to fuel loading. The program is revised and updated as experience is gained with the equipment. To facilitate this, equipment history files are created and maintained. The files are organized to provide complete and easily retrievable equipment history.

STD SUP 13.5-33

13.5.2.2.6.2 Inspection Procedures

IS058c

The QAPD provides a description of procedural requirements for inspections.

13.5.2.2.6.3 Surveillance Testing Procedures

The QAPD provides a description of procedural requirements for surveillance testing. Surveillance testing procedures are written in a manner that adequately tests all portions of safety-related logic circuitry as described in Generic Letter 96-01, "Testing of Safety Related Logic Circuits."

STD SUP 13.5-34

13.5.2.2.6.4 Modification Procedures

IS058c

Plant modifications and changes to setpoints are developed in accordance with approved procedures. These procedures control necessary activities associated with the modifications such that they are carried out in a planned, controlled, and orderly manner. For each modification, design documents such as drawings, equipment and material specifications, and appropriate design analyses are developed, or the as-built design documents are utilized. Separate reviews are conducted by individuals knowledgeable in both technical and QA requirements to verify the adequacy of the design effort.

Proposed modifications that involve a license amendment or a change to Technical Specifications are processed as proposed license amendment request.

Plant procedures impacted by modifications are changed to reflect revised plant conditions prior to declaring the system operable and cognizant personnel who are responsible for operating and maintaining the modified equipment are adequately trained.

STD SUP 13.5-35

13.5.2.2.6.5 Heavy Load Handling Procedures

IS058c

This topic is discussed in Section 9.1.5.8.

IS058b

STD SUP 13.5-36

13.5.2.2.7 Material Control Procedures

IS058c

The QAPD provides a description of procedural requirements for material control.

STD SUP 13.5-37

13.5.2.2.8 Security Procedures

IS058c

A discussion of security procedures is provided in the Security Plan.

STD SUP 13.5-38

13.5.2.2.9 Refueling and Outage Planning Procedures

IS058c

Procedures provide guidance for the development of refueling and outage plans, and as a minimum address the following elements:

- An outage philosophy which includes safety as a primary consideration in outage planning and implementation
- Separate organizations responsible for scheduling and overseeing the outage and provisions for an independent safety review team that would be assigned to perform final review and grant approval for outage activities
- Control procedures, which address both the initial outage plan and safety-significant changes to schedule
- Provisions that activities receive adequate resources
- Provisions that defense-in-depth during shutdown and margins are not reduced or provisions that an alternate or backup system must be available if a safety system or a defense-in-depth system is removed from service
- Provisions that personnel involved in outage activities are adequately trained including operator simulator training to the extent practicable, and training of other plant personnel, including temporary personnel, commensurate with the outage tasks they are to perform
- The guidance described in NUMARC 91-06, “Guidelines for Industry Actions to Assess Shutdown Management,” to reduce the potential for loss of reactor coolant system boundary and inventory during shutdown conditions (Reference 13.5-203)

13.5.3 COL Information

13.5-1-A Administrative Procedures Development Plan

STD COL 13.5-1-A

This COL item is addressed in Section 13.5.1.

13.5-2-A Plant Operating Procedures Development Plan

STD COL 13.5-2-A This COL item is addressed in Section 13.5.2.

13.5-3-A Emergency Procedures Development

STD COL 13.5-3-A This COL item is addressed in Section 13.5.2.

13.5-4-A Implementation of the Plant Procedures Plan

No chg.

NAPS COL 13.5-4-A This COL item is addressed in Section 13.5 and Section 13.5.2.

S058a

13.5-5-A Procedures Included in Scope of Plan

S115b

STD COL 13.5-5-A This COL item is addressed in Section 13.5.2.

13.5-6-H Procedures for Calibration, Inspection, and Testing

S115b

STD COL 13.5-6-H This COL item is addressed in Section 13.5.2.

13.5.4 References

13.5-201 American National Standards Institute, Overhead and Gantry Cranes, ANSI B30.2- 2001.

13.5-202 American Society of Mechanical Engineers, Quality Assurance Requirements for Nuclear Facility Applications, NQA-1-1994.

13.5-203 Nuclear Utilities Management and Resources Council, Guidelines for Industry Actions to Assess Shutdown Management, NUMARC 91-06, December 1991.

13.5-204 General Electric Corporation, Licensing Topical Report ESBWR Human Factors Engineering Procedures Development Implementation Plan, NEDO-33274, Revision 2, March 2007.

STD SUP 13.5-39

Table 13.5-201 Pre-COL Phase Administrative Programs and Procedures

(This table is included for future designation as historical information.)

Design/Construction Quality Assurance Program
Reporting of Defects and Noncompliance,10 CFR 21 Program
Construction License Fitness for Duty Programs, 10 CFR 26
Design Reliability Assurance Program

STD COL 13.5-1-A

Table 13.5-202 Nominal Procedure Development Schedule

(This table is included for future designation as historical information.)

Category A: Controls

Group	Procedure Type	Preparation Milestone
1	Procedures review and approval	6 months before first license class
2	Equipment control procedures	18 months before fuel load
3	Control of maintenance and modifications	18 months before fuel load
4	Fire Protection procedures	1. 6 months before fuel receipt for elements of the program supporting fuel onsite 2. 6 months before fuel load for elements supporting fuel load and plant operation
5	Crane operation procedures	6 months before fuel receipt
6	Temporary changes to procedures	6 months before first license class
7	Temporary procedures	6 months before first license class
8	Special orders of a transient or self-canceling character	6 months before first license class

Category B: Specific Procedures

Group	Procedure Type	Preparation Milestone
1	Standing orders to shift personnel including the authority and responsibility of the shift supervisor, licensed senior reactor operator in the control room, control room operator, and shift technical advisor	6 months before first license class
2	Assignment of shift personnel to duty stations and definition of "surveillance area"	6 months before first license class
3	Shift relief and turnover	6 months before fuel load
4	Fitness for duty	1. Construction FFD program: 6 months before on-site construction of safety- or security-related SSCs 2. Operational FFD program: 6 months before fuel load
5	Control room access	6 months before fuel load

STD COL 13.5-1-A

Table 13.5-202 Nominal Procedure Development Schedule

6	Limitations on work hours	6 months before fuel load
7	Feedback of design, construction, and applicable important industry and operating experience	6 months before fuel load
8	Shift supervisor administrative duties	6 months before fuel load
9	Verification of correct performance of operating activities	6 months before first license class

13.6 Physical Security

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

13.6.1.1.3 Detection Aids

S078

Replace the last sentence in the third paragraph with the following. S078

STD COL 13.6-9-A Operating alarm response procedures will be developed and implemented in accordance with milestone defined in Section 13.5.2.1. S078

Replace the last sentence in the fourth paragraph with the following. S078

STD COL 13.6-13-A This action will be completed prior to the milestone for Physical Security Plan implementation (Table 13.4-201). S078

13.6.1.1.5 Access Controls

S078

Replace the first sentence in the third paragraph with the following. S078

STD COL 13.6-6A A key control program will be developed and implemented prior to the milestone for Physical Security Plan implementation (Table 13.4-201). S078

Replace the fifth paragraph with the following. S078

STD COL 13.6-14-A Administrative procedures will be developed prior to the milestone for Physical Security Plan implementation (Table 13.4-201) to control work being performed in cabinets containing the control circuitry (contact elements) for the systems listed in Table 4-1 of NEDE-33391. S078

Replace the last sentence in the sixth paragraph with the following. S078

STD COL 13.6-15-A Administrative procedures will be developed prior to the milestone for Physical Security Plan implementation (Table 13.4-201) that will require two persons, each of whom are qualified to perform the intended work, to be present during the performance of any work on systems listed in Table 4-1 of NEDE-33391. S078

13.6.1.1.8 Testing

S078

Replace the last sentence in the first paragraph with the following. S078

STD COL 13.6-10-A

The establishment of these surveillance test procedures and frequencies will be completed in accordance with the milestone for Physical Security Plan implementation (Table 13.4-201). S078

Replace the last sentence in the second paragraph with the following. S078

STD COL 13.6-11-A

The establishment of these testing and maintenance milestones will be completed in accordance with the milestone for Physical Security Plan implementation (Table 13.4-201). S078

STD COL 13.6-8-H

The licensee will demonstrate through a one time test, analysis, or a combination of tests and analyses, that no single postulated security event will disable the capability of both the Central and Secondary Alarm Stations. This demonstration will be completed prior to the milestone for Physical Security Plan implementation (Table 13.4-201). S078

13.6.2 Security Plan

S127

Add the following at the end of this section: N031

STD SUP 13.6-1

The Physical Security Plan during construction, including control of access to the new plant construction site, is consistent with NEI 03-12, Appendix F (Reference 13.6-201), which is currently under NRC review. Table 13.4-201 provides milestones for security program implementation.

NAPS ESP COL 13.6-1

The design requirements for protected area barriers are described in the Physical Security Plan. The barriers will be designed and located to support the security response strategy timelines. The specific designs for protected area barriers will be completed as part of detailed plant design before the milestone for Physical Security Plan implementation (Table 13.4-201). N031

STD COL 13.6-12-A

As part of the Security Plan, the licensee will develop an integrated response strategy to a confirmed security event that provides for manual actuation of plant systems by the operators to an evolving scenario necessitating escalating operator response. This action will be completed S078 prior to the milestone for Physical Security Plan implementation (Table 13.4-201).

S078

13.6.3 COL Information

S078

13.6-6-A Key Control

STD COL 13.6-6-A This COL item is addressed in Section 13.6.1.1.5.

S078

13.6-7-A Secondary Alarm Station Design

STD COL 13.6-7-A This COL item is addressed in the Physical Security Plan.

S078

13.6-8-H CAS and SAS Redundancy

STD COL 13.6-8-H This COL item is addressed in Section 13.6.1.1.8.

S078

13.6-9-A Operational Alarm Response Procedures

STD COL 13.6-9-A This COL item is addressed in Section 13.6.1.1.3.

S078

13.6-10-A Operational Surveillance Test Procedures

STD COL 13.6-10-A This COL item is addressed in Section 13.6.1.1.8.

S078

13.6-11-A Maintenance Test Procedures

STD COL 13.6-11-A This COL item is addressed in Section 13.6.1.1.8.

S078

13.6-12-A Operational Response Procedures to Security Events

STD COL 13.6-12-A This COL item is addressed in Section 13.6.2.

S078

13.6-13-A Operational Alarm Response Procedures

STD COL 13.6-13-A This COL item is addressed in Section 13.6.1.1.3.

S078

13.6-14-A Administrative Controls to Sensitive Cabinets

STD COL 13.6-14-A This COL item is addressed in Section 13.6.1.1.5.

S078

13.6-15-A Administrative Controls to Sensitive Equipment

STD COL 13.6-15-A This COL item is addressed in Section 13.6.1.1.5. S078

13.6.4 References

13.6-201 Nuclear Energy Institute, Security Measures During New Reactor Construction, NEI 03-12 Appendix F.

NAPS SUP 13.6-2

13.6.5 ESP Information

S115b

SSAR Section 13.6 is incorporated by reference.

STD SUP 13.7-1

13.7 Fitness For Duty

The Fitness for Duty (FFD) Program is implemented and maintained in two phases: the construction phase program and the operating phase program. The construction phase program is consistent with NEI 06-06 (Reference 13.7-201), which is currently under NRC review. The construction phase program is implemented, as identified in Table 13.4-201, prior to on-site construction of safety- or security-related SSCs. The operations phase program is consistent with NEI 03-01 (Reference 13.7-202), which is currently under NRC review. The operations phase program is implemented prior to fuel receipt, as identified in Table 13.4-201.

S015

S015

13.7.1 References

13.7-201 Nuclear Energy Institute (NEI) "Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites," NEI 06-06.

13.7-202 Nuclear Energy Institute (NEI) "Nuclear Power Plant Access Authorization Program," NEI 03-01.

S015

NAPS COL 13.1-1-A

Appendix 13AA Design and Construction Responsibilities

IN031

13AA.1 Design and Construction Activities

Dominion has substantial experience in the design, construction, and operation of nuclear power plants and substantial experience in activities of similar scope and complexity. Dominion was responsible for the design and construction activities associated with two existing nuclear power stations in Virginia, Surry and North Anna, both of which Dominion currently operates. Dominion oversaw the activities of Westinghouse Electric Company and Stone & Webster Engineering Corporation in the design and construction of those stations.

In addition, Dominion has been responsible for the design, construction, and operation of several large fossil stations, activities of similar scope and complexity. One example is Chesterfield Power Station in Virginia. Dominion oversaw the activities of Combustion Engineer, General Electric Co. and Stone & Webster in the design and construction of the station. Dominion currently operates Chesterfield Power Station. The station generates over 1700 MWe.

Dominion's management, engineering, and technical support organization for the construction and operation of Unit 3 are described in Chapters 17 and 13, respectively. As described in Section 1.4.1, Dominion has selected GEH as its primary contractor for the design of Unit 3, and Bechtel as the primary contractor for site engineering. The contractors for the construction of the nuclear island and the turbine island have not yet been selected.

Other design and construction activities will be contracted to qualified suppliers of such services. Implementation or delegation of design and construction responsibilities is described in the sections below. Quality Assurance aspects are described in Chapter 17.

13AA.1.1 Principal Site-Related Engineering Work

The principal site engineering activities accomplished towards the construction and operation of the plant are:

Meteorology

Information concerning local (site) meteorological parameters is developed and applied by station and contract personnel to assess the impact of the station on local meteorological conditions. An onsite meteorological measurements program is employed by station personnel to produce data for the purpose of making atmospheric dispersion estimates for postulated accidental and expected routine airborne releases of effluents. A maintenance program is established for surveillance, calibration, and repair of instruments. More information regarding the study and meteorological program is found in Section 2.3.

Geology

Information relating to site and regional geotechnical conditions is developed and evaluated by utility and contract personnel to determine if geologic conditions could present a challenge to safety of the plant. Items of interest include geologic structure, seismicity, geological history, and ground water conditions. The excavation for safety-related structures will be geologically mapped and photographed by experienced geologists. Unforeseen geologic features that are encountered will be evaluated. Section 2.5 provides details of these investigations.

Seismology

Information relating to seismological conditions is developed and evaluated by utility and contract personnel to determine if the site location and area surrounding the site is appropriate from a safety standpoint for the construction and operation of a nuclear power plant. Information regarding tectonics, seismicity, correlation of seismicity with tectonic structure, characterization of seismic sources, and ground motion are assessed to estimate the potential for strong earthquake ground motions or surface deformation at the site. Section 2.5 provides details of these investigations.

Hydrology

Information relating to hydrological conditions at the plant site and the surrounding area is developed and evaluated by utility and contract personnel. The study includes hydrologic characteristics of streams, lakes, shore regions, the regional and local groundwater environments, and existing or proposed water control structures that could influence flood control and plant safety. Section 2.4 includes more detailed information regarding this subject.

Demography

Information relating to local and surrounding area population distribution is developed and evaluated by utility and contract personnel. The data is used to determine if requirements are met for establishment of exclusion area, low population zone, and population center distance. Section 2.1 includes more detailed information regarding population around the plant site.

Environmental Effects

Monitoring programs are developed to enable the collection of data necessary to determine possible impact on the environment due to construction, startup, and operational activities and to establish a baseline from which to evaluate future environmental monitoring. This program is described in the ESP-ER and in COLA Part 3.

13AA.1.2 Design of Plant and Ancillary Systems

Design and construction of systems outside the power block such as circulating water, service water, switchyard, and secondary fire protection systems are performed by Dominion or qualified contractors, as assigned.

13AA.1.3 Review and Approval of Plant Design Features

Design engineering review and approval is performed in accordance with Chapter 17. The reactor vendor is responsible for design control of the power block. Design work is performed in accordance with the design and construction QA manual including the reviews necessary to verify the adequacy of the design. Verification is performed by competent individuals or groups other than those who performed the original design. Design issues arising during construction are addressed and implemented with notification and communication of changes to the manager in charge of engineering for review. As systems are tested and approved for turnover and operation, control of design is turned over to plant staff. The manager in charge of engineering, along with functional managers and staff, assumes responsibility for review and approval of modifications, additions, or deletions in plant design features, as well as control of design documentation, in accordance with the Operational QA Program. Design control becomes the responsibility of the manager in charge of engineering prior to loading fuel. During construction, startup, and operation, changes to human-system interfaces of control room design are approved using a Human Factors Engineering evaluation addressed within DCD Chapter 18. See Figure 13.1-201, Construction Organization and the QAPD (incorporated into Section 17.5) for reporting relationships.

13AA.1.4 Environmental Effects

Impact to the surrounding environment from construction and operating activities is fully addressed in COLA Part 3, Applicants' Environmental Report - Combined License Stage. N031

13AA.1.5 Security Provisions

The Physical Security Plan is designed with provisions that meet the applicable NRC regulations. See Section 13.6 and the Security Plan, which was submitted under separate transmittal.

13AA.1.6 Development of Safety Analysis Reports

Information regarding the development of the FSAR is found in Chapter 1.

13AA.1.7 Review and Approval of Material and Component Specifications

Safety-related material and component specifications of SSCs designed by the reactor vendor are reviewed and approved in accordance with the reactor vendor quality assurance program and Section 17.1. Review and approval of items not designed by the reactor vendor are controlled for review and approval by Section 17.5 and the QAPD.

13AA.1.8 Procurement of Materials and Equipment

Procurement of materials during construction phase is the responsibility of the reactor vendor and constructor. The process is controlled by the construction QA programs of these organizations. Oversight of the inspection and receipt of materials process is the responsibility of the manager in charge of nuclear oversight.

13AA.1.9 Management and Review of Construction Activities

Management and responsibility for construction activities is assigned to the construction manager. This position reports to the Engineer, Procure, and Construct (EPC) executive, who is accountable to the CNO. See Figure 13.1-201, Construction Organization. N103a

Monitoring and review of construction activities by utility personnel is a continuous process at the plant site. Contractor performance is monitored to provide objective data to utility management in order to identify problems early and develop solutions. Monitoring of construction activities verifies that the contractors are in compliance with contractual obligations for quality, schedule, and cost. To maintain independence from the construction organization, the oversight organization reports directly to the CNO.

Monitoring and review of construction activities is divided functionally across the various disciplines of the utility construction staff, i.e. electrical, mechanical, instrument and control, etc., and tracked by schedule based on system and major plant components/areas.

After each system is turned over to plant staff the construction organization relinquishes responsibility for that system. At that time the construction organization will be responsible for completion of construction activities as directed by plant staff and available to provide support for start-up testing as necessary.

13AA.2 Preoperational Activities

This section describes the activities required to transition the unit from the construction phase to the operational phase. These activities include turnover of systems from construction, preoperational testing, schedule management, test procedure development, fuel load, integrated startup testing, and turnover of systems to plant staff.

13AA.2.1 Development of Human Factors Engineering Design Objectives and Design Phase Review of Proposed Control Room Layouts

HFE design objectives are initially developed by the reactor vendor in accordance with DCD Chapter 18. As a collaborative team, personnel from the reactor vendor design staff and personnel, including licensed operators, engineers, and instrumentation and control technicians from owner and other organizations in the nuclear industry, assess the design of the control room and man-machine interfaces to attain safe and efficient operation of the plant. See DCD Section 18.2 for additional details of HFE program management.

Modifications to the certified design of the control room or man-machine interface described in the DCD are reviewed per engineering procedures, as required by DCD Section 18.2, to evaluate the impact to plant safety. The engineering manager is responsible for the human factors engineering design process and for the design commitment to HFE during construction and throughout the life of the plant. The HFE program is established in accordance with the description and commitments in DCD Chapter 18.

13AA.2.2 **Preoperational and Startup Testing**

Functional managers reporting to the plant manager are assigned responsibility for organizing and developing the preoperational testing and startup testing organizations. These organizations prepare procedures and schedules and conduct preoperational and startup testing. The preoperational and startup testing organizations are staffed by testing engineers, procedure writers, and planner/schedulers. The qualification requirements of testing engineers in the preoperational and startup testing organizations meet those established in ANSI/ANS-3.1 (Reference 13.1-201).

Test engineers are responsible for integrated testing of systems to prove functionality of system design requirements. They provide guidance and supervision to procedure writers and communicate closely with operations personnel and other supporting staff to facilitate safe and efficient performance of preoperational and startup tests. The scope of testing to be accomplished is presented in Chapter 14. As systems are turned over from the constructor they are tested by component then by integrated system preoperational test. Sufficient numbers of personnel are assigned to perform preoperational and startup testing to facilitate safe and efficient implementation of the testing program. Plant-specific training provides instruction on the administrative controls of the test program. The startup test program provides data and experience useful during the operational phase.

During the preoperational and startup testing phases, the constructor and reactor vendor staff support, as necessary, the testing performed by the nuclear plant preoperational and startup testing staffs. The functional managers in charge of preoperational and startup testing are assisted by other station organizations including operations, plant maintenance, and engineering. These assisting organizations provide support in developing test procedures, conducting the test program, and in reviewing test results.

Procedures are written to describe organizational responsibilities and interfaces between staff, constructor, and reactor vendor, and to establish direction in writing, reviewing, and performing tests. The construction organization, depicted in Figure 13.1-201, includes the preoperational and startup testing functional groups.

13AA.2.3 Development and Implementation of Staff Recruiting and Training Programs

Staffing plans are developed with input from the reactor vendor for safe operation of the plant as determined by HFE. See DCD Section 18.6. These plans are developed under the direction and guidance of the Vice President - Nuclear Development (see Table 13.1-201 and Figure 13.1-201). Staffing plans will be completed and manager level positions filled prior to start of preoperational testing. Personnel selected to be licensed reactor operators and senior reactor operators along with other staff necessary to support the safe operation of the plant are hired with sufficient time available to complete appropriate training programs and become qualified and licensed (if required) prior to fuel being loaded in the reactor vessel. See Figure 13.1-202 for hiring and training requirements for operator and technical staff relative to fuel load.

N031

Table 13.1-201 includes the initial estimated number of staff for selected positions that will be filled at the time of initial fuel load. Recruiting of personnel to fill positions is the shared responsibility of the manager in charge of human resources and the various heads of departments. The training program is described in Section 13.2.

13AA.2.4 Transition to Operating Phase

The construction executive (Vice President - Nuclear Development) is responsible for developing and implementing a plan for the organizational transition from the construction phase to the operating phase. The plan is fully implemented and transition completed prior to commencement of commercial operations with operational responsibility then fully under the direction of the Senior Vice President - Nuclear Operations.

①

Appendix 13BB Training Program

STD SUP 13.2-1
STD COL 13.2-1-A
STD COL 13.2-2-A

NEI 06-13A (Reference 13BB-201), Technical Report on a Template for an Industry Training Program Description, which is under review by the NRC staff, is incorporated by reference.

①
5011

13BB References

13BB-201 Nuclear Energy Institute (NEI), "Technical Report on a Template for an Industry Training Program Description," NEI 06-13A.

① 13.02.01-1

Chapter 14 Initial Test Program

14.1 Initial Test Program for Preliminary Safety Analysis Reports

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

14.2 Initial Plant Test Program for Final Safety Analysis Reports

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

14.2.1.4 Organization and Staffing

Add the following at the end of this section.

NAPS SUP 14.2-1

Section 13.1 provides additional information regarding responsibilities, qualifications, and organization for implementing the pre-operational and startup testing program. S023d

14.2.2.1 Startup Administrative Manual S044a

Replace the first two paragraphs with the following. S044a

STD COL 14.2-1-A
STD COL 14.2-2-H

A description of the Initial Test Program (ITP) administration is provided in Appendix 14AA. The Startup Administrative Manual (SAM) will be developed and made available for review 60 days prior to scheduled start of the preoperational test program. S044a S044b 14.02-3

14.2.2.2 Test Procedures

Replace the last two sentences in this section with the following.

STD COL 14.2-3-H

Approved test procedures for satisfying the commitments of this section will be developed and available for review no later than 60 days prior to their intended use for preoperational tests and no later than 60 days prior to scheduled fuel loading for power ascension tests. S044a

14.2.2.5 Test Records

Add the following at the end of this section.

STD SUP 14.2-2

Startup test reports are prepared in accordance with RG 1.16.

14.2.7 Test Program Schedule and Sequence

Replace the last paragraph with the following.

STD COL 14.2-4-H The detailed testing schedule will be developed and made available for review prior to actual implementation. The schedule may be updated and continually optimized to reflect actual progress and subsequent revised projections. S044a

The implementation milestones for the Initial Test Program are provided in Section 13.4. S023b

14.2.8.1.36 AC Power Distribution System Preoperational Test General Test Methods and Acceptance Criteria 14.02-1

Add the following at the end of this section. 14.02-1

STD-SUP-14.2-4

- Proper operation of the automatic transfer capability of the normal preferred power source to the alternate preferred power source. 14.02-1

14.2.9 Site-Specific Preoperational and Startup Tests

Replace the second and third paragraphs with the following.

NAPS COL 14.2-5-A This section describes the site specific pre-operational and initial startup tests not addressed in DCD Section 14.2.8. S044b

NAPS COL 14.2-6-H Specific testing to be performed and the applicable acceptance criteria S044a
for each preoperational and startup test are documented in test S023c
procedures to be made available to the NRC approximately 60 days prior to their intended use for preoperational tests, and not less than 60 days prior to scheduled fuel load for initial startup tests. Site-specific S023c
preoperational tests are in accordance with the system specifications and associated equipment specifications for equipment in those systems provided by the licensee that are not part of the standard plant described in DCD Section 14.2.8. The tests demonstrate that the installed equipment and systems perform within the limits of these specifications. S023c

14.2.9.1 Site-specific Pre-Operational Tests

Replace this section with the following.

NAPS SUP 14.2-3

14.2.9.1.1 Station Water System Pre-Operation Test

IS023d

Purpose

The objective of this test is to verify proper operation of the SWS and its ability to supply design quantities and quality of water to the CIRC, PSWS cooling tower basin, MWS, and FPS.

Prerequisites

The construction tests have been successfully completed and the SCG has reviewed the test procedure and approved the initiation of testing. Electrical power, the CIRC, PSWS, MWS and FPS, instrument air, Chemical Storage and Transfer System, and other required interfacing systems are available, as needed, to support the specified testing.

General Test Methods and Acceptance Criteria

Performance is observed and recorded during a series of individual component and integrated system tests to demonstrate the following:

- Proper operation of instrumentation and equipment in appropriate design combinations of logic and instrument channel trip;
- Proper functioning of instrumentation and alarms used to monitor system operation and availability;
- Proper operation of pumps, motors, and valves in all design operating modes;
- Proper operation of motorized self-cleaning strainers;
- Proper system flow paths and flow rates, including pump capacity and discharge head;
- Proper operation of interlocks and equipment protective device in pump, motor, and valve controls;
- Proper operation of freeze protection methods and devices, where installed; and
- Acceptability of pump/motor vibration levels.

14.2.9.1.2 Cooling Tower Preoperational Test

Purpose

The objective of this test is to verify proper operation of the waste heat rejection portion of the CIRC (i.e., the dry cooling array and the hybrid cooling tower and basin.) Testing of the balance of the CIRC is addressed in DCD Section 14.2.8.1.50.

Prerequisites

The construction tests have been successfully completed and the SCG has reviewed the test procedure and approved the initiation of testing. Electrical power, the CIRC, SWS, Instrument Air System, Chemical Storage and Transfer System, and other required interfacing systems are available, as needed, to support the specific testing.

General Test Methods and Acceptance Criteria

Because of insufficient heat loads during the preoperational test phase, cooling tower performance evaluations are performed during the startup phase with the turbine generator on line.

Operation is observed and recorded during a series of individual component and integrated system tests to demonstrate the following:

- Proper operation of instrumentation and equipment in appropriate design combinations of logic and instrument channel trip;
- Proper functioning of instrumentation and alarms used to monitor system operation and availability;
- Proper operation of pumps, fans, motors, and valves in all design operating modes;
- Proper system flow paths and flow rates, including pump capacity and discharge head;
- Proper operation of interlocks and equipment protective devices in pump, motor, and valve controls;
- Proper operation of freeze protection methods and devices, where installed; and
- Acceptability of pump/motor vibration levels.

14.2.9.1.3 **[Deleted]** 14.02-1

14.2.9.1.4 **[Deleted]** 14.02-5

14.2.9.2 Site-Specific Startup Tests

Replace this section with the following.

NAPS SUP 14.2-2

14.2.9.2.1 Cooling Tower Performance Test

IS023d

Purpose

The objective of this test is to demonstrate acceptable performance of the waste heat rejection portion of the CIRC (i.e., the dry cooling array and the hybrid cooling tower and basin), particularly its ability to cool design quantities of circulating water to design temperature under expected operational load conditions.

Prerequisites

The preoperational tests are complete and plant management has reviewed the test procedure and approved the initiation of testing. The plant is in the appropriate operational configuration for the scheduled testing. The necessary instrumentation is checked or calibrated.

Description

Power ascension phase testing of the waste heat rejection portions of the CIRC is necessary to the extent that fully loaded conditions could not be approached during the preoperational phase. Pertinent parameters are monitored in order to provide a verification of proper system flow balancing and performance of both the dry cooling array and hybrid-cooling tower.

Criteria

System performance is consistent with design requirements.

14.2.10 COL Information

14.2-1-A Description - Initial Test Program Administration

IS044a

STD COL 14.2-1-A This COL Item is addressed in Section 14.2.2.1 and Appendix 14AA. S044a

14.2-2-H Startup Administrative Manual

STD COL 14.2-2-H This COL Item is addressed in Section 14.2.2.1.

14.2-3-H Test Procedures

IS044a

STD COL 14.2-3-H This COL Item is addressed in Section 14.2.2.2. IS044a

14.2-4-H **Test Program Schedule and Sequence** S044a

NAPS COL 14.2-4-H This COL Item is addressed in Section 14.2.7. S044a

14.2-5-A **Site Specific Tests** S044a

NAPS COL 14.2-5-A This COL Item is addressed in Section 14.2.9.

S044a

14.2-6-H **Site Specific Test Procedures**

NAPS COL 14.2-6-H This COL Item is addressed in Section 14.2.9. S044a

14.3 Inspections, Tests, Analysis, and Acceptance Criteria

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

14.3.8 **Overall ITAAC Content for Combined License Applications**

Replace the last paragraph with the following.

STD COL 14.3-1-A The requirements for inclusion of Emergency Planning ITAAC (EP-ITAAC) in a COLA are provided in 10 CFR 52.80(a). In SRM-SECY-05-0197, the NRC-approved generic EP-ITAAC for use in COL and ESP applications. This set of EP-ITAAC was considered in the development of the plant-specific EP-ITAAC, which are tailored to the ESBWR design. The plant-specific EP-ITAAC are included in a separate part of the COLA. S086

14.3.9 **Site-Specific ITAAC**

Delete the last sentence of the first paragraph and add the following at the end of this section. S086

STD COL 14.3-2-A The selection criteria and methodology provided in this section of the referenced DCD were utilized as the site-specific selection criteria and methodology for ITAAC. These criteria and methodology were applied to those site-specific (SS) systems that were not evaluated in the referenced DCD. The entire set of ITAAC for the facility, including DC-ITAAC, EP-ITAAC, PS-ITAAC, and SS-ITAAC, is included in a separate part of the COLA.

14.3.10 **COL Information**

14.3-1-A **Emergency Planning ITAAC**

STD COL 14.3-1-A This COL item is addressed in Section 14.3.8.

14.3-2-A Site-Specific ITAAC

STD COL 14.3-2-A This COL item is addressed in Section 14.3.9.

Appendix 14.3A Design Acceptance Criteria ITAAC Closure Process

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

S065

14.3A.1 Design Acceptance Criteria ITAAC Closure Options

Replace the last two sentences of the second paragraph with the following.

S065

NAPS COL 14.3A-1-1 Unit 3 is scheduled to be the first standard ESBWR plant licensed and will use the standard approach. A Design Acceptance Criteria ITAAC closure schedule will be provided for Unit 3 within one year after ESBWR design certification.

S065

14.3A.5 COL Information

14.3A-1-1 Establish a Schedule for Design Acceptance Criteria ITAAC Closure

S065

NAPS COL 14.3A-1-1 This COL item is addressed in Section 14.3A.1.

S065

STD COL 14.2-1-A

Appendix 14AA Description of Initial Test Program Administration

14AA.1 Summary of Test Program and Objectives

14AA.1.1 Applicability

This appendix provides the requirements to be included in the Startup Administrative Manual (SAM), as discussed in DCD Sections 14.2.2.1 and 14.2.2.3. The information in and referenced in this appendix meets the ITP criteria of NUREG-0800 and is formatted to follow RG 1.206, Section C.I.14.2.

The ITP is applied to structures, systems, and components that perform the functions described in the RG 1.68 evaluation in Section 1.9. The ITP is also applied to other structures, systems, and components that meet any of the following criteria, even if not included in RG 1.68, Appendix A:

- Will be used for shutdown and cool down of the reactor under normal plant conditions, and for maintaining the reactor in a safe condition for an extended shutdown period.
- Will be used for shutdown and cool down of the reactor under transient (infrequent or moderately frequent events) conditions and postulated accident conditions, and for maintaining the reactor in a safe condition for an extended shutdown period following such conditions.
- Will be used to establish conformance with safety limits or limiting conditions for operation that will be included in the facility's Technical Specifications.
- Are classified as engineered safety features or will be relied on to support or ensure the operation of engineered safety features within design limits.
- Are assumed to function, or for which credit is taken, in the accident analysis of the facility, as described in the FSAR.
- Will be used to process, store, control, or limit the release of radioactive materials.

14.02-3

The SAM includes a list of the ESBWR structures, systems, and components to which the ITP is applied.

14AA.1.2 **Phases of the Initial Test Program**

The ITP (per RG 1.68) has the following five phases:

1. Preoperational Testing
2. Initial Fuel Loading and Pre-Criticality Tests
3. Initial Criticality
4. Low-Power Tests
5. Power Ascension Tests

These phases are described in further detail in DCD Section 14.2 and in Section 14.2, and are referred to collectively as Startup Tests.

14AA.1.3 **Objectives of Preoperational and Startup Testing**

Objectives of Preoperational Testing are in DCD Section 14.2.1.2. Objectives of Startup Testing are in DCD Section 14.2.1.3.

14AA.1.4 **Testing of First of a Kind Design Features**

14.02-3

First of a kind (FOAK) testing may occur in any of the phases depending on the nature of the testing and required sequencing of the tests. When testing FOAK design features, applicable operating experience from previous test performance on other ESBWR plants is reviewed where available and the ITP modified as needed based on those lessons learned.

14AA.1.5 **Credit for Previously Performed Testing of First of a Kind Design Features**

In some cases, FOAK testing is required only for the first of a new design or for the first few plants of a standard design. In such cases, credit may be taken for the previously performed tests. A discussion is included in the startup test reports of the results of those tests that are credited.

14AA.2 Organization and Staffing

Administration of the ITP is governed by procedures in the SAM.

14AA.2.1 **Organizational Description**

The Plant Staff organization is described in Section 13.1. General preoperational responsibilities and a description of preoperational and startup testing are provided in Section 13AA.2. DCD Section 14.2.1.4 provides a description of the Startup Group organization.

The Startup Group has two internal groups: the Preoperational Test Group, which is responsible for conducting and documenting preoperational tests; and the Startup Test Group, which is responsible for conducting and documenting initial startup testing. Both groups consist of personnel drawn from various organizations such as plant staff, construction personnel, GEH, and other contractors, vendors and consultants.

The manager in charge of the Startup Group reports to the plant manager and has the qualifications of Preoperational Testing Supervisor as set forth in Table 13.1-201.

The Preoperational Test Group consists of Preoperational Testing Supervisors (i.e., NSSS, BOP, Electrical, and others, as required), each of whom reports to the manager in charge of the Startup Group. Preoperational Testing Engineers are assigned to this group and report to one of the Preoperational Testing Supervisors. Qualifications of Preoperational Testing Supervisors and Preoperational Testing Engineers are set forth in Table 13.1-201.

14.02-3

The Startup Test Group consists of Startup Testing Supervisors who report to the manager in charge of the Startup Group. Startup Test Engineers are assigned to this group and report directly to one of the Startup Testing Supervisors. Qualifications of Startup Testing Supervisors and Startup Test Engineers are set forth in Table 13.1-201. Figure 14AA-201 illustrates the organizational structure of the Startup Group.

14AA.2.2 **Responsibilities**

The manager in charge of Operations coordinates with the manager in charge of the Startup Group during the ITP to provide operations personnel to coordinate, support, and participate in preoperational testing. The manager in charge of Operations is a voting member of the Joint Test Group (JTG) and the Independent Review Body (IRB). The manager in charge of Operations is responsible for safe operation of the plant and ensuring tests are performed efficiently and effectively.

14AA.2.2.1 **Startup Group Manager**

The manager in charge of the Startup Group is responsible for:

- Staffing within the Startup Group.
- Developing procedures associated with ITP.
- Acting as Chairman of the JTG.
- Acting as an advisor to the IRB for all matters associated with startup testing.
- Managing contracts associated with the ITP.
- Coordinating with station and construction department heads for assignment of staff personnel to accomplish the test program objectives.

14AA.2.2.2 **GEH Resident Site Manager**

The GEH resident site manager is responsible for technical direction during the ITP. Qualifications of the GEH resident site manager are equivalent to the qualifications described in ANSI/ANS-3.1-1993 for a Preoperational Testing Supervisor. Specific responsibilities are: 14.02-3

- Acting as liaison with GEH on testing matters involving GEH-supplied equipment.
- Reviewing preoperational and startup test procedures, with emphasis on the GEH Nuclear Steam Supply System (NSSS).
- Assisting in data reduction, analysis, and evaluation for completed tests.
- Acting as a voting member of JTG.
- Providing administrative support and supervision to GEH onsite personnel involved in the test program.

14AA.2.2.3 **Vendor Site Representative**

A vendor site representative is responsible for technical direction during the preoperational phase of the test program. This position is filled as needed based on the scope of non-GEH supplied equipment that requires preoperational or startup testing. Specific responsibilities are:

- Acting as liaison with vendor on testing matters involving vendor supplied equipment.
- Reviewing preoperational tests with emphasis on vendor-supplied equipment.

- Assisting in data reduction, analysis, and evaluation for preoperational tests.
- Providing administrative support and supervision to vendor onsite personnel involved in the test program.

14AA.2.2.4 **Preoperational Testing Supervisor**

Preoperational Testing Supervisors are responsible for:

- Supervising the Preoperational Testing Engineers assigned to them.
- Coordinating and scheduling test preparation and test activities.
- Acting as voting member of JTG.
- Preparing, reviewing, and performing preoperational test procedures.
- Reviewing preoperational test results and making recommendations based on the results.
- Resolving deficiencies identified during preoperational inspection and test activities.
- Ensuring Preoperational Testing Engineers are not the same personnel who designed or are responsible for satisfactory performance of the system(s) or design features(s) being tested. 14.02-3

14AA.2.2.5 **Startup Testing Supervisor**

Startup Testing Supervisors are responsible for:

- Supervising the Startup Test Engineers assigned to them.
- Coordinating and scheduling test preparation and test activities.
- Coordinating and directing testing for their shift via the Operations Shift Supervisor for all initial startup testing.
- Assisting with preparing, reviewing, and performing startup test procedures.
- Reviewing, analyzing, and evaluating test results and data.
- Assisting in the resolution of deficiencies identified during startup testing activities.
- Coordinating with the planning and scheduling group for initial startup activities.
- Expediting testing progress as necessary to support project schedule.

- Ensuring Startup Test Engineers are not the same personnel who designed or are responsible for satisfactory performance of the system(s) or design features(s) being tested.

14AA.2.2.6 **Preoperational Testing Engineer**

Preoperational Testing Engineers are responsible for:

- Determining the nature and degree of testing required for assigned systems.
- Developing test activity milestones, target dates, and manpower requirements.
- Following construction progress to support test program requirements.
- Ensuring that the required detailed preoperational test procedures are available for review and approval.
- Identifying special or temporary equipment or services needed to support testing.
- Assuring test identification tagging and station tagging are implemented as necessary to support testing and turnover. 14.02-3
- Directing all participating groups during preparation for the execution of assigned tasks.
- Identifying and assisting in the resolution of deficiencies and problems found during the construction and testing of assigned systems and areas.
- Reviewing and evaluating test results and preparing test summaries.

14AA.2.2.7 **Startup Test Engineer**

Startup Test Engineers are responsible for:

- Preparing the required detailed startup test procedures and making them available for review and approval.
- Identifying special or temporary equipment or services needed to support testing.
- Directing all participating groups during preparation for the execution of assigned tasks.
- Identifying and assisting in the resolution of deficiencies found during the construction and testing of assigned systems.
- Reviewing and evaluating the test results and data.

- Coordinating with Operations during the execution of assigned tasks.
- Assisting in the supervision and inspection of Balance of Plant (BOP) work, reviewing installation and performance tests, and providing general advice on startup tests.
- Providing engineering support activities and services during startup turbine generator testing and Main Turbine Electro-Hydraulic Control (EHC) System testing.

14AA.2.2.8 **Joint Test Group**

The JTG is the primary review and approval organization during the preoperational test phase of the test program and is equivalent to the group referred to in DCD Section 14.2.1.4 as the Startup Controlling Group (SCG). The required JTG quorum is described in an administrative procedure in the SAM. The JTG is responsible for:

- Performing duties delineated in the SAM.
- Reviewing and approving all preoperational test procedures prior to testing.
- Reviewing and approving all major changes or revisions to JTG-approved test procedures.
- Reviewing and approving the overall preoperational test schedule and sequence.
- Reviewing and approving the results of preoperational tests.
- Recommending the disposition of test deficiencies.
- Recommending retests or supplemental tests as required.
- Determining system readiness for turnover to operations.

14.02-3

14AA.2.2.9 **Document Control Coordinator**

A document control coordinator reports to the manager in charge of the Startup Group and has the qualifications described in ANSI/ANS-3.I-1993 for a Startup Test Engineer. The document control coordinator is responsible for:

- Tracking test procedure changes.
- Reviewing, approving and tracking document changes (including drawings, vendor tech manuals, procedures, design changes, etc.).
- Verifying that the test schedules are up to date with regard to latest testing results.

- Processing final test packages through review and approval by the IRB.

14AA.2.2.10 **Independent Review Body**

Upon initial fuel load, the IRB assumes responsibility for tasks previously assigned to the JTG. The IRB is responsible for review of all procedures that require a regulatory evaluation under 10 CFR 50.59 and 10 CFR 72.48, as well as all tests and modifications that affect nuclear safety. The IRB is responsible for review of all startup test procedures. The organizational structure, functions, and responsibilities of IRB are described in Appendix 17AA. During the startup test phase, the IRB is advised by the manager in charge of the Startup Group and the GEH resident site manager. The IRB may be addressed by other titles such as Plant Operations Review Committee (PORC), On-site Safety Review Committee, or Plant Safety Review Committee (PSRC). NI21a

14AA.2.3 **Operating and Technical Staff Participation**

Operating and technical staff qualifications and experience requirements are: 14.02-3

- Plant staff qualification and experience requirements are in Chapter 13 and in this appendix.
- Contractor qualification and experience requirements are in this appendix and in approved contractor procedures.
- Vendor staff qualification and experience requirements are in this appendix and in approved vendor procedures.
- Architect Engineer staff qualification and experience requirements are in this appendix and in approved Architect Engineer procedures.

Plant staff participates in all phases of the ITP. Plant staff groups that participate include but are not limited to: Quality Assurance staff, Quality Control staff, Operations staff, Maintenance staff, Engineering staff, Planning, Scheduling and Outage planning staff, and Work Management staff, including work planners and schedulers. Operations staff participates in preoperational testing as part of gaining experience as described in Appendix 13BB. Refer to Figure 14AA-201 for identification of organizations that have one or more participants in the ITP.

14AA.2.4 **Conflict of Interest**

Members of the Startup Group responsible for formulating and conducting preoperational and startup tests are not the same individuals who designed or are responsible for satisfactory performance of the systems or design features being tested. This does not preclude members of the design organizations from participating in test activities.

14AA.2.5 **Training Requirements**

Training on the overall test program is conducted prior to scheduled preoperational and initial startup testing and as new employees are added to the test groups. A training program for each functional group in the organization is developed, with regard to the scheduled preoperational and startup testing, to ensure that the necessary plant staff is ready for commencement of the ITP. Additional discussion on staff training is found in Section 13.2, Appendices 13AA and 13BB, and Figure 13.1-202. The training program includes:

14.02-3

- Systems to be tested.
- Training by selected major equipment vendors (e.g., turbine, plant control).
- A review of test program administration.
- Content of test procedures, including acceptance criteria review.
- Test sequence.
- Test conduct and closure.

Specific Just-In-Time (JIT) training is conducted for operating crews and other personnel conducting certain startup tests. This JIT training may involve simulator training. Criteria to be considered when determining if JIT is used for a test include complexity of the test and plant response, such as tests that result in plant trips or other transients, or where they may occur. Accredited training program procedures describe the process for determining training topics to be conducted. The intention is to be as well prepared as possible to operate the plant safely.

14AA.3 Test Procedures

14AA.3.1 **Procedure Development**

DCD Sections 14.2.2.2 and 14.2.2.4 provide a general discussion concerning test procedure development and review. Section 13.5

provides detailed requirements for developing, reviewing, and scheduling administrative procedures.

Test procedures are written in accordance with a technical procedure writer's guide. This writer's guide provides for procedure validation. This validation may, in some cases, be through the use of an available plant reference simulator. The suitability of using the simulator to validate a test procedure is evaluated on a case by case basis. It may not be suitable, for example, to use the simulator to validate a procedure whose results are required to validate the simulator modeling.

Test procedures maximize the use of plant operating and maintenance procedures for test tasks. This can take the form of referencing a plant procedure to perform a task, or extracting the steps from the plant procedure for use in the preoperational and startup test procedures. This includes the use of emergency procedures for verifying appropriate emergency actions as described in DCD Section 14.2.5. Step-by-step instructions on how to conduct the applicable test are described and are coordinated with plant procedures wherever applicable in the test procedure. Test procedures contain cautions, warnings, and notes, using criteria established in the technical procedure writer's guide. 14.02-3

14AA.3.2 **Procedure Format and Content Requirements**

DCD Section 14.2.8.1 discusses technical information to be provided by GEH and others that form the technical basis for test procedure objectives and acceptance criteria.

Each preoperational and startup test procedure includes the following:

- Cover page

  The cover page provides approval signatures and effective dates (signatures may be maintained on file and may not appear on the cover page). The title and the unit designator water mark appear on the cover page. If the test is considered an infrequently performed test, this would appear on the cover page.

- Table of Contents
- Purpose and Test Objectives Section

  This section identifies the goal of the specific preoperational/startup test. This is established by stating those systems, subsystems, or components that are included in the test, and a series of summarized specific functions to be demonstrated during the test. Objectives of the test are stated. Many systems tests are intended to demonstrate that each of several initiating events produces one or more expected responses. These initiating events and the corresponding responses are identified.

- Description Section

  This section describes the power plateau, specific testing activities, operability impacts, systems affected, RPS trips, containment isolation, etc.

- Reference Section

  This section lists documents used to prepare or revise the pre-operational or startup test procedure and any documents used or referred to while performing the procedure.

- Special Tools and Equipment (Temporary Equipment Installations) Section

  This section lists test equipment and special tools not routinely carried, plus any unusual expendable items recommended to perform the procedure. This section also identifies temporary test equipment installations and test equipment instructions.

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- Precautions and Limitations Section

  The test procedure highlights and clearly describes any and all precautions needed to ensure a reliable test or the safety of personnel or equipment including termination criteria for the test. Included are any special actions to be taken if the test is terminated at critical points in the test.

- Initial Conditions Section

  This section lists the plant conditions required to perform the test. Example: verify that the plant is operating at the 75 percent (+0, –5 percent) rod line. Each test of the operation of a system requires that certain other activities be performed first (e.g., completion of construction, construction and/or preliminary tests, inspections, and certain other preoperational tests or operations). Where appropriate, instructions are given pertaining to the system configuration, components that should or should not be operating, and other pertinent conditions that might affect the operation of the given system. The preoperational testing procedures include, as appropriate, these specific prerequisites, as illustrated by the following examples:

- Confirm that construction activities associated with the system have been completed and documented.
- Field inspections have been conducted to ensure that the equipment is ready for operation, including inspection for proper fabrication and cleanliness, checkout of wiring continuity and electrical protective devices, adjustment of settings on torque-limiting devices and calibration of instruments, verification that all instrument loops are operable and respond within required response times, and adjustment and settings of temperature controllers and limit switches.
- Confirm that test equipment is operable and properly calibrated.
- Confirm communications systems are functional for conducting the test.
- Access control is in place for personnel safety.
- Support or interface systems are functional.
- Confirm that prerequisite tests are conducted on individual components or subsystems to demonstrate that they meet their functional requirements.

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Special environmental conditions are included in this section. Test procedures include provisions to test the equipment under environmental conditions as close as practical to those the equipment will experience in both normal and accident situations. However, many tests are conducted at ambient conditions due to the impracticality of achieving normal and accident conditions during preoperational testing.

- System Testing Section

  This section provides detailed step-by-step instructions for each test. To the extent practical, the test procedures use approved normal plant operating procedures. Expected plant result is explicitly or implicitly stated in the instructions through verification or measurement steps. Each procedure requires necessary nonstandard arrangements to be restored to their normal status after the test is completed. Control measures such as jumper logs and check-off lists are specified.

Nonstandard bypasses, valve configurations, and instrument settings are identified and highlighted for return to normal. Nonstandard arrangements are carefully examined to ensure that temporary arrangements do not invalidate the test by interfering with proper testing of the as-built system.

- Data Collection Section

  The test procedures prescribe the data to be collected and the form in which the data are to be recorded. All entries are permanent. The administrative controls include an acceptable method for correcting an entry.

- Acceptance Criteria Section

  The test procedures clearly identify the criteria against which the success or failure of the test is judged, and account for measurement errors and uncertainties. In some cases, these are qualitative criteria. Where applicable, quantitative values with appropriate tolerances are designated as acceptance criteria. This section includes acceptance criteria for judgment of plant and system performance (as described in the applicable test specification). Those test criteria that show compliance with the Combined License ITAAC are identified in this section. When a test criterion for a preoperational test is not met, the Preoperational Testing Engineer documents the failure through the corrective action process and contacts the applicable preoperational test supervisor to determine actions to take (e.g., submitting a work request). 14.02-3

  For the startup test program, criteria are divided into three categories, depending on the significance of the parameter or function. The following paragraphs describe each kind of test criterion, and the actions to be taken by the Startup Test Engineer after an individual test criterion is not satisfied.

  - Level I Criteria: Level I criteria relate to the values of process variables assigned in the design or analysis of the plant and component systems or associated equipment. Violation of these Level I criteria may have plant operational or plant safety implications. If a Level I test criterion is not satisfied, the plant must be placed in a suitable hold condition that is judged to be satisfactory to safety based on the results of prior testing. The Startup Test Engineer notifies the on-shift SRO, (who may declare the equipment inoperable), notifies the Startup Group manager/Startup Testing Supervisor, enters the condition in the corrective action program, and issues work requests as needed. Plant operating or test procedures or the Technical Specifications guide the decision on the direction to be taken. Startup tests compatible with this hold condition may be continued. Resolution of the problem must be documented and pursued by appropriate equipment adjustments or through engineering support personnel. Following resolution, the applicable test portion must be repeated to verify that the Level I requirement is ultimately satisfied. A description of the problem resolution shall be included in the report documenting the successful test.

- Level 2 Criteria: Level 2 criteria are specified as key plant performance requirements that are equipment design specification values or requirements for the measured response. The expected plant response is predicted by best estimate computer code and the desired trip avoidance margins. Level 2 failures that occur during tuning and system adjustment must be documented in the test report and following resolution, the applicable test portion must be repeated (retesting could occur at a higher power level with IRB approval) to verify that the Level 2 criterion requirement is satisfied. If a Level 2 criterion requirement is not satisfied after a reasonable effort, then the cognizant design and engineering organization shall document the results in the corrective action program with a full explanation of their recommendations. In order for the system as a whole to be acceptable, all Level 2 requirements must be satisfied or documentation provided that either modifies Level 2 requirements or changes specific design criteria. 14.02-3
- Level 3 Criteria: Level 3 criteria are associated with specifications on the expected or desired performance of individual control loop components. Meeting Level 3 criteria helps assure that overall system and plant response requirements are satisfied. Therefore, Level 3 criteria are to be viewed as highly desirable rather than required to be satisfied. Good engineering judgment is appropriate in the application of these rules. Since overall system performance is a mathematical function of its individual components, one component whose performance is slightly worse than specified can be accepted provided that a system adjustment elsewhere will

positively overcome the deficiency. Large deviations from Level 3 performance requirements are not allowable. If a Level 3 criterion requirement is not satisfied, the subject component or inner loop shall be analyzed closely. However, if all Level I and Level 2 criteria are satisfied, then it is not required to repeat the transient test to satisfy the Level 3 performance requirements. The occurrence of this Level 3 criterion failure shall be documented in the test report and entered into the corrective action program.

- Follow-on Task Section

  This section includes activities that must be performed to complete the test procedure.

  - Completion Notification

    This section is included to identify persons to be notified that the procedure has been satisfactorily or unsatisfactorily completed.

  - Procedure Reviews

    This section is included to specify required reviews and comments by various personnel.

  - Records Disposition

    Records disposition guidance is described in site-specific procedures.

  - Attachments

    Test procedure attachments provide supporting information and equations and evaluation methods to be used to analyze the obtained data. This attachment lists the signals to be recorded by the data collection equipment. Analysis and evaluation attachments outline the calculations to be performed and provide for an evaluation of the test.

    Upon completion of a given test, a preliminary evaluation is performed which confirms acceptability for continued testing. Smaller transient changes are performed initially, gradually increasing to larger transient changes. Test results at lower powers are extrapolated to higher power levels to determine acceptability of performing the test at higher powers.

  - Documentation of Test Results

    Records identify each observer and/or data recorder participating in the test, as well as the type of observation, identifying numbers of test or measuring equipment, results, acceptability, and action

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taken to correct any deficiencies. Administrative procedures specify the retention period of test result summaries, and require permanent retention of documented summaries and evaluations.

14AA.3.3 **Other Startup Test Procedures**

The need for special startup tests may arise due to unplanned conditions. The format and content requirements for preoperational and startup tests apply to these procedures.

14AA.3.4 **Test Procedure Changes**

If it is determined that procedure corrections (including changes in test sequence) are required before or during the conduct of the test, the test engineer suspends testing and notifies operations and test personnel of the required change. For all such corrections, the test engineer prepares and processes a procedure change request as delineated in a site-specific procedure for processing procedure changes. Revisions are classified into two categories based on the intent of the change. The intent of a procedure is the specific task or goal that is to be accomplished by the procedure. 14.02-3 14.02-7

Intent changes are changes to:

- Purpose.
- Initial conditions (or prerequisites).
- Acceptance criteria or tolerances.
- Scaling or setpoints.
- The method for meeting a commitment identified in the procedure.
- Step verification (independent or concurrent).
- System/component as-left condition(s).
- Reactivity management (changes that impact the operator's ability to monitor, control, or manipulate the reactor).
- Add or delete a subsection.
- Decrease personnel safety or fire protection effectiveness.
- Delete, relocate, or add a hold point.
- Caution or warning statements.
- Startup test procedure testing sequence.

Non-intent changes and revisions do not change the intent of the procedure (e.g., typographical error corrections). Review and approval requirements for procedure changes that do not change the intent are established in administrative procedures in the SAM.

Procedure changes that change the intent of the procedure receive the same level of review and approval as the original procedure. All test procedure intent changes will be revised against the following criteria (consistent with 10 CFR 50.59 and the design certification rule):

- Departure from Tier 1 information.
- Departure from Tier 2 information that significantly decreases the level of safety in accordance with 10 CFR 50.59(c)(1) and meets any one of eight criteria in 10 CFR 50.59(c)(2)(i) through (viii) or 10 CFR 52, Design Certification Appendix, Section VIII.B.5.b.
- Departure from Tier 2* information.
- Departure from Technical Specifications.

Preoperational test procedure intent changes involving Tier 1, Tier 2*, Technical Specifications, or Tier 2 that require a license amendment must be approved by the NRC prior to procedure completion and approval. Startup test procedure intent changes involving Tier 1, Tier 2*, Technical Specifications, or Tier 2 that require a license amendment must be approved by the NRC prior to procedure use. Timely notification of the NRC is made when procedures are changed that have been sent to the NRC.

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14AA.4 Conduct of the Initial Test Program

14AA.4.1 Administrative Controls

ITP conduct is described in DCD Section 14.2.2.3. The SAM governs the ITP and will be issued no later than 60 days prior to the beginning of the pre-operational phase. Testing during all phases of the test program is conducted using approved test procedures.

14AA.4.2 Procedure Verification

Because procedures may be approved for implementation weeks or months in advance of the scheduled test date, a review of the approved test procedure is required before commencement of testing. The test engineer is responsible for ensuring:

- Drawing and document revision numbers listed in the reference section of the test procedure agree with the latest revisions.

- The procedure text reflects any design change(s) made since the procedure was originally approved for implementation in the areas of acceptance criteria, FSAR, Technical Specifications, piping changes, etc.
- Any new Operating Experience lessons learned (since preparation of the procedure) are incorporated into individual test procedures.

Procedures require signoff of verification for prerequisites and instruction steps. This signoff includes identification of the person doing the signoff and the date and time of completion.

Test engineers maintain chronological logs of test status to facilitate turnover and aid in maintaining operational configuration control. These logs become part of the test documentation.

There is a documented turnover process to ensure that test status and equipment configuration are known when personnel transfer responsibilities, such as during a shift change.

Test briefings are conducted for each test in accordance with administrative procedures. When a shift change occurs before test completion, another briefing occurs before resumption or continuation of the test. 14.02-3

Data collected is marked or identified with test, date, and person collecting data. This data becomes part of the test documentation.

The plant corrective action program is used to document all deficiencies, discrepancies, exceptions, nonconformances and failures (collectively known as test exceptions) identified in the ITP. The corrective action documentation becomes part of the test documentation. GEH and/or other design organizations participate in the resolution of design-related problems that result in, or contribute to, a failure to meet test acceptance criteria.

The plant manager approves proceeding from one test phase to the next during the ITP. Approvals are documented in an overall ITP governance document.

Administrative procedures detail the test documentation review and approval. Review and approval of test documentation includes the test engineer, testing supervisor, Startup Group manager, GEH site representative or appropriate vendor, and JTG or IRB. Final approval is by the plant manager.

Plant readiness reviews are conducted to assure that the plant staff and equipment are ready to proceed to the next test phase or plateau.

14AA.4.3 **Work Control**

The Startup Group is responsible for preparing work requests when Construction organization assistance is required. Work requests are issued in accordance with a site-specific procedure governing the work management process. The plant staff, upon identifying a need for Construction organization assistance, coordinates their requirements through the appropriate Startup Test Engineer.

Activities requiring Construction organization work efforts are performed under the plant tagging procedures. Tagging requests are governed by a site-specific procedure for equipment clearance. Tagging procedures shall be used for protection of personnel and equipment and for jurisdictional or custodial conditions that have been turned over in accordance with the turnover procedure.

The Startup Group is responsible for supervising minor repairs and modifications, changing equipment settings, and disconnecting and reconnecting electrical terminations as stipulated in a specific test procedure. Startup Test Engineers may perform independent verification of changes made in accordance with approved test procedures. 14.02-3

14AA.4.4 **Measuring and Test Equipment (M&TE)**

During the preoperational test program, as well as the startup test program, most activities that lead to plant commercial operation involve design value verifications. M&TE used during these activities are properly controlled, calibrated, and adjusted at specified intervals to maintain accuracy within necessary limits. M&TE is governed by a site-specific procedure for control of M&TE. M&TE includes portable tools, gauges, instruments, and other measuring and testing devices not permanently installed, for example, startup test instruments prepared by the Preoperational Test Group as well as those provided by the Construction organization or by vendors.

A calibration program is implemented. For standard M&TE equipment, calibration procedures are prepared for each type of M&TE calibrated onsite. Calibration intervals are established for each item of M&TE. However, if the calibration requirement of a particular piece of M&TE is beyond the capabilities or resources of the plant staff, this M&TE is sent to an offsite certified calibration or testing agency. If special test equipment is necessary only for the ITP, the responsible vendor provides this equipment with the appropriate calibration documentation.

14AA.4.5 System Turnover

During the construction phase, systems, subsystems, and equipment are completed and turned over in an orderly and well-coordinated manner. Guidelines are established to define the boundary and interface between related system/subsystem and are used to generate boundary scope documents; for example, marked-up piping and instrument diagrams (P&IDs), electrical schematic diagrams, for scheduling and subsequent development of component and system turnover packages. The system turnover process includes requirements for the following:

- Documenting inspections performed by the construction organization (e.g., highlighted drawings showing areas inspected).
- Documenting results of construction testing.
- Determining the construction-related inspections and tests that need to be completed before preoperational testing begins. Any open items are evaluated for acceptability of commencing preoperational testing.
- Developing and implementing plans for correcting adverse conditions and open items, and means for tracking such conditions and items.
- Verifying completeness of construction and documentation of incomplete items.

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14AA.4.6 Preoperational Testing

During preoperational testing, it may be necessary to return system control to Construction organization to repair or modify the system or to correct new problems. Administrative procedures include direction for:

- Means of releasing control of systems and or components to construction.
- Methods used for documenting actual work performed and determining impact on testing.
- Identification of required testing to restore the system to operability/functionality/availability status, and to identify tests to be re-performed based on the impact of the work performed.
- Authorizing and tracking operability and unavailability determinations.
- Verifying retests stay in compliance with ITAAC.

14AA.4.7 **Startup Testing**

The startup testing program is based on increasing power in discrete steps. Major testing is performed at discrete power levels as described in DCD Section 14.2.7. The first tests during power ascension testing that verify movements and expansion of equipment are in accordance with design, and are conducted at a power level as low as practical (approximately 5 percent).

The governing power ascension test plan requires the following operations to be performed at appropriate steps in the power-ascension test phase:

- Conduct any tests that are scheduled at the test condition or power plateau.
- Confirm core performance parameters (core power distribution) are within expectations.
- Determine reactor power by heat balance, calibrate nuclear instruments accordingly, and confirm the existence of adequate instrumentation overlap between the startup range and power range detectors.
- Reset high-flux trips, just prior to ascending to the next level, to a value no greater than 20 percent beyond the power of the next level unless Technical Specification limits are more restrictive.
- Perform general surveys of plant systems and equipment to confirm that they are operating within expected values.
- Check for unexpected radioactivity in process systems and effluents.
- Perform reactor coolant leak checks.
- Review the completed testing program at each plateau; perform preliminary evaluations, including extrapolation core performance parameters for the next power level; and obtain the required management approvals before ascending to the next power level or test condition.

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Upon completion of a given test, a preliminary evaluation is performed that confirms acceptability for continued testing. Smaller transient changes are performed initially, gradually increasing to larger transient changes. Test results at lower powers are extrapolated to higher power levels to determine acceptability of performing the test at higher powers.

This extrapolation is included in the analysis section of the lower power procedure.

Surveillance test procedures may be used to document portions of tests, and ITP tests or portions of tests may be used to satisfy Technical Specifications surveillance requirements in accordance with administrative procedures. At Startup Test Program completion, a plant capacity warranty test is performed to satisfy the contract warranty and to confirm safe and stable plant operation.

14AA.4.8 **Conduct of Modifications during the Initial Test Program**

Temporary modifications may be required to conduct certain tests. These modifications are documented in the test procedure. The test procedures contain restoration steps and retesting required to confirm satisfactory restoration to required configuration. Modifications may be performed by the Construction organization or the plant staff processes prior to NRC issuance of the 10 CFR 52.103g finding. If the modification invalidates a previously completed ITAAC, then that ITAAC is re-performed. Each modification is reviewed to determine the scope of post-modification testing that is to be performed. Testing is conducted and documented to ensure that preoperational testing and ITAAC remain valid. Modifications made following NRC issuance of the 10 CFR 52.103g finding are in accordance with plant staff processes and meet license conditions. Modifications that require change of ITAAC require NRC approval of the ITAAC change.

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14AA.4.9 **Conduct of Maintenance during the Initial Test Program**

All corrective or preventive maintenance activities are reviewed to determine the scope of post-maintenance testing to be performed. Prior to NRC issuance of the 10 CFR 52.103g finding, post-maintenance testing is conducted and documented to ensure that associated preoperational testing and ITAAC remain valid. Maintenance performed following NRC issuance of the 10 CFR 52.103g finding is in accordance with plant staff processes and meets license conditions.

14AA.4.10 **Audits**

A comprehensive system of planned and periodic audits is carried out to verify compliance with the ITP in accordance with the Quality Assurance Program Description. Follow-up actions, including re-audit of deficient areas, are taken where indicated.

14AA.5 Review, Evaluation and Approval of Test Results

14AA.5.1 Review and Approval Responsibilities

The reactor vendor is responsible for reviewing and approving the results of all tests of supplied equipment. Architect Engineer representatives review and approve the results of all tests of supplied equipment. Other vendors' representatives review and approve the results of all tests of supplied equipment. Plant staff review and approval responsibilities are in Section 14AA.2. Final approval of individual test completion is by the plant manager after approval by the JTG or IRB.

14AA.5.2 Technical Evaluation

Each completed test package is reviewed by technically qualified personnel to confirm satisfactory demonstration of plant, system or component performance and compliance with design and license criteria.

14AA.6 Test Records

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Records retention requirements are in DCD Section 14.2.2.5 and in the Quality Assurance Program Description.

14AA.6.1 Startup Test Reports

Startup test reports are generated describing and summarizing the completion of tests performed during the ITP. A startup report is required per RG 1.16 at the earliest of: 1) 9 months following initial criticality, 2) 90 days after completion of the ITP, or 3) 90 days after start of commercial operations. If one report does not cover all three events, then supplemental reports are submitted every three months until all three events are completed. These reports:

- Address each ITP test described in the FSAR.
- Provide a general description of measured values of operating conditions or characteristics obtained from the ITP as compared to design or specification values.
- Describe any corrective actions that were required to achieve satisfactory operation.
- Include any other information required to be reported by license conditions due to regulatory guide commitments.

14AA.7 Test Program Conformance with Regulatory Guides

Section 1.9 provides the evaluation of ITP conformance with the following RGs:

- RG 1.30, "Quality Assurance Requirements for Installation, Inspection and Testing of Instrumentation and Electrical Equipment (Safety Guide 30)."
- RG 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants."
- RG 1.68, "Initial Test Program For Water-Cooled Nuclear Power Plants."
- RG 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room during a Postulated Hazardous Chemical Release."
- RG 1.116, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems."
- RG 1.139, "Guidance for Residual Heat Removal."
- RG 1.152, "Criteria for Digital Computers in Safety Systems of Nuclear Power Plants."
- RG 1.168, "Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants."

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These RGs contain guidance that is included in the content of test procedures.

14AA.8 Utilization of Operating Experience

Administrative procedures provide methodologies for evaluating and initiating action for operating experience information (OE). DCD Section 14.2.4 describes the general use of operating experience by GEH in the development of the ITP.

14AA.8.1 Sources and Types of Information Reviewed for ITP Development

Multiple sources of operating experience were reviewed to develop this description of the ITP administration program. These included:

- INPO Operating Experience Reports.
- INPO 06-001, "Operating Experience."

- INPO 06-001 Addendum.
- INPO 07-003, "INPO/ Utility Benchmarking for New Plant Deployment."
- INPO 07-003 Addendum.
- INPO 86-023, "Guidelines for Nuclear Power Construction Projects."
- INPO 94-005, "Standard Operation Support of Nuclear Plants."
- INPO 94-03, "Review of Commercial Nuclear Power Industry Standardization Experience."
- INPO Document AP-909, "Construction of Standard Nuclear Plants."
- INPO NX-1067, "Browns Ferry Nuclear Plant Unit I Restart Operational Readiness Lessons Learned."
- NRC RG 1.68, "Initial Test Programs For Water-Cooled Nuclear Power Plants."
- SER 24-85, "Xenon Tilt Oscillation Following Control Rod Insertion Test (05-24-1985)."
- SER 29-86, "Inadvertent Rapid Cooldown and Depressurization During a Remote Shutdown Test (08-12-1986)."
- SOER 87-01, "Core Damaging Accident Following an Improperly Conducted Test (03-06-1987)."
- SOER 91-01, "Conduct of Infrequently Performed Tests or Evolutions."

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14AA.8.2 Conclusions from Review

The following conclusions are a result of the OE review conducted to develop this ITP administration program description:

- The test procedures should provide guidance as to the expected plant response and instructions concerning what conditions warrant aborting the test. Errors and problems with the procedures should be anticipated. A means for prompt but controlled approval of changes to test procedures is needed. Critical test procedures should provide specific criteria for test termination and specific steps to ensure termination is conducted in a safe and orderly manner. Providing procedural guidance for aborting the test could prevent delays in plant restoration. Conservative guidance for actions to be taken should be included in the procedures.

- Plant simulators may prove useful in preparing for special tests and verifying procedures.
- Appropriate component/system operability should be verified prior to critical tests.
- The need to perform physics tests that can produce severe power tilts should be evaluated, particularly if tests at other similar reactors have provided sufficient data to verify the adequacy of the nuclear physics analysis.
- Implement compensatory measures in accordance with guidance for infrequently performed tests or evolutions where appropriate.

14AA.8.3 Summary of Test Program Features Influenced by the Review

The conclusions from the preceding section were incorporated in Sections 14AA.3.1 and 14AA.3.2.

14AA.8.4 Use of OE during Test Procedure Preparation

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Administrative procedures require review of recent internal and external operating experience when preparing test procedures.

14AA.8.5 Use of OE during Conduct of ITP

Administrative procedures require discussion of operating experience when performing pre-job briefs immediately prior to the conduct of a test.

14AA.9 Trial Use of Plant Operating Procedures and Emergency Procedures

14AA.9.1 Use of Plant Procedures during Initial Test Program

Whenever practical, plant procedures are used to perform system and component operation during the conduct of a test.

14AA.9.2 Operator Training and Participation during Certain Initial Tests (TMI Action Plan Item I.G.1, NUREG-0737)

The objectives of operator participation are to increase the capability of shift crews to operate facilities in a safe and competent manner by assuring that training for plant changes and off-normal events is conducted.

The major objective of TMI Action Plan Task I.G.1 was to use the preoperational and startup test programs as a training exercise for operating crews. NUREG-0933 contains a discussion of the proposed actions and the conclusions made. NUREG-0800, Section 14 was revised to address the original issue of this action item. NUREG-0933 discusses three anticipated operational occurrences applicable to the ESBWR. These are pressure controller failed high, pressure controller failed low, and stuck-open safety/relief valve. These events are addressed in the abnormal operating procedures. Operators receive training on them as part of their initial training. Operators participate in preoperational and startup testing.

Operators are trained on the specifics of the ITP schedule, administrative requirements and tests. Specific JIT training is conducted for selected startup tests.

The ITP may result in discovery of acceptable plant or system response differing from expected response. Test results are reviewed to identify these differences and the training for operators is changed to reflect them. Training is conducted as soon as is practicable in accordance with training procedures.

14AA.10 Initial Fuel Loading and Initial Criticality

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14AA.10.1 Prerequisites for Fuel Loading

- Preoperational tests are completed or justification is documented and approved for test exceptions and tests that have not been performed.
- All ITAAC are complete and the NRC has issued 10 CFR 52.103g declaration.
- Technical Specifications required for fuel load are met.
- License Conditions are met to allow fuel load.
- Licensed operators are stationed in the control room and for supervision of core alterations.
- Composition, duties, and emergency procedure responsibilities of the fuel handling crew are specified.
- Persons are technically qualified in accordance with plant procedures.
- Radiation monitors, nuclear instrumentation, manual initiation, and other devices are tested and verified to be operable to actuate the building evacuation alarm and ventilation control.
- Status of each system required for fuel loading is specified.
- Inspections of fuel and control rods are complete and all identified issues with installed fuel and control rods are resolved.

- Nuclear instruments are calibrated, operable and properly located (source-fuel-detector geometry). One operating channel has audible indication or annunciation in the control room.
- A response check of nuclear instruments to a neutron source consistent with the Technical Specifications surveillance frequency for source range nuclear instruments in the refueling mode is complete.
- Required status of containment is specified and met.
- Required status of the reactor vessel is specified and met. Components are either in place or out of the vessel, as specified, to be capable of receiving fuel.
- Vessel water level is established, and the minimum level for fuel loading and unloading is specified.
- The standby liquid control system is operable.
- Fuel handling equipment is confirmed functional and operable through surveillance and other tests, including dry runs.
- The status of protection systems, interlocks, mode switches, alarms, and radiation protection equipment is prescribed and verified.
- Water quality is established within prescribed limits.

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14AA.10.2 **Fuel Loading Procedure Details**

The fuel loading procedure includes instructions or information for the following areas:

- Loading sequence and pattern for fuel, control rods, and other components, with guidance regarding fuel addition increments so that the reactivity worth of added individual fuel assemblies becomes less as the core is assembled.
- Maintenance of a display for indicating the status of the core and fuel pool, as well as appropriate records of core loading.
- Proper seating and orientation of fuel and components (the procedure specifies a visual check of each assembly in each core position).
- Functional testing of each control rod immediately following fuel loading.
- Nuclear instrumentation and neutron source requirements for monitoring subcritical multiplication, including source or detector relocation and normalization of count rate after relocation.

- Flux monitoring, including counting times and frequencies and rules for plotting inverse multiplication and interpreting plots (the counting period for count rates is specified, and an inverse multiplication plot is maintained).
- The expected subcritical multiplication behavior.
- The minimum shutdown margin is proved periodically during loading and at the completion of loading. Shutdown margin verifications do not involve planned approach to criticality using nonstandard rod patterns or with operational interlocks bypassed.
- Actions (especially those pertaining to flux monitoring) for periods when fuel loading is interrupted.
- Maintenance of continuous voice communication between the control room and loading station.
- Minimum crew required to load fuel (the procedure requires the presence of at least two persons at any location where fuel handling is taking place, and a senior reactor operator with no other concurrent duties be in charge).

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- Crew work time limits per 10 CFR 26 are in effect.
- Approvals required for changing the procedure.

14AA.10.3 **Fuel Loading Procedure Limitations and Actions**

The fuel loading procedure includes the following limits and instructions:

- Established criteria for stopping fuel loading. Some circumstances that might warrant this are unexpected subcritical multiplication behavior, loss of communications between the control room and fuel loading station, inoperable source-range detector, and inoperability of the emergency boration system.
- Established criteria for emergency boron injection.
- Established criteria for containment evacuation.
- Actions to be performed in the event of fuel damage.
- Actions to be performed and/or approvals to be obtained before routine loading may resume after one of the above limitations has been reached or invoked.

14AA.10.4 Initial Criticality Procedure Requirements

The format and content requirements for preoperational tests apply to the initial criticality procedure. Plant operations are in accordance with plant operating procedures to the maximum extent possible. This procedure includes steps to ensure that the startup proceeds in a deliberate and orderly manner, changes in reactivity are continuously monitored, and inverse multiplication plots are maintained and interpreted.

The initial criticality procedure includes the following requirements:

- A critical rod position is predicted so that any anomalies may be noted and evaluated.
- All systems needed for startup are aligned and in proper operation.
- The standby liquid control system is operable.
- Procedural, license and Technical Specification requirements are met for initial criticality.
- Nuclear instruments are calibrated. A neutron count rate (of at least one-half count per second) should register on neutron monitoring channels before the startup begins, and the signal-to-noise ratio should be known to be greater than two. A conservative startup rate limit (no shorter than approximately a 30-second period) is established.

14.02-3

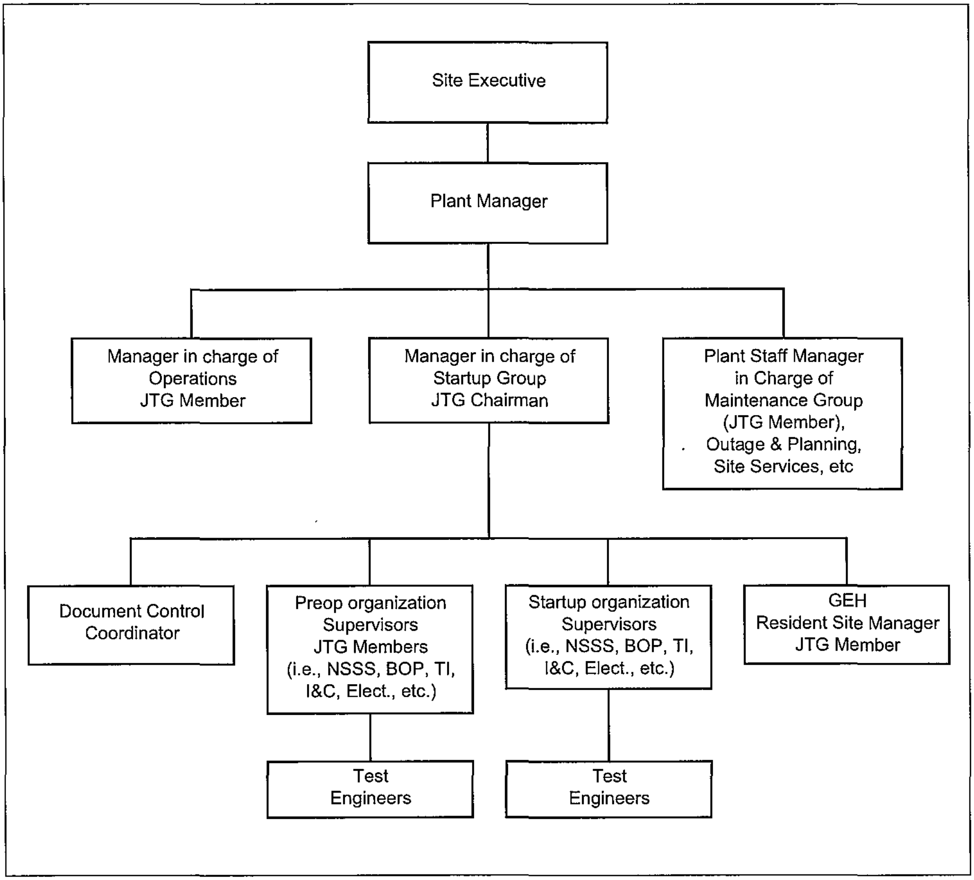
14AA.11 Plant Procedure Development Schedule

The milestone schedule for developing plant operating procedures is presented in Table 13.5-202 and discussed in Section 13.5.2.1. The operating and emergency procedures are available prior to start of licensed operator training and, therefore, are available for use during the ITP. Required or desired procedure changes may be identified during their use. Administrative procedures describe the process for revising plant operating procedures.

14AA.12 Individual Test Descriptions

Individual test descriptions can be found in DCD Section 14.2.8 and in Section 14.2.9.

Figure 14AA-201 Preoperational and Startup Test Organization (Typical)



14.02-3

Chapter 15 Safety Analyses

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

15.3 Analysis of Infrequent Events

15.3.10.5 Radiological Consequences

Add the following sentence at the end of this section.

STD SUP 15.3-1 In addition, procedures discuss the use of nuclear instrumentation to aid in detecting a possible mislocated fuel bundle after fueling operations.

NAPS SUP 15.3-2

15.6 ESP Information

NAPS ESP VAR 2.0-6 SSAR Chapter 15 is incorporated by reference except that information related to the ESBWR is replaced by DCD Chapter 15.

N025e

Chapter 16 Technical Specifications

16.0 Introduction

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

STD SUP 16.0-1 The Technical Specifications and the Technical Specification Bases are maintained as separate documents.

16.0.1 COL Information

S115a

16.0-1-A COL Applicant Bracketed Items

STD COL 16.0-1-A This COL item is addressed in the Technical Specifications and Technical Specification Bases.

S115a

16.0-2-H COL Holder Bracketed Items

STD COL 16.0-1-H This COL item is addressed in the Technical Specifications and Technical Specification Bases.

S115a

Chapter 17 Quality Assurance

17.0 Introduction

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

Add the following after the last paragraph.

NAPS SUP 17.0-1 The QAPD applicable to the COL licensee is described in Section 17.5. The licensee's QAPD describes the basis of the program, its scope of activities, and the control of work performed by suppliers. S023d

17.1 Quality Assurance During Design

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

Add the following after the first paragraph.

NAPS SUP 17.1-1 Quality Assurance (QA) applied during the preparation of the ESPA is described in SSAR Chapter 17, which is incorporated by reference.

NAPS SUP 17.1-2 QA applied during COL application preparation and site specific design activities is addressed in Section 17.5.

17.2 Quality Assurance During Construction and Operations

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

Replace the first paragraph with the following.

NAPS COL 17.2-1-A
NAPS COL 17.2-2-A The licensee's Quality Assurance Program in place during the construction and operations phases, including adapting the design to specific plant implementation, is described in Section 17.5. S023d

17.2.1 COL Information

17.2-1-A QA Program for the Construction and Operations Phases

NAPS COL 17.2-1-A This COL Item is addressed in Section 17.2. S023d

17.2-2-A QA Program for Design Activities

NAPS COL 17.2-2-A This COL Item is addressed in Section 17.2. S023d

17.3 Quality Assurance Program Description

IS127

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

Replace the first and second sentences with the following.

NAPS COL 17.3-1-A The Quality Assurance Program Document applicable to the licensee is described in Section 17.5. IS023d

17.3.1 COL Information

17.3-1-A Quality Assurance Program Document

NAPS COL 17.3-1-A This COL Item is addressed in Section 17.3. IS023d

17.4 Reliability Assurance Program During Design Phase

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

17.4.1 Introduction

Replace the third paragraph and subsequent bulleted list with the following.

STD COL 17.4-1-H The objectives of reliability assurance during the operations phase are integrated into the Quality Assurance Program (Section 17.5), the Maintenance Rule (MR) Program (Section 17.6), and other operational programs. Specific reliability assurance activities are addressed within operational programs (e.g., maintenance rule, surveillance testing, inservice testing, inservice inspection, and quality assurance) and the maintenance programs. IS085

The MR Program incorporates the following aspects of operational reliability assurance (refer to Section 17.6):

- Use of PRA importance measures, the expert panel process, and deterministic methods to determine the list of risk-significant SSCs
- Evaluation and maintenance of the reliability of risk-significant SSCs
- Monitoring the effectiveness of maintenance activities needed for operational reliability assurance
- Classifying, initially, as high-safety-significant, all SSCs that are in the scope of the design reliability assurance program (D-RAP), or applying expert panel review for any exceptions

- Use of historical data and industry operating experience on equipment performance as available
- Use of specific criteria to establish the level of performance or condition being maintained for SSCs within the scope of the MR Program; and use of monitoring to identify declining trends between surveillances and to minimize the likelihood of undetected performance or condition degradation to unacceptable levels, to the extent possible
- Use of maintenance programs to determine the nature and frequency of maintenance activities to be performed on plant equipment, including SSCs within the scope of the MR Program

17.4.6 SSC Identification/Prioritization

Add the following new paragraph at the end of this section.

STD COL 17.4-1-H The list of risk-significant SSCs will be confirmed via ITAAC (see DCD Tier 1 Table 3.6-1). IS085

17.4.9 Operational Reliability Assurance Activities

Replace the second paragraph with the following.

STD COL 17.4-1-H Refer to Section 17.4.1 for the implementation of reliability assurance during the operations phase. IS085

17.4.10 Owner/Operator's Reliability Assurance Program

Replace the fifth bullet with the following.

STD COL 17.4-1-H

- **MR Program:** The MR Program is described in Section 17.6. IS085

Replace the last sentence in this section with the following.

Refer to Section 17.4.1 for the implementation of reliability assurance activities.

17.4.13 COL Information

17.4-1-H Operation Reliability Assurance Activities IS085

STD COL 17.4-1-H This COL Item is addressed in Sections 17.4.1, 17.4.6, 17.4.9, 17.4.10, and 17.6. IS085

NAPS COL 17.3-1-A

17.5 Quality Assurance Program Description - Design Certification, Early Site Permits, and New License Applicants S023d

QA applied to the DC activities is described in DCD Section 17.1.

QA applied during the preparation of the ESP application is described in SSAR Chapter 17. N065

NAPS SUP 17.5-2

QA applied to safety-related activities performed prior to start of construction (e.g., site investigation, design and safety analysis, early procurements) is described in the Dominion Nuclear Facility QAPD (Reference 17.5-201) topical report for the Dominion operating nuclear plants as supplemented by COL Project procedures.

NAPS COL 17.2-1-A
NAPS COL 17.2-2-A

QA applied to activities to adapt the design to specific plant implementation, construction, and operations is addressed in the Dominion QAPD (Appendix 17AA). The QAPD is based on NEI 06-14. (Reference 17.5-202) S023d N075 N121a

The implementation milestones for the Operational Quality Assurance Program are provided in Section 13.4. S023b

17.5.1 References

17.5-201 DOM-QA-1, Dominion Nuclear Facility Quality Assurance Program Description.

17.5-202 Nuclear Energy Institute, "Quality Assurance Program Description," NEI 06-14. N075

STD COL 17.4-1-H

17.6 Maintenance Rule Program

NEI 07-02, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52" (Reference 17.6-201) is incorporated by reference with the following supplemental information:

STD SUP 17.6-1

The text of the template provided in NEI 07-02 is generically numbered as "17.X." When the template is incorporated by reference into this section, numbering is changed from "17.X" to "17.6."

STD SUP 17.6-3

17.6.1.1 Maintenance Rule Scoping per 10 CFR 50.65(b)

In Paragraph 17.6.1.1.b, replace "(DRAP - see FSAR Section 17.Y)" with the following.

(See Section 17.4)

17.6.3 Maintenance Rule Program Relationship with Reliability Assurance Activities

Replace with the following.

STD SUP 17.6-2

Reliability during the operations phase is assured through the implementation of operational programs, i.e., the MR program (Section 17.6), the Quality Assurance Program (Section 17.5), the Inservice Inspection Program (Sections 5.2.4 and 6.6, and DCD Section 3.8.1.7.3), and the Inservice Testing Program (Sections 3.9.6 and 3.9.3.7.1(3)e), as well as the Technical Specifications Surveillance Requirements (Chapter 16) and maintenance programs.

No chg.

S056

S056
S023a
17.06-1

17.6.6 References

17.6-201 Nuclear Energy Institute, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52," NEI 07-02.

NAPS SUP 17.5-3

Appendix 17AA North Anna Power Station Unit 3 Quality Assurance Program Description

Dominion®

North Anna
Unit 3
Quality
Assurance
Program
Description

Topical Report
DOM-QA-2

SEE
NOTE 1

Revision 0

NOTE 1: CHANGES TO THE QUALITY ASSURANCE PROGRAM DESCRIPTION ARE DESCRIBED IN CHANGE IDENTIFIER N121a.

Policy

Quality Assurance During Construction and Operation

Dominion Virginia Power (Dominion) shall design, procure, construct and operate the North Anna Unit 3 nuclear plant in a manner that will ensure the health and safety of the public and workers. These activities shall be performed in compliance with the requirements of the Code of Federal Regulations (CFR), the applicable Nuclear Regulatory Commission (NRC) Facility Operating Licenses, and applicable laws and regulations of the state and local governments.

The Dominion North Anna Unit 3 Quality Assurance Program (QAP) is the Quality Assurance Program Description (QAPD) provided in this document and the associated implementing documents. Together they provide for control of Dominion activities that affect the quality of safety-related nuclear plant structures, systems, and components (SSCs) and include all planned and systematic activities necessary to provide adequate confidence that such SSCs will perform satisfactorily in service. The QAPD may also be applied to certain equipment and activities that are not safety-related, but support safe plant operations, or where other NRC guidance establishes program requirements.

The QAPD is the top-level policy document that establishes the manner in which quality is to be achieved and presents Dominion's overall philosophy regarding achievement and assurance of quality. Implementing documents assign more detailed responsibilities and requirements and define the organizational interfaces involved in conducting activities within the scope of the QAP. Compliance with the QAPD and implementing documents is mandatory for personnel directly or indirectly associated with implementation of the Dominion North Anna Unit 3 QAP.

Signed *Signature on file*

David A. Christian

Senior Vice President Nuclear Operations & Chief Nuclear Officer

LIST OF EFFECTIVE SECTIONS

Section		Revision
Policy Quality Assurance During Construction and Operation		0
Part I	**Introduction**	0
Part II	**QAPD Details**	0
Section 1	Organization	0
Section 2	Quality Assurance Program	0
Section 3	Design Control	0
Section 4	Procurement Document Control	0
Section 5	Instructions, Procedures, and Drawings	0
Section 6	Document Control	0
Section 7	Control of Purchased Material, Equipment, and Services	0
Section 8	Identification and Control of Materials, Parts, and Components	0
Section 9	Control of Special Processes	0
Section 10	Inspection	0
Section 11	Test Control	0
Section 13	Handling, Storage, and Shipping	0
Section 14	Inspection, Test, and Operating Status	0
Section 16	Corrective Action	0
Section 17	Quality Assurance Records	0
Section 18	Audits	0
Part III	**Nonsafety-Related SSC Quality Control**	0
Part IV	**Regulatory Commitments**	0

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Part I Introduction

Section 1 General

Dominion's North Anna Unit 3 Quality Assurance Program Description (QAPD) is the top-level document that establishes the quality assurance policy and assigns major functional responsibilities for combined construction and operating license (COL) activities conducted by or for Dominion. The QAPD describes the methods and establishes quality assurance (QA) and administrative control requirements that meet 10 CFR 50, Appendix B, and 10 CFR 52. The QAPD is based on the requirements and recommendations of ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications," Parts I, II and III, as specified in this document.

The QAP is defined by the NRC-approved regulatory document that describes the QA elements (i.e., the QAPD), along with the associated implementing documents. Procedures and instructions that control North Anna Unit 3 activities will be developed prior to commencement of those activities. Dominion policies establish high-level responsibilities and authority for carrying out important administrative functions. Procedures establish practices for certain activities that are common to all Dominion nuclear business unit organizations performing those activities so that the activity is controlled and carried out in a manner that meets QAPD requirements. Procedures specific to a site, organization, or group establish detailed implementation requirements and methods, and may be used to implement policies or be unique to particular functions or work activities.

1.1 Scope/Applicability

The QAPD applies to COL, construction/pre-operation and operations, activities affecting the quality and performance of safety-related structures, systems, and components, including, but not limited to:

Designing
Siting
Training
Constructing
Procuring
Receiving
Storing
Handling
Shipping
Erecting
Installing
Fabricating
Cleaning
Testing
Inspecting
Preoperational activities (including ITAAC*)
Startup
Operating
Maintaining
Repairing
Refueling
Modifying
Decommissioning

* ITAAC are those Inspections, Tests, Analyses, and Acceptance Criteria the applicant must satisfy as determined by the Commission in accordance with 10 CFR Part 52.

Safety-related SSCs, under the control of the QAPD, are identified by design documents. The technical aspects of these items are considered when determining program applicability, including, as appropriate, the item's design safety function. The QAPD may be applied to certain activities where regulations other than 10 CFR 50 and 10 CFR 52 establish QA requirements for activities within their scope.

The policy of Dominion is to assure a high degree of availability and reliability of the nuclear plant while ensuring the health and safety of its workers and the public. To this end, selected elements of the QAPD are also applied to certain equipment and activities that are not safety-related, but support safe, economic, and reliable plant operations, or where other NRC guidance establishes quality assurance requirements. Implementing documents establish program element applicability.

The definitions provided in ASME NQA-1-1994, Part 1, Section 1.4, apply to select terms as used in this document.

Part II QAPD Details

Section 1 Organization

This section describes the Dominion organizational structure, functional responsibilities, levels of authority and interfaces for establishing, executing, and verifying QAPD implementation. The organizational structure includes corporate support and onsite functions for North Anna Unit 3 including interface responsibilities for multiple organizations that perform quality-related functions. Implementing documents assign more specific responsibilities and duties, and define the organizational interfaces involved in conducting activities and duties within the scope of the QAPD. Management gives careful consideration to the timing, extent and effects of organizational structure changes.

Dominion Nuclear Oversight Senior Manager is responsible to size the Quality Assurance organization commensurate with the duties and responsibilities assigned.

The following sections describe the reporting relationships, functional responsibilities and authorities for organizations implementing and supporting the North Anna Unit 3 QA Program. Titles used herein are generic functional descriptions. Administrative documents are maintained to relate the generic titles to the Dominion specific titles. The Dominion organizations for the North Anna Unit 3 construction and operations phases are shown in Figures II-1 and II-2, respectively.

1.1 Chief Nuclear Officer

The Chief Nuclear Officer (CNO) has overall responsibility and authority for implementing all activities associated with the safe and reliable design, construction, operation, and decommissioning of Dominion's nuclear facilities. The CNO establishes the North Anna Unit 3 quality assurance policy and provides guidance regarding its implementation. The CNO has delegated the responsibility and authority for approval of the QAPD to the senior manager of the group responsible for nuclear oversight. The CNO has the authority to resolve disputes related to implementation of the QAPD for which resolution is not achieved at lower levels within the organization. There are six functional organizations reporting to the CNO that affect the safety of the nuclear facilities: Nuclear Development, Nuclear Plant Construction, Nuclear Oversight, Operations, Engineering Services, and Support Services.

1.2 Nuclear Development

An executive management position is responsible for the development of new nuclear power plants. This includes activities associated with new nuclear plant engineering, analysis, design, procurement, pre-construction preparation, preparing applications, and obtaining permits and licenses for potential construction. Where implementation of any or all of these functions is delegated to organizations outside Dominion, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, this executive management position retains responsibility for the scope and effective implementation of the quality assurance program for those functions.

1.2.1 Manager Engineering

The functional manager for Engineering is responsible for the conduct of reviews of design developed by the suppliers, preservice testing activities during the preoperational and startup period. This group is responsible procurement of items and services for the new plant. The new plant engineering group is also responsible for document control and collection and preservation of records.

1.2.1.1 Engineering Design Service

Dominion has contracted with General Electric - Hitachi (GEH) and Bechtel to perform design activities in support of construction and to adapt the ESBWR design to the North Anna site. Dominion has delegated the responsibility of establishing and executing quality assurance measures for this design activity to the respective companies in accordance with their approved quality assurance programs. Dominion has also contracted with GEH to provide safety-related long lead-time components under the GEH quality assurance program. Dominion reviews and audits the suppliers on a regular basis to ensure conformance with the quality requirements.

1.2.1.2 Preservice Testing and Inspection

Preservice testing and inspection duties and responsibilities include the establishment of the programs to ensure required preservice inspections and tests for the plant are identified, performed and documented. This group is responsible for the incorporation of inspection and test information into the plant inservice inspection and test program and the submittal of required reports.

1.2.1.3 Plant Engineering

Plant engineering duties and responsibilities include establishing and implementing a process for selection and review of design documents produced for the North Anna Unit 3 project. The selection is based on the item's safety significance, complexity of design, standardization, state of the art, and/or similarity to other proven designs. This group is also responsible for providing input to and technical review of Dominion purchase documents for services and items related to the project, including any necessary interface with existing Dominion systems and groups. This group is responsible for the review and approval of the resolution of nonconforming items with a disposition of "accept-as-is" or "repair', i.e., where the action does not fully restore the item to the supplier's design, manufacturing and/or testing specifications, requirements of the purchase document, or purchaser approved documents.

1.2.1.4 Document Control

This group is responsible for control of Dominion documents, such as instructions, procedures, and drawings. This group is also responsible for the collection and preservation of quality assurance records. This group interfaces with existing Dominion processes and personnel in performing these duties.

1.2.2 Plant Manager

The plant manager's group is responsible for developing a trained and qualified staff for licensed operating activities. They accept control of SSCs turned over to Dominion for operation. Functional activities include operation, control, maintenance and start-up testing of the SSCs. This group is responsible for transitioning into the operating phase organization as described in Chapter 13 of the FSAR.

1.2.2.1 Operations

This group is responsible for operation and control of SSCs that have been turned over to Dominion. This group controls the starting and stopping of components, isolation for maintenance, and assists in the conduct of preoperational and startup tests as necessary. This group ensures sufficient staff are trained and licensed as necessary to progress into the operations phase of the plant.

1.2.2.2 Startup Testing

The startup test group is responsible for the development of procedures, planning, scheduling, and executing startup tests in accordance with the procedures. Qualified test personnel are used to review and approve the procedures. Qualified individuals are designated to review and approve test results.

1.2.2.3 Maintenance

The maintenance group is responsible for developing, scheduling, and performing periodic maintenance, including associated special processes, necessary to ensure the quality of installed SSCs that have been turned over to Dominion. This group assists in the performance of preoperational and startup testing, as necessary, and maintains control of measuring and test equipment for use by Dominion.

1.2.2.4 Training

The training group is responsible to develop and implement a systematic approach to training for operations and maintenance personnel. This group ensures fidelity of the training simulator with the constructed plant. The training group is responsible for achieving and maintaining accreditation of the training program. This group interfaces with the corporate training group for support as needed.

1.2.3 Organizational Effectiveness

The manager of the organizational effectiveness group is responsible for the corrective action program and the construction experience program.

1.2.4 Licensing and Regulatory Interface

The manager of the licensing and regulatory interface group is responsible for corresponding with the NRC on regulatory matters including the combined construction and operating license, other permits, and the completion of ITAAC requirements.

1.3 Nuclear Plant Construction

An executive management position is responsible for the construction of new nuclear power plants. This position assists in establishing contracts, provides oversight and coordination of construction contractors, and manages Dominion's cost and schedules. Suppliers will be used to perform the majority of engineering, procurement, and construction activities. The suppliers will be delegated the responsibility for achieving and assuring quality of the SSCs, however, Dominion retains the overall responsibility for quality.

1.3.1 Manager Construction

The manager of construction is responsible for interfacing with contractors for coordination of the overall construction effort to keep the project moving, controlling cost and schedule while maintaining quality of work. The manager construction ensures a process is developed and implemented to identify and resolve construction interferences so that changes are reflected back to the design and as-built configuration of the plant.

1.3.1.1 Scheduling

The scheduling personnel provide oversight and coordination of the overall project schedule development and implementation.

1.3.1.2 Cost

The cost personnel are responsible for oversight of cost controls for the construction phase of the project.

1.3.1.3 Procurement

The procurement personnel are responsible for the development and issuance of Dominion procurement documents for the project. They may interface with existing Dominion systems and personnel in the performance of this activity.

1.3.1.4 Fire Protection and Industrial Safety

The fire protection and industrial safety personnel are responsible for the development and implementation of fire protection measures and the industrial safety program during construction. This includes monitoring of supplier performance in these areas.

1.3.2 Principal Design and Construction Supplier(s)

Dominion will procure the services of one or more suppliers to develop and implement the North Anna Unit 3 construction project. This will include the activities of detailed construction engineering, procuring items, and the construction and installation of SSCs for the facility. Designation of the entities and their responsibilities will be added to this organization description as the suppliers are identified. Dominion will delegate to these suppliers the duties of and responsibility for establishing and executing a QA program for the design, procurement, manufacture, fabrication, installation, inspection, and testing of SSCs for the North Anna Unit 3 facility.

1.4 Nuclear Oversight

A senior management position is responsible for the verification of effective Dominion and Supplier QA program development, documentation, and implementation. This position is independent of cost and scheduling concerns associated with construction, operations, maintenance, modification, and decommissioning activities for performing quality assurance program verification. Where implementation of any or all of these functions is delegated to Suppliers, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, this senior management position retains responsibility for the scope and effective implementation of the quality assurance program for those functions. This management position has the necessary authority and responsibility for verifying quality achievement; identifying quality problems, recommending solutions and verifying implementation of the solutions; and escalating quality problems to higher management levels. This position has the authority to suspend unsatisfactory work and control further processing or installation of non-conforming materials. The authority to stop work delegated to Nuclear Oversight personnel is delineated in procedures.

1.4.1 Nuclear Development Phase (Construction)

Nuclear Oversight is responsible for QA oversight of the North Anna Unit 3 project. The oversight includes activities in development of the license application, design, procurement, construction, and related activities that affect the quality of SSCs.

1.4.1.1 QA Program Development

This group is responsible for development and maintenance of the QAPD. This group is responsible for verification of the development of the construction QA program through review of and concurrence in quality-related procedures for design, construction, and installation. This group also performs audits of the effectiveness of the QA program implementation within the Dominion new plant development organization.

1.4.1.2 Site QA/QC

This group is responsible for quality oversight of supplier conducted activities at the North Anna construction site through a system of planned audits, surveillances, and inspections as appropriate to the activity and based on the importance of the item or activity to the safety of the plant. This group is responsible for performance of inspections for Dominion activities on SSCs that have been turned over to Dominion for operation.

1.4.1.3 Supplier QA/QC

This group is responsible for quality oversight of suppliers and is performed through a system of audits, surveillances, and inspections as appropriate to the activity and based on the importance of the item or activity to the safety of the plant. This oversight is conducted at Dominion's and Suppliers' facilities. In performance of the oversight, this group will interface with Dominion's existing systems and groups for qualifying suppliers and performing verification activities.

1.4.2 Operations Phase

Nuclear Oversight is responsible for the evaluation of Suppliers' quality programs through a system of external audits, evaluations, and reviews of Supplier performance in accordance with quality assurance requirements. A list of approved Suppliers is maintained. Nuclear Oversight is responsible for assuring Dominion compliance with the QAPD through administration of a comprehensive and systematic internal audit program.

Nuclear Oversight is responsible for developing and maintaining an appropriate quality verification inspection program where not provided for in the facility construction or operating organization functions.

1.4.2.1 Facility Oversight

A management position is responsible for the effective performance of Nuclear Oversight activities. This position performs independent assessment of facility operations related to quality and safety with lines of communication to the executive management position responsible for facility operations.

1.4.2.1.1 Quality Control Inspection

The Quality Control Inspection group plans and conducts inspections of operating facility maintenance and modification activities to ensure quality in accordance with the requirements of the QA program. The Quality Control Inspectors report through this functional organization while performing maintenance and modification inspections for the operating facility.

1.5 Operations (Operations Phase)

An executive management position is responsible for overall operating activities of Dominion's nuclear facilities. This executive is responsible for implementing the quality assurance program during operating activities, including related decommissioning activities.

1.5.1 Facility Operations

An executive management position is responsible for operations of their assigned Dominion nuclear facilities. The necessary responsibility and authority for the management and direction of all activities related to the safe and efficient operation and decommissioning has been delegated by the senior executives. This responsibility includes ensuring quality through implementation of the QAPD in all the activities related to operation such as maintenance, testing, start-up and shutdown, refueling, fuel storage, and modification.

1.5.1.1 Facility Operations and Maintenance

A senior management position is responsible for safe operations and maintenance of the nuclear facilities including those activities necessary for safe storage and handling of spent nuclear fuel during decommissioning. The position responsibilities include: directing the operations, maintenance, planning, and site services groups; implementing facility modifications; and maintaining compliance with requirements of the operating license, Technical Specifications, and applicable federal, state, and local laws, regulations, and codes.

1.5.1.1.1 Operations

Operations is responsible for operating the facility in accordance with the applicable license, including those in a decommissioning phase that still contain nuclear fuel. Overall facility operation is directed by a management position responsible for Operations activities.

Operations activities include monitoring and controlling day-to-day operation of the nuclear facility; responding to alarms; manipulating facility equipment; coordinating facility operations to manage work such as maintenance, testing, and modifications; and moving nuclear fuel. The Operations organization contains supervision and staff for shift operations, including shift managers, unit supervisors, licensed control room operators, and non-licensed operators. Operations is also responsible for the shift technical advisor function. Operations is also responsible for oversight of fire protection measures.

1.5.1.1.2 Maintenance

Maintenance is responsible for directing and coordinating facility maintenance activities including on-line maintenance, installation, maintenance, alterations, adjustment and calibration, replacement and repair of plant electrical and mechanical equipment, and instruments and controls. The responsibilities include performance of surveillances required by Technical Specifications, establishing standards and frequency of calibration for instrumentation and control devices, and ensuring instrumentation and related testing equipment are properly used, inspected and maintained.

1.5.1.1.3 Outage and Planning

Outage & Planning is responsible for planning and scheduling online-maintenance and outage activities.

1.5.1.1.4 Site Services

Site Services is responsible for facility project support, including project construction and project controls.

1.5.1.2 Safety and Licensing

A senior management position is responsible for ensuring that facility safety and licensing requirements are implemented. This position is responsible for directing and coordinating radiological protection and assessment of nuclear safety issues at the facility, including independent review functions through the independent review body (IRB). The responsibilities also include managing licensing activities; interfacing with corporate management on operating experience and licensing issues, managing facility procedures, and administering the facility environmental compliance program. This position is independent of cost and scheduling concerns associated with operations, maintenance, and modification activities. This position has the authority to suspend unsatisfactory work and control further processing or installation of non-conforming materials. The authority to stop work delegated to quality control inspection personnel is delineated in procedures.

1.5.1.2.1 Organizational Effectiveness

Organizational Effectiveness is responsible for the corrective action program and the operating experience program.

1.5.1.2.2 Radiological Protection and Chemistry

Radiological Protection & Chemistry carries out health physics and chemistry functions and maintains sufficient organizational freedom and independence from operating pressures as required by the facility Technical Specifications. A qualified supervisor or manager is assigned to fulfill the radiological protection manager position described in Section 2.6 of the QAPD. The radiological protection responsibilities include scheduling and conducting radiological surveys, contamination sample collection, determining contamination levels, assigning work restrictions through radiation work permits, administering the personnel monitoring program, and maintaining required records in accordance with federal and state codes. The chemistry responsibilities include maintaining primary and secondary plant chemistry in accordance with established program requirements.

1.5.1.2.3 Procedures

The Procedures group is responsible for ensuring that procedures are prepared in accordance with applicable regulatory requirements, industry quality standards, and the QAPD.

1.5.1.2.4 Licensing

The licensing group is responsible for corresponding with the NRC on license related matters and supporting arrangements for NRC inspections.

1.5.1.2.5 Quality Control

The quality control group is responsible for the development and implementation of a QC program for the operating unit. The responsibilities include the planning of inspections and a process for assigning inspections to qualified individuals. This group is responsible for oversight of the training, qualification and certification of inspection personnel.

1.6 Engineering Services (Operations Phase)

An executive management position is responsible for the engineering functions supporting design and construction activities and long-term nuclear operations. These are accomplished through nuclear engineering, projects, nuclear analysis and fuel, information technology, and document control and records management groups. Responsibilities include system level implementation of the requirements established by the QAPD for the nuclear facilities and facility specific engineering and technical support required for day-to-day operations. Where implementation of any or all of these functions is delegated to organizations outside Dominion, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, this executive management position retains responsibility for the scope and effective implementation of the quality assurance program for those functions.

1.6.1 Nuclear Engineering

A senior management position is responsible for design engineering functions and supporting activities. Such as independent design checks and reviews, developing and maintaining engineering programs, including those for nondestructive examination (NDE), and the facility inservice inspection and test (ISI/IST) programs; configuration management including design and configuration control, and developing and revising facility drawings; and engineering technical support at the operating facilities.

1.6.1.1 Design Engineering

Design engineering is responsible for managing engineering resources providing day-to-day technical support for facility operations. The functions include engineering and technical support at a system and component level to ensure optimum design basis performance, system reliability, and optimum component performance and reliability. Support is also provided in developing and implementing testing programs, tracking and scheduling test performance, and evaluating test results. The test programs include inservice inspections, Technical Specification surveillances, post-modification and post-maintenance testing, and nondestructive examinations.

1.6.1.2 Project Engineering

Project engineering is responsible for the implementation of large projects for the nuclear facilities on behalf of Dominion. Implementation includes development of the detailed scope, estimate, schedule, cost, design, procurement, construction, testing, and closeout of each project. Project engineering focuses on defined projects separate from ongoing routine engineering projects.

1.6.1.3 Engineering Programs

Engineering programs is responsible for providing support in classifying SSCs, maintaining the design control program, developing and implementing the inservice inspection and test programs, and ensuring the design basis for the facility is maintained.

1.6.1.3.1 Document Control and Records Management

Document control and records management groups are assigned responsibility to ensure controlled documents (such as manuals, instructions, procedures, and drawings) and facility records are maintained in accordance with applicable regulatory requirements, industry quality standards, and the QAPD.

1.6.1.3.2 Fire Protection Engineer

The fire protection engineer is responsible for maintaining the fire protection design basis and assisting with the resolution of problems related to fire protection at the site.

1.6.2 Nuclear Analysis and Fuel

A senior management position is responsible for activities related to safety and management of nuclear fuel. Nuclear Analysis and Fuel (NAF) is responsible for engineering activities, evaluation, and analysis of: core design, fuel and reactor performance, probabilistic risk assessment, spent fuel storage, and radiological effects. NAF provides reactor-engineering support for the operating power stations. NAF is responsible for nuclear fuel procurement, assurance of nuclear fuel quality through surveillances and inspections at Dominion and supplier facilities, and special nuclear material accountability. This position has the authority to control further processing or installation of nonconforming materials. The authority delegated to inspection and surveillance personnel is delineated in procedures. NAF is also responsible for providing engineering oversight of dry cask spent fuel storage system fabrication, including approval of nonconformance disposition.

1.6.3 Information Technology

A senior management position is responsible for direction and support of information technology for the nuclear organizations and facilities. Responsibilities include: network infrastructure maintenance and upgrade, network and application security, network operations; automation strategy, application development and support, automation training; development and maintenance of the software control program; and oversight, maintenance, and repair of the Emergency Response Facility Computer System.

1.7 Support Services (Operations Phase)

An executive management position is responsible to provide licensing, fire protection, security, emergency preparedness, training, and procurement support services to the Nuclear Organization. Where implementation of any or all of these functions is delegated to organizations outside Dominion, procedures require the establishment of interface documents including defining lines of communication and authorities as appropriate for the delegated functions. However, this executive management position retains responsibility for the scope and effective implementation of the quality assurance program for those functions.

1.7.1 Licensing and Operations Support

A senior management position is responsible for providing regulatory compliance and licensing support through NRC communications, maintaining and acquiring licenses required for continued and extended operations and providing operations, chemistry and health physics support.

1.7.2 Protection Services and Emergency Preparedness

A senior management position is responsible for providing nuclear facility security, and overall management of Nuclear Emergency Preparedness activities.

1.7.2.1 Protection Services

Protection Services is responsible for facility protective services, including physical security, nuclear facility access programs, and fitness for duty programs. Protection Services is also responsible for industrial safety and loss prevention including oversight of fire protection measures.

1.7.2.2 Emergency Preparedness

Emergency Preparedness is responsible for development and maintenance of Dominion radiological emergency plans and coordination with required off-site radiological emergency response groups for the nuclear facilities. This includes managing the overall scheduling and coordination of emergency plan testing, training and exercises with federal, state, and local agencies, and working with corporate and facility personnel to ensure emergency plans meet all the requirements and commitments.

1.7.3 Training

A senior management position is responsible for the training of personnel who operate or support the nuclear facilities. Training responsibilities include: determining the need for training based on information provided by the various groups, developing performance-based training programs, implementing training programs to support employee and facility needs, and evaluating training programs. Certain functional groups may be assigned responsibility for the development and conduct of their own training programs provided these groups are not required to have a systems approach to training under 10 CFR 50.120.

1.7.4 Supply Chain Management

A senior management position is responsible for material management, purchasing, procurement engineering, Supplier surveillance functions, and source and receipt inspection. This position has the authority to control further processing or installation of nonconforming materials. This authority is delegated to inspection and surveillance personnel as delineated in procedures.

1.8 Authority to Stop Work

Quality assurance and inspection personnel have the authority, and the responsibility, to stop work in progress which is not being done in accordance with approved procedures or where safety or SSC integrity may be jeopardized. This extends to offsite work performed by suppliers that furnish safety-related materials and services to Dominion.

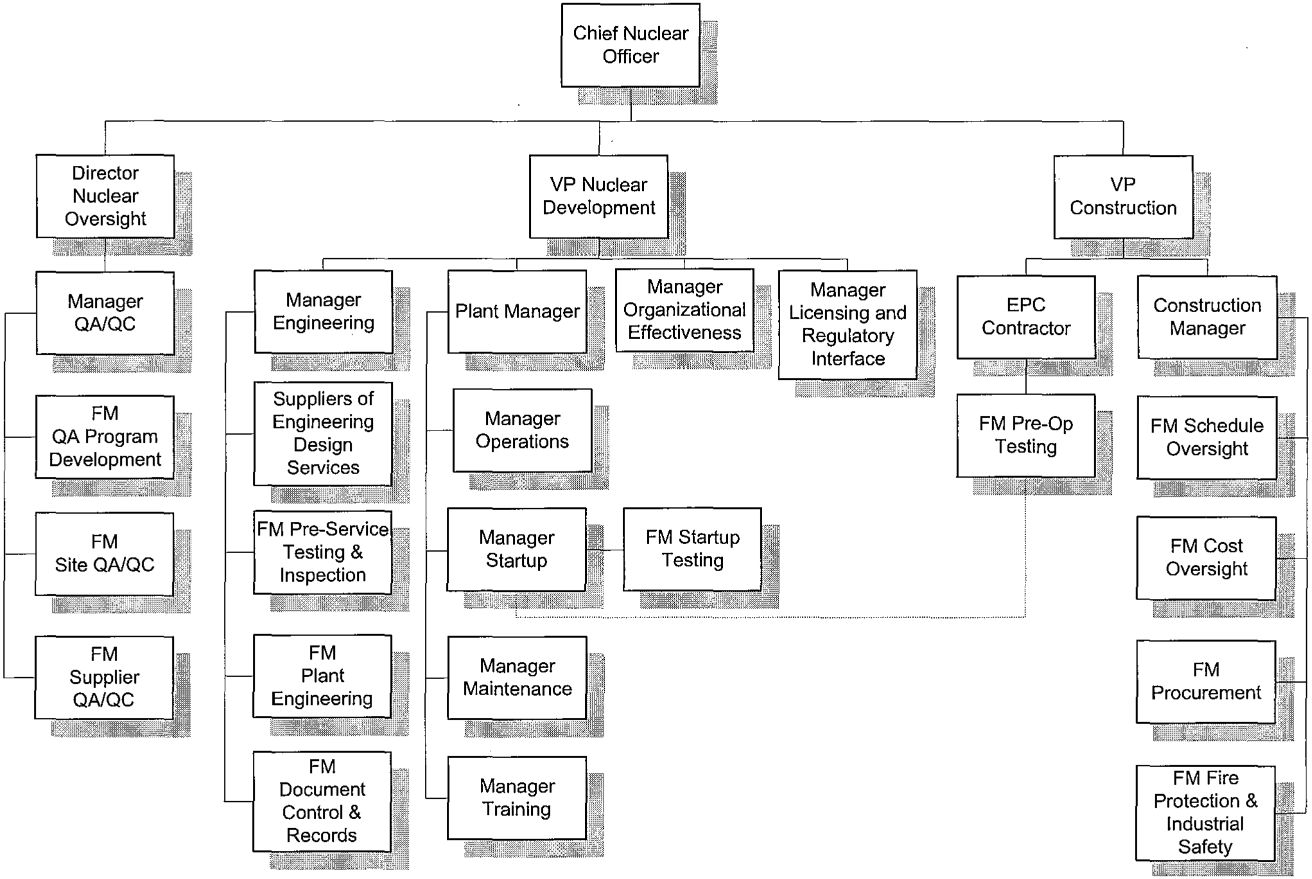
1.9 Quality Assurance Organizational Independence

For the COL construction activities, independence shall be maintained between the organization or organizations performing the checking (quality assurance and control) functions and the organizations performing the functions. This provision Is not applicable to design review/verification.

1.10 NQA-1-1994 Commitment

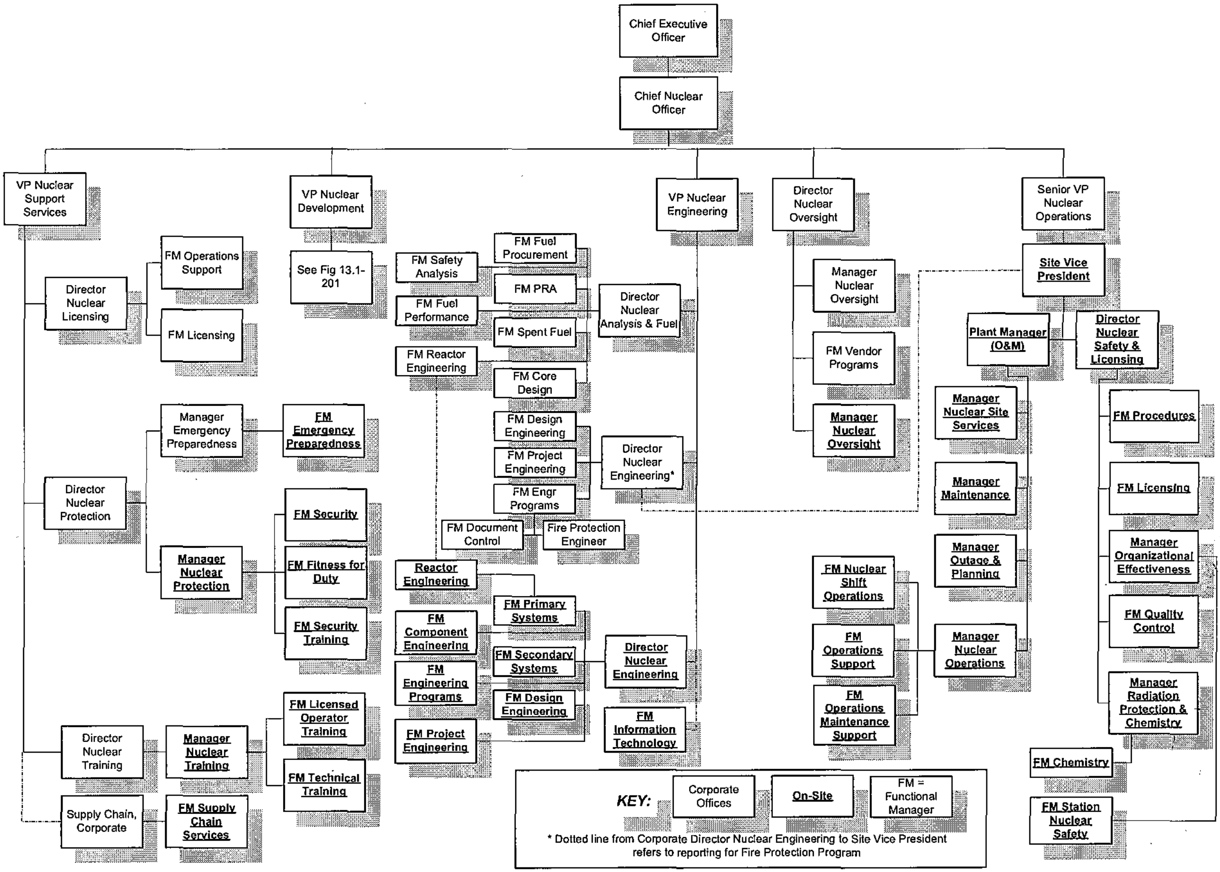
In establishing its organizational structure, Dominion commits to compliance with NQA-1-1994, Basic Requirement 1 and Supplement 1S-1.

Figure II-1 Construction Organization



17.05-4

Figure II-2 Operating Organization



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Section 2 Quality Assurance Program

Dominion has established the necessary measures and governing procedures to implement the QAP as described in the QAPD. Dominion is committed to implementing the QAP in all aspects of work that are important to the safety of the nuclear plant as described and to the extent delineated in the QAPD. Further, Dominion ensures through the systematic process described herein that its suppliers of safety-related equipment or services meet the applicable requirements of 10 CFR 50, Appendix B. Senior management is regularly apprised of the adequacy of implementation of the QAP through the audit functions described in Part II, Section 18.

The objective of the QAP is to assure that the North Anna Unit 3 nuclear generating plant is designed, constructed, and operated in accordance with governing regulations and license requirements. The program is based on the requirements of ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications," as further described in this document. The QAP applies to those quality-related activities that involve the functions of safety-related SSCs associated with the design (excluding Design Certification activities), fabrication, construction, and testing of the facility SSC, and to the managerial and administrative controls used to assure safe operations. Examples of COL safety-related activities include, but are not limited to, site-specific engineering related to safety-related SSCs, site geotechnical investigations, site engineering analysis, seismic analysis, and meteorological analysis. A list or system that identifies SSCs and activities to which this program applies is maintained at the appropriate facility. The Design Certification Document is used as the basis for this list or system. Cost and scheduling functions do not prevent proper implementation of the QAP.

As described in Part III of the QAPD, specific program controls are applied to nonsafety-related SSCs, for which 10 CFR 50, Appendix B, is not applicable, that are significant contributors to plant safety. The specific program controls consistent with applicable sections of the QAPD are applied to those items in a selected manner, targeted at those characteristics or critical attributes that render the SSC a significant contributor to plant safety.

Delegated responsibilities may be performed under a supplier's or principal contractor's QA Program, provided that the supplier or principal contractor has been approved as a supplier in accordance with the QAP. Periodic audits and assessments of supplier QA programs are performed to assure compliance with the supplier's or principal contractor's QAPD and implementing procedures. In addition, routine interfaces with supplier's personnel provide added assurance that quality expectations are met.

For the COL application, the QAPD applies to those North Anna Unit 3 and Dominion activities that can affect either directly or indirectly the safety-related site characteristics or analysis of those characteristics. In addition, the QAPD applies to engineering activities that are used to characterize the site or analyze that characterization.

New nuclear plant construction will be the responsibility of Dominion's North Anna Unit 3 organization. Detailed engineering specifications and construction procedures will be developed to implement the QAPD and EPC QA programs prior to commencement of construction (COL) activities. Examples of Limited Work Authorization (LWA) activities that could impact safety-related SSCs include impacts of construction to existing facilities and for construction of new plants, the interface between nonsafety-related and safety-related SSCs, and the placement of seismically-designed backfill.

In general, the program requirements specified herein are detailed in implementing procedures that are either Dominion/North Anna Unit 3 implementing procedures, or supplier implementing procedures governed by a supplier quality assurance program.

A grace period of 90 days may be applied to provisions that are required to be performed on a periodic basis unless otherwise noted. Annual evaluations and audits that must be performed on a triennial basis are examples where the 90 day grace period could be applied. The grace period does not allow the "clock" for a particular activity to be reset forward. The "clock" for an activity is reset backwards by performing the activity early. Audits schedules are based on the month in which the audit starts.

2.1 Responsibilities

Personnel who work directly or indirectly for Dominion are responsible for achieving acceptable quality in the work covered by the QAPD. This includes those activities delineated in Part I, Section 1.1. Dominion personnel performing verification activities are responsible for verifying the achievement of acceptable quality. Activities governed by the QAPD are performed as directed by documented instructions, procedures, and drawings that are of a detail appropriate for the activity's complexity and effect on safety. Instructions, procedures, and drawings specify quantitative or qualitative acceptance criteria, as applicable or appropriate for the activity, and verification is against these criteria. Provisions are established to designate or identify the proper documents to be used in an activity, and to ascertain that such documents are being used. The North Anna Unit 3 nuclear oversight manager is responsible to verify that processes and procedures comply with the QAPD and other applicable requirements, that such processes or procedures are implemented, and that management appropriately ensures compliance.

2.2 Delegation of Work

Dominion retains and exercises the responsibility for the scope and implementation of an effective QAP. Positions identified in Part II, Section 1, may delegate all or part of the activities of planning, establishing, and implementing the program for which they are responsible to others, but retain the responsibility for the program's effectiveness. Decisions affecting safety are made at the level appropriate for its nature and effect, and with any necessary technical advice or review.

2.3 Site-Specific Safety-Related Design Basis Activities

Site-specific safety-related design basis activities are defined as those activities, including sampling, testing, data collection, and supporting engineering calculations and reports, that will be used to determine the bounding physical parameters of the site. Appropriate quality assurance measures are applied.

2.4 Periodic Review of the Quality Assurance Program

Management of those organizations implementing the QA program, or portions thereof, assess the adequacy of that part of the program for which they are responsible to assure its effective implementation at least once each year or at least once during the life of the activity, whichever is shorter. However, the period for assessing QA programs during the operations phase may be extended to once every two years.

2.5 Issuance and Revision to Quality Assurance Program

Administrative control of the QAPD will be in accordance with 10 CFR 50.55(f) and 10 CFR 50.54(a), as appropriate. Changes to the QAPD are evaluated by the nuclear oversight manager to ensure that such changes do not degrade previously approved quality assurance controls specified in the QAPD. This document shall be revised as appropriate to incorporate additional QA commitments, that may be established during the COL application development process. New revisions to the document will be reviewed, at a minimum, by the Dominion manager responsible for North Anna Unit 3 nuclear oversight and approved by the senior manager responsible for Dominion's nuclear oversight group.

Regulations require that the FSAR include, among other things, the managerial and administrative controls to be used to assure safe operation, including a discussion of how the applicable requirements of Appendix B will be satisfied. In order to comply with this requirement, the FSAR references the QAPD and, as a result, the requirements of 10 CFR 50.54(a) are satisfied by and apply to the QAPD.

2.6 Personnel Qualifications

Personnel assigned to implement elements of the QAPD shall be capable of performing their assigned tasks. To this end, Dominion establishes and maintains formal indoctrination and training programs for personnel performing, verifying, or managing activities within the scope of the QAPD to assure that suitable proficiency is achieved and maintained. Plant and support staff minimum qualification requirements are as delineated in the unit Technical Specifications. Other qualification requirements may be established but will not reduce those required by Technical Specifications. Sufficient managerial depth is provided to cover absences of incumbents. When required by code, regulation, or standard, specific qualification and selection of personnel is conducted in accordance with those requirements as established in the applicable Dominion procedures. Indoctrination includes the administrative and technical objectives, requirements of the applicable codes and standards, and the QAPD elements to be employed. Training for positions identified in 10 CFR 50.120 is accomplished according to programs accredited by the National Nuclear Accrediting Board of the National Academy of Nuclear Training that implement a systematic approach to training. Records of personnel training and qualification are maintained.

The minimum qualifications of the senior management position for Dominion's nuclear oversight group and the management position for North Anna Unit 3 nuclear oversight are that each holds an engineering or related science degree and a minimum of four years of related experience including two years of nuclear power plant experience, one year of supervisory or management experience, and one year of the experience is in performing quality verification activities. Special requirements shall include management and supervisory skills and experience or training in leadership, interpersonal communication, management responsibilities, motivation of personnel, problem analysis and decision making, and administrative policies and procedures. Individuals who do not possess these formal education and minimum experience requirements should not be eliminated automatically when other factors provide sufficient demonstration of their abilities. These other factors are evaluated on a case-by-case basis and approved and documented by senior management.

The minimum qualifications of the individuals responsible for planning, implementing, and maintaining the QAPD are that each has a high school diploma or equivalent and has a minimum of one year of related experience. Individuals who do not possess these formal education and minimum experience requirements should not be eliminated automatically when other factors provide sufficient demonstration of their abilities. These other factors are evaluated on a case-by-case basis and approved and documented by senior management.

2.7 Independent Review

Activities occurring during the operational phase shall be independently reviewed on a periodic basis. The independent review program shall be functional prior to initial core loading. The independent review function performs the following:

- Reviews proposed changes to the facility as described in the safety analysis report (SAR). The Independent Review Body (IRB) also verifies that changes do not adversely affect safety and if a technical specification change or NRC review is required.
- Reviews proposed tests and experiments not described in the SAR. Changes to proposed tests and experiments not described in the SAR that do require a technical specification change must be reviewed by the IRB prior to NRC submittal and implementation.

- Reviews proposed technical specification changes and license amendments relating to nuclear safety prior to NRC submittal and implementation, except in those cases where the change is identical to a previously approved change.
- Reviews violations, deviations, and events that are required to be reported to the NRC. This review includes the results of investigations and recommendations resulting from such investigations to prevent or reduce the probability of recurrence of the event.
- Reviews any matter related to nuclear safety that is requested by the Site Executive or any IRB member.
- Reviews corrective actions for significant conditions adverse to quality.
- Reviews the adequacy of the audit program every 24 months.

A group may function as an independent review body (IRB). In discharging its review responsibilities, the IRB keeps safety considerations paramount when opposed to cost or schedule considerations. One or more organizational units may collectively perform this function.

IRB reviews are supplemented as follows:

- A qualified person, independent of the preparer, reviews proposed changes in the procedures as described in the SAR prior to implementation of the change to determine if a technical specification change or NRC approval is required.
- Audits of selected changes in the procedures described in the SAR are performed to verify that procedure reviews and revision controls are effectively implemented.
- Competent individual(s) or group(s) other than those who performed the original design but who may be from the same organization verify that changes to the facility do not result in a loss of adequate design or safety margins.

The results of IRB reviews of matters involving the safe operation of the facility are periodically independently reviewed. This review is intended to support management in identifying and resolving issues potentially affecting safe plant operation. This review supplements the existing corrective action programs and audits.

- The review is performed by a team consisting of personnel with experience and competence in the activities being reviewed, but independent from cost and schedule considerations and from the organizations responsible for those activities.
- The review is supplemented by outside consultants or organizations as necessary to ensure the team has the requisite expertise and competence.
- Results of the review are documented and reported to responsible management.

- Management periodically consider issues they determine warrant special attention, such as deficient plant programs, declining performance trends, employee concerns, or other issues related to safe plant operations and determine what issues warrant the review.
- Management determines the scheduling and scope of review and the composition of the team performing the review.

2.8 NQA-1-1994 Commitment/Exceptions

In establishing qualification and training programs, Dominion commits to compliance with NQA-1-1994, Basic Requirement 2 and Supplements 2S-1, 2S-2, 2S-3 and 2S-4, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 2S-1
  - Supplement 2S-1 will include use of the guidance provided in Appendix 2A-1 the same as if it were part of the Supplement. The following two alternatives may be applied to the implementation of this Supplement and Appendix:
    - (1) In lieu of being certified as Level I, II, or III in accordance with NQA-1-1994, personnel that perform independent quality verification inspections, examinations, measurements, or tests of material, products, or activities will be required to possess qualifications equal to or better than those required for performing the task being verified; and the verification is within the skills of these personnel and/or is addressed by procedures. These individuals will not be responsible for the planning of quality verification inspections and tests (i.e., establishing hold points and acceptance criteria in procedures, and determining who will be responsible for performing the inspections), evaluating inspection training programs, nor certifying inspection personnel.
    - (2) A qualified engineer may be used to plan inspections, evaluate the capabilities of an inspector, or evaluate the training program for inspectors. For the purpose of these functions, a qualified engineer is one who has a baccalaureate in engineering in a discipline related to the inspection activity (such as electrical, mechanical, civil) and has a minimum of five years engineering work experience with at least two years of this experience related to nuclear facilities.
- NQA-1-1994, Supplement 2S-2
  - In lieu of Supplement 2S-2, for qualification of nondestructive examination personnel, North Anna Unit 3 will follow the applicable standard cited in the version(s) of Section III and Section XI of the ASME Boiler and Pressure Vessel Code approved by the NRC for use at the North Anna Unit 3 site.
- NQA-1-1994, Supplement 2S-3

- The requirement that prospective Lead Auditors have participated in a minimum of five audits in the previous three years is replaced by the following, "The prospective lead auditor shall demonstrate his/her ability to properly implement the audit process, as implemented by North Anna Unit 3, to effectively lead an audit team, and to effectively organize and report results, including participation in at least one nuclear audit within the year preceding the date of qualification."

Section 3 Design Control

Dominion has established and implements a process to control the design, design changes, and temporary modifications (e.g.,temporary bypass lines, electrical jumpers and lifted wires, and temporary setpoints) of items that are subject to the provisions of the QAPD. The design process includes provisions to control design inputs, outputs, changes, interfaces, records, and organizational interfaces within Dominion and with suppliers. These provisions assure that design inputs (such as design bases and the performance, regulatory, quality, and quality verification requirements) are correctly translated into design outputs (such as analyses, specifications, drawings, procedures, and instructions) so that the final design output can be related to the design input in sufficient detail to permit verification. Design change processes and the division of responsibilities for design-related activities are detailed in North Anna Unit 3 and supplier procedures. The design control program includes interface controls necessary to control the development, verification, approval, release, status, distribution, and revision of design inputs and outputs. Design changes and disposition of nonconforming items as “use as is” or “repair” are reviewed and approved by the North Anna Unit 3 design organization or by other organizations so authorized by Dominion.

Design documents are reviewed by individuals knowledgeable in QA to ensure the documents contain the necessary QA requirements.

3.1 Design Verification

Dominion design processes provide for design verification to ensure that items and activities subject to the provisions of the QAPD are suitable for their intended application, consistent with their effect on safety. Design changes are subjected to these controls, which include verification measures commensurate with those applied to original plant design.

Design verifications are performed by competent individuals or groups other than those who performed the original design but who may be from the same organization. The verifier shall not have taken part in the selection of design inputs, the selection of design considerations, or the selection of a singular design approach, as applicable. This verification may be performed by the originator’s supervisor provided the supervisor did not specify a singular design approach, rule out certain design considerations, and did not establish the design inputs used in the design, or if the supervisor is the only individual in the organization competent to perform the verification. If the verification is performed by the originator’s supervisor, the justification of the need is documented and approved in advance by management.

The extent of the design verification required is a function of the importance to safety of the item under consideration, the complexity of the design, the degree of standardization, the state-of-the-art, and the similarity with previously proven designs. This includes design inputs, design outputs, and design changes. Design verification procedures are established and implemented to assure that an appropriate verification method is used, the appropriate design parameters to be verified are chosen, the acceptance criteria are identified, and the verification is satisfactorily accomplished and documented. Verification methods may include, but are not limited to, design reviews, alternative calculations and qualification testing. Testing used to verify the acceptability of a specific design feature demonstrates acceptable performance under conditions that simulate the most adverse design conditions expected for the item's intended use.

North Anna Unit 3 normally completes design verification activities before the design outputs are used by other organizations for design work, and before they are used to support other activities such as procurement, manufacture, or construction. When such timing cannot be achieved, the design verification is completed before relying on the item to perform its intended design or safety function.

3.2 Design Records

Dominion maintains records sufficient to provide evidence that the design was properly accomplished. These records include the final design output and any revisions thereto, as well as record of the important design steps (e.g., calculations, analyses and computer programs) and the sources of input that support the final output.

Plant design drawings reflect the properly reviewed and approved configuration of the plant.

3.3 Computer Application and Digital Equipment Software

The QAPD governs the development, procurement, testing, maintenance, and use of computer application and digital equipment software when used in safety-related applications and designated nonsafety-related applications. Dominion and suppliers are responsible for developing, approving, and issuing procedures, as necessary, to control the use of such computer application and digital equipment software. The procedures require that the application software be assigned a proper quality classification and that the associated quality requirements be consistent with this classification. Each application software and revision thereto is documented and approved by the code manager as delineated in the software control procedures. The QAPD is also applicable to the administrative functions associated with the maintenance and security of computer hardware where such functions are considered essential in order to comply with other QAPD requirements such as QA records.

3.4 Setpoint Control

Instrument and equipment setpoints that could affect nuclear safety shall be controlled in accordance with written instructions. As a minimum, these written instructions shall:

(1) Identify responsibilities and processes for reviewing, approving, and revising setpoints and setpoint changes originally supplied by the reactor plant supplier, the A/E, and the plant's technical staff.

(2) Ensure that setpoints and setpoint changes are consistent with design and accident analysis requirements and assumptions.

(3) Provide for documentation of setpoints, including those determined operationally.

(4) Provide for access to necessary setpoint information for personnel who write or revise plant procedures, operate or maintain plant equipment, develop or revise design documents, or develop or revise accident analyses.

3.5 NQA-1-1994 Commitment/Exceptions

In establishing its program for design control and verification, Dominion commits to compliance with NQA-1-1994, Basic Requirement 3, and Supplement 3S-1, the subsurface investigation requirements in Subpart 2.20, and the standards for computer software in Subpart 2.7.

Section 4 Procurement Document Control

Dominion has established the necessary measures and governing procedures to assure that purchased items and services are subject to appropriate quality and technical requirements. Procurement document changes shall be subject to the same degree of control as utilized in the preparation of the original documents. These controls include provisions such that:

- Where original technical or quality assurance requirements cannot be determined, an engineering evaluation is conducted and documented by qualified staff to establish appropriate requirements and controls to assure that interfaces, interchangeability, safety, fit and function, as applicable, are not adversely affected or contrary to applicable regulatory requirements.
- Applicable technical, regulatory, administrative, quality and reporting requirements (such as specifications, codes, standards, tests, inspections, special processes, and 10 CFR 21) are invoked for procurement of items and services. 10 CFR 21 requirements for posting, evaluating, and reporting will be followed and imposed on suppliers when applicable. Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents for procurement of items and services. To the extent necessary, procurement documents shall require suppliers to have a documented QA program that is determined to meet the applicable requirements of 10 CFR 50, Appendix B, as appropriate to the circumstances of procurements (or the supplier may work under Dominion's approved QA program).

Reviews of procurement documents shall be performed by personnel who have access to pertinent information and who have an adequate understanding of the requirements and intent of the procurement documents.

4.1 NQA-1-1994 Commitment/Exceptions

In establishing controls for procurement, Dominion commits to compliance with NQA-1-1994, Basic Requirement 4 and Supplement 4S-1, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 4S-1
    - Section 2.3 of this Supplement 4S-1 includes a requirement that procurement documents require suppliers to have a documented QAP that implements NQA-1-1994, Part 1. In lieu of this requirement, Dominion may require suppliers to have a documented supplier QAP that is determined to meet the applicable requirements of 10 CFR 50, Appendix B, as appropriate to the circumstances of the procurement.
    - With regard to service performed by a supplier, Dominion procurement documents may allow the supplier to work under the North Anna Unit 3 QAP, including implementing procedures, in lieu of the supplier having its own QAP.

- Section 3 of this Supplement 4S-1 requires procurement documents to be reviewed prior to bid or award of contract. The quality assurance review of procurement documents is satisfied through review of the applicable procurement specification, including the technical and quality procurement requirements, prior to bid or award of contract. Procurement document changes (e.g., scope, technical or quality requirements) will also receive the quality assurance review.
- Procurement documents for Commercial Grade Items that will be procured by North Anna Unit 3 for use as safety-related items shall contain technical and quality requirements such that the procured item can be appropriately dedicated.

Section 5 Instructions, Procedures, and Drawings

North Anna Unit 3 has established the necessary measures and governing procedures to ensure that activities affecting quality are prescribed by and performed in accordance with instructions, procedures, or drawings of a type appropriate to the circumstances and which, where applicable, include quantitative or qualitative acceptance criteria to implement the QAP as described in the QAPD. Such documents are prepared and controlled according to Part II, Section 6. In addition, means are provided to disseminate to the staff instructions of both general and continuing applicability, as well as those of short-term applicability. Provisions are included for reviewing, updating, and canceling such instructions.

5.1 Procedure Adherence

Dominion's policy is that procedures are followed, and the requirements for use of procedures have been established in administrative procedures. Where procedures cannot be followed as written, provisions are established for making changes in accordance with Part II, Section 6. Requirements are established to identify the manner in which procedures are to be implemented, including identification of those tasks that require: (1) the written procedure to be present and followed step-by-step while the task is being performed, (2) the user to have committed the procedure steps to memory, (3) verification of completion of significant steps, by initials or signatures or use of check-off lists. Procedures that are required to be present and referred to directly are those developed for extensive or complex jobs where reliance on memory cannot be trusted, tasks that are infrequently performed, and tasks where steps must be performed in a specified sequence.

In cases of emergency, personnel are authorized to depart from approved procedures when necessary to prevent injury to personnel or damage to the plant. Such departures are recorded describing the prevailing conditions and reasons for the action taken.

5.2 Procedure Content

The established measures address the applicable content of procedures as described in the introduction to Part II of NQA-1-1994. In addition, procedures governing tests, inspections, operational activities and maintenance will include as applicable, initial conditions and prerequisites for the performance of the activity.

5.3 NQA-1-1994 Commitment

In establishing procedural controls, Dominion commits to compliance with NQA-1-1994, Basic Requirement 5.

Section 6 Document Control

Dominion has established the necessary measures and governing procedures to control the preparation of, issuance of, and changes to documents that specify quality requirements or prescribe how activities affecting quality, including organizational interfaces, are controlled to assure that correct documents are being employed. The control systems (including electronic systems used to make documents available) are documented and provide for the following:

a. identification of documents to be controlled and their specified distribution;

b. a method to identify the correct document (including revision) to be used and control of superseded documents;

c. identification of assignment of responsibility for preparing, reviewing, approving, and issuing documents;

d. review of documents for adequacy, completeness, and correctness prior to approval and issuance;

e. a method for providing feedback from users to continually improve procedures and work instructions; and

f. coordinating and controlling interface documents and procedures.

The types of documents to be controlled include:

a. drawings such as design, construction, installation, and as-built drawings.

b. engineering calculations.

c. design specifications.

d. purchase orders and related documents.

e. vendor-supplied documents.

f. audit, surveillance, and quality verification/inspection procedures.

g. inspection and test reports.

h. instructions and procedures for activities covered by the QAPD including design, construction, installation, operating (including normal and emergency operations), maintenance, calibration, and routine testing.

i. technical specifications.

j. nonconformance reports and corrective action reports.

During the operational phase, where temporary procedures are used, they shall include a designation of the period of time during which it is acceptable to use them.

6.1 Review and Approval of Documents

Documents are reviewed for adequacy by qualified persons other than the preparer. During the construction phase, procedures for design, construction, and installation are also reviewed by the nuclear oversight group to ensure quality assurance measures have been appropriately applied. The documented review signifies concurrence.

During the operations phase, documents affecting the configuration or operation of the station as described in the SAR are screened to identify those that require review by the IRB prior to implementation as described in Part II, Section 2.

To ensure effective and accurate procedures during the operational phase, applicable procedures are reviewed, and updated as necessary, based on the following conditions:

a. following any modification to a system;

b. following an unusual incident, such as an accident, significant operator error, or equipment malfunction;

c. when procedure discrepancies are found;

d. prior to use if not used in the previous two years; or

e. results of QA audits conducted in accordance with Part II, Section 18.1.

Prior to issuance or use, documents including revisions thereto, are approved by the designated authority. A listing of all controlled documents identifying the current approved revision, or date, is maintained so personnel can readily determine the appropriate document for use.

6.2 Changes to Documents

Changes to documents, other than those defined in implementing procedures as minor changes, are reviewed and approved by the same organizations that performed the original review and approval unless other organizations are specifically designated. The reviewing organization has access to pertinent background data or information upon which to base their approval. Where temporary procedure changes are necessary during the operations phase, changes that clearly do not change the intent of the approved procedure may be implemented provided they are approved by two members of the staff knowledgeable in the areas affected by the procedures. Minor changes to documents, such as inconsequential editorial corrections, do not require that the revised documents receive the same review and approval as the original documents. To avoid a possible omission of a required review, the type of minor changes that do not require such a review and approval and the persons who can authorize such a classification are clearly delineated in implementing procedures.

6.3 NQA-1-1994 Commitment

In establishing provisions for document control, Dominion commits to compliance with NQA-1-1994, Basic Requirement 6 and Supplement 6S-1.

Section 7 Control of Purchased Material, Equipment, and Services

Dominion has established the necessary measures and governing procedures to control the procurement of items and services to assure conformance with specified requirements. Such control provides for the following as appropriate: source evaluation and selection, evaluation of objective evidence of quality furnished by the supplier, source inspection, audit, and examination of items or services.

7.1 Acceptance of Item or Service

Dominion establishes and implements measures to assess the quality of purchased items and services, whether purchased directly or through contractors, at intervals and to a depth consistent with the item's or service's importance to safety, complexity, quantity, and the frequency of procurement. Verification actions include testing, as appropriate, during design, fabrication and construction activities. Verifications occur at the appropriate phases of the procurement process, including, as necessary, verification of activities of suppliers below the first tier.

Measures to assure the quality of purchased items and services include the following, as applicable:

- Items are inspected, identified, and stored to protect against damage, deterioration, or misuse.
- Prospective suppliers of safety-related items and services are evaluated to assure that only qualified suppliers are used. Qualified suppliers are audited on a triennial basis. In addition, if a subsequent contract or a contract modification significantly enlarges the scope of, or changes the methods or controls for activities performed by the same supplier, an audit of the modified requirements is conducted, thus starting a new triennial period. North Anna Unit 3 may utilize audits conducted by outside organizations for supplier qualification provided that the scope and adequacy of the audits meet North Anna Unit 3 requirements. Documented annual evaluations are performed for qualified suppliers to assure they continue to provide acceptable products and services. Industry programs, such as those applied by ASME, Nuclear Procurement Issues Committee (NUPIC), or other established utility groups, are used as input or the basis for supplier qualification whenever appropriate. The results of the reviews are promptly considered for effect on a supplier's continued qualification and adjustments made as necessary (including corrective actions, adjustments of supplier audit plans, and input to third party auditing entities, as warranted). In addition, results are reviewed periodically to determine if, as a whole, they constitute a significant condition adverse to quality requiring additional action.

- Provisions are made for accepting purchased items and services, such as source verification, receipt inspection, pre- and post-installation tests, certificates of conformance, and document reviews (including Certified Material Test Report/Certificate). Acceptance actions/documents should be established by the Purchaser with appropriate input from the Supplier and be completed to ensure that procurement, inspection, and test requirements, as applicable, have been satisfied before relying on the item to perform its intended safety function.
- Controls are imposed for the selection, determination of suitability for intended use (critical characteristics), evaluation, receipt and acceptance of commercial-grade services or items to assure they will perform satisfactorily in service in safety-related applications.
- If there is insufficient evidence of implementation of a QA program, the initial evaluation is of the existence of a QA program addressing the scope of services to be provided. The initial audit is performed after the supplier has completed sufficient work to demonstrate that its organization is implementing a QA program.

7.2 NQA-1-1994 Commitment/Exceptions

In establishing procurement verification controls, North Anna Unit 3 commits to compliance with NQA-1-1994, Basic Requirement 7 and Supplement 7S-1, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 7S-1
    - •• North Anna Unit 3 considers that other 10 CFR 50 licensees, Authorized Nuclear Inspection Agencies, National Institute of Standards and Technology, or other State and Federal agencies which may provide items or services to the Dominion North Anna Unit 3 plant are not required to be evaluated or audited.
    - •• When purchasing commercial grade calibration services from a calibration laboratory, procurement source evaluation and selection measures need not be performed provided each of the following conditions are met:
        - – (1) The purchase documents impose any additional technical and administrative requirements, as necessary, to comply with the North Anna Unit 3 QA program and technical provisions. At a minimum, the purchase document shall require that the calibration certificate/report include identification of the laboratory equipment/standard used.
        - – (2) The purchase documents require reporting as-found calibration data when calibrated items are found to be out-of-tolerance.
        - – (3) A documented review of the supplier's accreditation will be performed and will include a verification of each of the following:

  - The calibration laboratory holds a domestic (United States) accreditation by any one of the following bodies, which are recognized by the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA):
    - National Voluntary Laboratory Accreditation Program (NVLAP), administered by the National Institute of Standards & Technology;
    - American Association for Laboratory Accreditation (A2LA);
    - ACLASS Accreditation Services (ACLASS);
    - International Accreditation Service (IAS);
    - Laboratory Accreditation Bureau (L-A-B);
    - Other NRC-approved laboratory accrediting body.
  - The accreditation encompasses ANS/ISO/IEC 17025, “General Requirements for the Competence of Testing and Calibration Laboratories.”
  - The published scope of accreditation for the calibration laboratory covers the necessary measurement parameters, range, and uncertainties.

•• For Section 8.1, Dominion considers documents that may be stored in approved electronic media under Dominion or vendor control, not physically located on the plant site, but are accessible from the respective nuclear facility site, as meeting the NQA-1 requirement for documents to be available at the site. When construction is complete, sufficient as-built documentation will be turned over to Dominion to support operations. The Dominion records management system will provide for timely retrieval of necessary records.

•• In lieu of the requirements of Section 10, Commercial Grade Items, controls for commercial grade items and services are established in North Anna Unit 3 documents using 10 CFR 21 and the guidance of EPRI NP-5652 as discussed in Generic Letter 89-02 and Generic Letter 91-05.

– For commercial grade items, special quality verification requirements are established and described in Dominion documents to provide the necessary assurance an item will perform satisfactorily in service. The Dominion documents address determining the critical characteristics that ensure an item is suitable for its intended use, technical evaluation of the item, receipt requirements, and quality evaluation of the item.

- Dominion will also use other appropriate approved regulatory means and controls to support Dominion commercial grade dedication activities. One example of this is Electric Power Research Institute (EPRI) Topical Report TR-106439, "Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications," dated July 17, 1997. Dominion will assume 10 CFR 21 reporting responsibility for all items that Dominion dedicates as safety-related.

Section 8 Identification and Control of Materials, Parts, and Components

Dominion has established the necessary measures and governing procedures to identify and control items to prevent the use of incorrect or defective items. This includes controls for consumable materials and items with limited shelf life. The identification of items is maintained throughout fabrication, erection, installation and use so that the item can be traced to its documentation, consistent with the item's effect on safety. Identification locations and methods are selected so as not to affect the function or quality of the item.

8.1 NQA-1-1994 Commitment

In establishing provisions for identification and control of items, Dominion commits to compliance with NQA-1-1994, Basic Requirement 8 and Supplement 8S-1.

Section 9 Control of Special Processes

Dominion has established the necessary measures and governing procedures to assure that special processes that require interim process controls to assure quality, such as welding, heat treating, and nondestructive examination, are controlled. These provisions include assuring that special processes are accomplished by qualified personnel using qualified procedures and equipment. Personnel are qualified and special processes are performed in accordance with applicable codes, standards, specifications, criteria or other specially established requirements. Special processes are those where the results are highly dependent on the control of the process or the skill of the operator, or both, and for which the specified quality cannot be fully and readily determined by inspection or test of the final product.

9.1 NQA-1-1994 Commitment

In establishing measures for the control of special processes, Dominion commits to compliance with NQA-1-1994, Basic Requirement 9 and Supplement 9S-1.

Section 10 Inspection

Dominion has established the necessary measures and governing procedures to implement inspections that assure items, services, and activities affecting safety meet established requirements and conform to applicable documented specifications, instructions, procedures, and design documents. Inspection may also be applied to items, services, and activities affecting plant reliability and integrity. Types of inspections may include those verifications related to procurement, such as source, in-process, final, and receipt inspection, as well as construction, installation, and operations activities. Inspections are carried out by properly qualified persons independent of those who performed or directly supervised the work. Inspection results are documented.

10.1 Inspection Program

The inspection program establishes inspections (including surveillance of processes), as necessary to verify quality: (1) at the source of supplied items or services, (2) in-process during fabrication at a supplier's facility or at a Company facility, (3) for final acceptance of fabricated and/or installed items during construction, (4) upon receipt of items for a facility, and (5) during maintenance, modification, inservice, and operating activities.

The inspection program establishes requirements for planning inspections, such as the group or discipline responsible for performing the inspection, where inspection hold points are to be applied, determining applicable acceptance criteria, the frequency of inspection to be applied, and identification of special tools needed to perform the inspection. Inspection planning is performed by personnel qualified in the discipline related to the inspection and includes qualified inspectors or engineers. Inspection plans are based on, as a minimum, the importance of the item to the safety of the facility, the complexity of the item, technical requirements to be met, and design specifications. Where significant changes in inspection activities for the facilities are to occur, management responsible for the inspection programs evaluate the resource and planning requirements to ensure effective implementation of the inspection program.

Inspection program documents establish requirements for performing the planned inspections, and documenting required inspection information such as rejection, acceptance, and reinspection results, and the person(s) performing the inspection.

Inspection results are documented by the inspector, reviewed by authorized personnel qualified to evaluate the technical adequacy of the inspection results, and controlled by instructions, procedures, and drawings.

10.2 Inspector Qualification

Dominion has established qualification programs for personnel performing quality inspections. The qualification program requirements are described inPart II, Section 2. These qualification programs are applied to individuals performing quality inspections regardless of the functional group where they are assigned.

10.3 NQA-1-1994 Commitment/Exceptions

In establishing inspection requirements, Dominion commits to compliance with NQA-1-1994, Basic Requirement 10, Supplement 10S-1 and Subpart 2.4, with the following clarification. In addition, Dominion commits to compliance with the requirements of Subparts 2.5 and 2.8 for establishing appropriate inspection requirements.

- Subpart 2.4 commits Dominion to IEEE Std. 336-1985. IEEE Std. 336 1985 refers to IEEE Std. 498-1985. Both IEEE Std. 336-1985 and IEEE Std. 498-1985 use the definition of "Safety Systems Equipment" from IEEE Std. 603-1980. North Anna Unit 3 commits to the definition of Safety Systems Equipment in IEEE Std. 603 1980, but does not commit to the balance of that standard. This definition is only applicable to equipment in the context of Subpart 2.4.
- An additional exception to Subpart 2.4 is addressed in Part II, Section 12 of the QAPD.
- Where inspections at the operating facility are performed by persons within the same organization (e.g., Maintenance group), Dominion takes exception to the requirements of NQA-1-1994, Supplement 10S-2, Section 3.1, in that the inspectors report to the site's Senior Manager for Safety and Licensing while performing those inspections.

Section 11 Test Control

Dominion has established the necessary measures and governing procedures to demonstrate that items subject to the provisions of the QAPD will perform satisfactorily in service, that the plant can be operated safely and as designed, and that the coordinated operation of the plant as a whole is satisfactory. These programs include criteria for determining when testing is required, such as proof tests before installation, pre-operational tests, post-maintenance tests, post-modification tests, in-service tests, and operational tests (such as surveillance tests required by Plant Technical Specifications), to demonstrate that the performance of plant systems is in accordance with design. Programs also include provisions to establish and adjust test schedules, and to maintain status for periodic or recurring tests. Tests are performed according to applicable procedures that include, consistent with the effect on safety: (1) instructions and prerequisites to perform the test, (2) use of proper test equipment, (3) acceptance criteria, and (4) mandatory verification points as necessary to confirm satisfactory test completion. Test results are documented and evaluated by the organization performing the test and reviewed by a responsible authority to assure that the test requirements have been satisfied. If acceptance criteria are not met, retesting is performed as needed to confirm acceptability following correction of the system or equipment deficiencies that caused the failure.

The initial start-up test program is planned and scheduled to permit safe fuel loading and start-up; to increase power in safe increments; and to perform major testing at specified power levels. If tests require the variation of operating parameters outside of their normal range, the limits within which such variation is permitted will be prescribed. The scope of the testing demonstrates, insofar as practicable, that the plant is capable of withstanding the design transients and accidents. For new facility construction, the suitability of facility operating procedures is checked to the maximum extent possible during the preoperational and initial start-up test programs.

Tests are performed and results documented in accordance with applicable technical and regulatory requirements, including those described in the Technical Specifications and SAR. Test programs ensure appropriate retention of test data in accordance with the records requirements of the QAPD. Personnel that perform or evaluate tests are qualified in accordance with the requirements established in Part II, Section 2.

11.1 NQA-1-1994 Commitment

In establishing provisions for testing, Dominion commits to compliance with NQA-1-1994, Basic Requirement 11 and Supplement 11S-1.

11.2 NQA-1-1994 Commitment for Computer Program Testing

Dominion establishes and implements provisions to assure that computer software used in applications affecting safety is prepared, documented, verified and tested, and used such that the expected output is obtained and configuration control maintained. To this end, Dominion commits to compliance with the requirements of NQA-1-1994, Supplement 11S-2 and Subpart 2.7 to establish the appropriate provisions.

Section 12 Control of Measuring and Test Equipment

Dominion has established the necessary measures and governing procedures to control the calibration, maintenance, and use of measuring and test equipment (M&TE) that provides information important to safe plant operation. The provisions of such procedures cover equipment such as indicating and actuating instruments and gages, tools, reference and transfer standards, and nondestructive examination equipment. The suppliers of commercial-grade calibration services are controlled as described in Part II, Section 7.

12.1 Installed Instrument and Control Devices

For the operations phase of the facilities, Dominion has established and implements procedures for the calibration and adjustment of instrument and control devices installed in the facility. The calibration and adjustment of these devices is accomplished through the facility maintenance programs to ensure the facility is operated within design and technical requirements. Appropriate documentation will be maintained for these devices to indicate the control status, when the next calibration is due, and identify any limitations on use of the device.

12.2 NQA-1-1994 Commitment/Exceptions

In establishing provisions for control of measuring and test equipment, Dominion commits to compliance with NQA-1-1994, Basic Requirement 12 and Supplement 12S-1 with the following clarification and exception:

- The out of calibration conditions described in paragraph 3.2 of Supplement 12S-1 refers to when the M&TE is found out of the required accuracy limits (i.e., out of tolerance) during calibration.
- Measuring and test equipment are not required to be marked with the calibration status where it is impossible or impractical due to equipment size or configuration (such as the label will interfere with operation of the device) provided the required information is maintained in suitable documentation traceable to the device. This exception also applies to the calibration labeling requirement stated in NQA-1-1994, Subpart 2.4, Section 7.2.1 (ANSI/IEEE Std. 336-1985).

Section 13 Handling, Storage, and Shipping

Dominion has established the necessary measures and governing procedures to control the handling, storage, packaging, shipping, cleaning, and preservation of items to prevent inadvertent damage or loss, and to minimize deterioration. These provisions include specific procedures, when required to maintain acceptable quality of the items important to the safe operations of the plant. Items are appropriately marked and labeled during packaging, shipping, handling and storage to identify, maintain, and preserve the item's integrity and indicate the need for special controls. Special controls (such as containers, shock absorbers, accelerometers, inert gas atmospheres, specific moisture content levels and temperature levels) are provided when required to maintain acceptable quality.

Special or additional handling, storage, shipping, cleaning and preservation requirements are identified and implemented as specified in procurement documents and applicable procedures. Where special requirements are specified, the items and containers (where used) are suitably marked.

Special handling tools and equipment are used and controlled as necessary to ensure safe and adequate handling. Special handling tools and equipment are inspected and tested at specified time intervals and in accordance with procedures to verify that the tools and equipment are adequately maintained.

Operators of special handling and lifting equipment are experienced or trained in the use of the equipment. During the operational phase, Dominion establishes and implements controls over hoisting, rigging and transport activities to the extent necessary to protect the integrity of the items involved, as well as potentially affected nearby structures and components. Where required, Dominion complies with applicable hoisting, rigging and transportation regulations and codes.

13.1 Housekeeping

Housekeeping practices are established to account for conditions or environments that could affect the quality of structures, systems and components within the plant. This includes control of cleanness of facilities and materials, fire prevention and protection, disposal of combustible material and debris, control of access to work areas, protection of equipment, radioactive contamination control and storage of solid radioactive waste. Housekeeping practices help assure that only proper materials, equipment, processes and procedures are used and that the quality of items is not degraded. Necessary procedures or work instructions, such as for electrical bus and control center cleaning, cleaning of control consoles, and radioactive decontamination are developed and used.

13.2 NQA-1-1994 Commitment/Exceptions

In establishing provisions for handling, storage and shipping, Dominion commits to compliance with NQA-1-1994, Basic Requirement 13 and Supplement 13S-1. Dominion also commits, during the construction and pre-operational phase of the plant, to compliance with the requirements of NQA-1-1994, Subpart 2.1, Subpart 2.2, and Subpart 3.2, Appendix 2.1, with the following clarifications and exceptions:

- NQA -1-1994, Subpart 2.2
    - Subpart 2.2, Section 6.6, “Storage Records:” This section requires written records be prepared containing information on personnel access. As an alternative to this requirement, North Anna Unit 3 documents establish controls for storage areas that describe those authorized to access areas and the requirements for recording access of personnel. However, these records of access are not considered quality records and will be retained in accordance with the administrative controls of the applicable plant.
    - Subpart 2.2, Section 7.1 refers to Subpart 2.15 for requirements related to handling of items. The scope of Subpart 2.15 includes hoisting, rigging and transporting of items for the nuclear power plant during construction.
- NQA-1-1994, Subpart 3.2
    - Subpart 3.2, Appendix 2.1: Only Section 3 precautions are being committed to in accordance with RG 1.37. In addition, a suitable chloride stress-cracking inhibitor should be added to the fresh water used to flush systems containing austenitic stainless steels.

Section 14 Inspection, Test, and Operating Status

Dominion has established the necessary measures and governing procedures to identify the inspection, test, and operating status of items and components subject to the provisions of the QAPD in order to maintain personnel and reactor safety and avoid inadvertent operation of equipment. Where necessary to preclude inadvertent bypassing of inspections or tests, or to preclude inadvertent operation, these measures require the inspection, test, or operating status be verified before release, fabrication, receipt, installation, test, or use. These measures also establish the necessary authorities and controls for the application and removal of status indicators or labels.

In addition, temporary design changes (temporary modifications), such as temporary bypass lines, electrical jumpers and lifted wires, and temporary trip-point settings, are controlled by procedures that include requirements for appropriate installation and removal, independent/concurrent verifications, and status tracking.

Administrative procedures also describe the measures taken to control altering the sequence of required tests, inspections, and other operations. Review and approval for these actions is subject to the same control as taken during the original review and approval of tests, inspections, and other operations.

14.1 NQA-1-1994 Commitment

In establishing measures for control of inspection, test, and operating status, Dominion commits to compliance with NQA-1-1994, Basic Requirement 14.

Section 15 Nonconforming Materials, Parts, or Components

Dominion has established the necessary measures and governing procedures to control items, including services, that do not conform to specified requirements to prevent inadvertent installation or use. Controls provide for identification, documentation, evaluation, segregation when practical, and disposition of nonconforming items, and for notification to affected organizations. Controls are provided to address conditional release of nonconforming items for use on an at-risk basis prior to resolution and disposition of the nonconformance, including maintaining identification of the item and documenting the basis for such release. Conditional release of nonconforming items for installation requires the approval of the designated management. Nonconformances are corrected or resolved prior to depending on the item to perform its intended safety function. Nonconformances are evaluated for impact on operability of quality structures, systems, and components to assure that the final condition does not adversely affect safety, operation, or maintenance of the item or service. Nonconformances to design requirements dispositioned repair or use-as-is are subject to design control measures commensurate with those applied to the original design. Nonconformance dispositions are reviewed for adequacy, analysis of quality trends, and reports provided to the designated management. Significant trends are reported to management in accordance with Dominion procedures, regulatory requirements, and industry standards.

15.1 Reporting Program

Dominion has the necessary measures and governing procedures that implement a reporting program that conforms to the requirements of 10 CFR 52, 10 CFR 50.55 and/or 10 CFR 21 during COL design and construction, and 10 CFR 21 during operations.

15.2 NQA-1-1994 Commitment

In establishing measures for nonconforming materials, parts, or components, Dominion commits to compliance with NQA-1-1994, Basic Requirement 15, and Supplement 15S-1.

Section 16 Corrective Action

Dominion has established the necessary measures and governing procedures to promptly identify, control, document, classify, and correct conditions adverse to quality. Dominion procedures assure that corrective actions are documented and initiated following the determination of conditions adverse to quality in accordance with regulatory requirements and applicable quality standards. Dominion procedures require personnel to identify known conditions adverse to quality. When complex issues arise where it cannot be readily determined if a condition adverse to quality exists, Dominion documents establish the requirements for documentation and timely evaluation of the issue. Reports of conditions adverse to quality are analyzed to identify trends. Significant conditions adverse to quality and significant adverse trends are documented and reported to responsible management. In the case of a significant condition adverse to quality, the cause is determined and actions to preclude recurrence are taken.

In the case of suppliers working on safety-related activities, or other similar situations, Dominion may delegate specific responsibilities of the Corrective Action program but Dominion maintains responsibility for the program's effectiveness.

16.1 Reporting Program

Dominion has the necessary measures and governing procedures that implement a reporting program that conforms to the requirements of 10 CFR 52, 10 CFR 50.55 and/or 10 CFR Part 21, during COL design and construction, and 10 CFR 21 during operations.

16.2 NQA-1-1994 Commitment

In establishing provisions for corrective action, Dominion commits to compliance with NQA-1-1994, Basic Requirement 16.

Section 17 Quality Assurance Records

Dominion has the necessary measures and governing procedures to ensure that sufficient records of items and activities affecting quality are developed, reviewed, approved, issued, used, and revised to reflect completed work. The provisions of such procedures establish the scope of the records retention program for Dominion and include requirements for records administration, including receipt, preservation, retention, storage, safekeeping, retrieval, access controls, user privileges, and final disposition.

17.1 Record Retention

Measures are established that ensure that sufficient records of completed items and activities affecting quality are appropriately stored. Such records and their retention times are defined in appropriate procedures. In all cases where state, local, or other agencies have more restrictive requirements for record retention, those requirements will be met.

17.2 Electronic Records

When using electronic records storage and retrieval systems, Dominion complies with NRC guidance Generic Letter 88-18, "Plant Record Storage on Optical Disks." Dominion will manage the storage of QA Records in electronic media consistent with the intent of RIS 2000-18 and associated NIRMA Guidelines TG 11-1998, TG15-1998, TG16-1998, and TG21-1998.

17.3 NQA-1-1994 Commitment/Exceptions

In establishing provisions for records, Dominion commits to compliance with NQA-1-1994, Basic Requirement 17 and Supplement 17S-1, with the following clarifications and exceptions:

- NQA-1-1994, Supplement 17S-1
  - Supplement 17S-1, Section 4.2(b) requires records to be firmly attached in binders or placed in folders or envelopes for storage in steel file cabinets or on shelving in containers. For hard-copy records maintained by Dominion, the records are suitably stored in steel file cabinets or on shelving in containers, except that methods other than binders, folders, or envelopes may be used to organize the records for storage.

Section 18 Audits

Dominion has established the necessary measures and governing procedures to implement audits to verify that activities covered by the QAPD are performed in conformance with the requirements established. The audit programs are themselves reviewed for effectiveness as a part of the overall audit process.

18.1 Performance of Audits

Internal audits of selected aspects of licensing, design, construction phase and operating activities are performed with a frequency commensurate with safety significance and in a manner which assures that audits of safety-related activities are completed. During the early portions of North Anna Unit 3 COL activities, audits will focus on areas including, but not limited to, site investigation, procurement, and corrective action. Functional areas of an organization's QA program for auditing include, at a minimum, verification of compliance and effectiveness of implementation of internal rules, procedures (e.g., operating, design, procurement, maintenance, modification, refueling, surveillance, and test), Technical Specifications, regulations and license conditions, programs for training, retraining, qualification and performance of operating staff, corrective actions, and observation of performance of operating, refueling, maintenance and modification activities, including associated recordkeeping.

The audits are scheduled on a formal preplanned audit schedule. The audit system is reviewed periodically and revised as necessary to assure coverage commensurate with current and planned activities. Additional audits may be performed as deemed necessary by management. The scope of the audit is determined by the quality status and safety importance of the activities being performed. These audits are conducted by trained personnel not having direct responsibilities in the area being audited and in accordance with preplanned and approved audit plans or checklists, under the direction of a qualified lead auditor and the cognizance of the manager for the North Anna Unit 3 nuclear oversight group.

Dominion is responsible for conducting periodic internal and external audits. Internal audits are conducted to determine the adequacy of programs and procedures (by representative sampling), and to determine if they are meaningful and comply with the overall QAPD. External audits determine the adequacy of supplier and contractor quality assurance program.

The results of each audit are reported in writing to the CNO, and the executives responsible for the area audited. Additional internal distribution is made to other concerned management levels in accordance with approved procedures.

Management responds to all audit findings and initiates corrective action where indicated. Where corrective action measures are indicated, documented follow-up of applicable areas through inspections, review, re-audits, or other appropriate means is conducted to verify implementation of assigned corrective action.

Audits of suppliers of safety-related components and/or services are conducted as described in Section 7.1.

18.2 Internal Audits

Internal audits of organization and facility activities, conducted prior to placing the facility in operation, should be performed in such a manner as to assure that an audit of all applicable QA program elements is completed for each functional area at least once each year or at least once during the life of the activity, whichever is shorter.

Internal audits of activities, conducted after placing the facility in operation, should be performed in such a manner as to assure that an audit of all applicable QA program elements is completed for each functional area within a period of two years. Internal audit frequencies of well established activities, conducted after placing the facility in operation, may be extended one year at a time beyond the above two-year interval based on the results of an annual evaluation of the applicable functional area and objective evidence that the functional area activities are being satisfactorily accomplished. The evaluation should include a detailed performance analysis of the functional area based upon applicable internal and external source data and due consideration of the impact of any functional area changes in responsibility, resources. or management. However, the internal audit frequency interval should not exceed a maximum of four years. If an adverse trend is identified in the applicable functional area, the extension of the internal audit frequency interval should be rescinded and an audit scheduled as soon as practicable.

During the operations phase, audits are performed at a frequency commensurate with the safety significance of the activities and in such a manner to assure audits of all applicable QA program elements are completed within a period of two years. These audits will include, as a minimum, activities in the following areas:

(1) The conformance of facility operation to provisions contained within the Technical Specifications and applicable license conditions including administrative controls.

(2) The performance, training, and qualifications of the facility staff.

(3) The performance of activities required by the QAPD to meet the criteria of 10 CFR 50, Appendix B.

(4) The Fire Protection Program and implementing procedures. A fire protection equipment and program implementation inspection and audit are conducted utilizing either a qualified offsite licensed fire protection engineer or an outside qualified fire protection consultant.

(5) Other activities and documents considered appropriate by the corporate executive for nuclear operations, or the CNO.

Audits may also be used to meet the periodic review requirements of the code for the Security, Emergency Preparedness, and Radiological Protection programs within the provisions of the applicable code.

Internal audits include verification of compliance and effectiveness of the administrative controls established for implementing the requirements of the QAPD; regulations and license provisions; provisions for training, retraining, qualification, and performance of personnel performing activities covered by the QAPD; corrective actions taken following abnormal occurrences; and, observation of the performance of construction, fabrication, operating, refueling, maintenance and modification activities including associated record keeping.

18.3 NQA-1-1994 Commitment

In establishing the independent audit program, Dominion commits to compliance with NQA-1-1994, Basic Requirement 18 and Supplement 18S-1.

Part III Nonsafety-Related SSC Quality Control

Section 1 Nonsafety-Related SSCs - Significant Contributors to Plant Safety

Specific program controls are applied to nonsafety-related SSCs, for which 10 CFR 50, Appendix B is not applicable, that are significant contributors to plant safety. The specific program controls consistent with applicable sections of the QAPD are applied to those items in a selected manner, targeted at those characteristics or critical attributes that render the SSC a significant contributor to plant safety.

The following clarify the applicability of the QA Program to the nonsafety-related SSCs and related activities, including the identification of exceptions to the QA Program described in Part II, Sections 1 through 18 taken for nonsafety-related SSCs.

1.1 Organization

Verification activities described in this part may be performed by the Dominion line organization, the QA organization described in Part II is not required to perform these functions.

1.2 QA Program

Dominion QA requirements for nonsafety-related SSCs are established in the QAPD and appropriate procedures. Suppliers of these SSCs or related services describe the quality controls applied in appropriate procedures. A new or separate QA program is not required.

1.3 Design Control

Dominion has design control measures to ensure that the contractually established design requirements are included in the design. These measures ensure that applicable design inputs are included or correctly translated into the design documents, and deviations from those requirements are controlled. Design verification is provided through the normal supervisory review of the designer's work.

1.4 Procurement Document Control

Procurement documents for items and services obtained by or for Dominion include or reference documents describing applicable design bases, design requirements, and other requirements necessary to ensure component performance. The procurement documents are controlled to address deviations from the specified requirements.

1.5 Instructions, Procedures, and Drawings

Dominions provides documents such as, but not limited to, written instructions, plant procedures, drawings, vendor technical manuals, and special instructions in work orders, to direct the performance of activities affecting quality. The method of instruction employed provides an appropriate degree of guidance to the personnel performing the activity to achieve acceptable functional performance of the SSC.

1.6 Document Control

Dominion controls the issuance and change of documents that specify quality requirements or prescribe activities affecting quality to ensure that correct documents are used. These controls include review and approval of documents, identification of the appropriate revision for use, and measures to preclude the use of superseded or obsolete documents.

1.7 Control of Purchased Items and Services

Dominion employs measures, such as inspection of items or documents upon receipt or acceptance testing, to ensure that all purchased items and services conform to appropriate procurement documents.

1.8 Identification and Control of Purchased Items

Dominion employs measures where necessary, to identify purchased items and preserve their functional performance capability. Storage controls take into account appropriate environmental, maintenance, or shelf life restrictions for the items.

1.9 Control of Special Processes

Dominion employs process and procedure controls for special processes, including welding, heat treating, and nondestructive testing. These controls are based on applicable codes, standards, specifications, criteria, or other special requirements for the special process.

1.10 Inspection

Dominion uses documented instructions to ensure necessary inspections are performed to verify conformance of an item or activity to specified requirements or to verify that activities are satisfactorily accomplished. These inspections are performed by knowledgeable personnel who may be in the same line organization as those performing the activity being inspected.

1.11 Test Control

Dominion employs measures to identify required testing that demonstrates that equipment conforms to design requirements. These tests are performed in accordance with test instructions or procedures. The test results are recorded, and authorized individuals evaluate the results to ensure that test requirements are met.

1.12 Control of Measuring and Test Equipment (M&TE)

Dominion employs measures to control M&TE use, and calibration and adjustment at specific intervals or prior to use.

1.13 Handling, Storage, and Shipping

Dominion employs measures to control the handling, storage, cleaning, packaging, shipping, and preservation of items to prevent damage or loss, and to minimize deterioration. These measures include appropriate marking or labels, and identification of any special storage or handling requirements.

1.14 Inspection, Test, and Operating Status

Dominion employs measures to identify items that have satisfactorily passed required tests and inspections and to indicate the status of inspection, test, and operability as appropriate.

1.15 Control of Nonconforming Items

Dominion employs measures to identify and control items that do not conform to specified requirements to prevent their inadvertent installation or use.

1.16 Corrective Action

Dominion employs measures to ensure that failures, malfunctions, deficiencies, deviations, defective components, and nonconformances are properly identified, reported, and corrected.

1.17 Records

Dominion employs measures to ensure records are prepared and maintained to furnish evidence that the above requirements for design, procurement, document control, inspection, and test activities have been met.

1.18 Audits

Dominion employs measures for line management to periodically review and document the adequacy of the process, including taking any necessary corrective action. Audits independent of line management are not required. Line management is responsible for determining whether reviews conducted by line management or audits conducted by any organization independent of line management are appropriate. If performed, audits are conducted and documented to verify compliance with design and procurement documents, instructions, procedures, drawings, and inspection and test activities. Where the measures of this part (Part III) are implemented by the same programs, processes, or procedures as the comparable activities of Part II, the audits performed under the provisions of Part II may be used to satisfy the review requirements of this Section (Part III, Section 1.18).

Section 2 Nonsafety-Related SSCs Credited for Regulatory Events

The following criteria apply to fire protection (10 CFR 50.48), anticipated transients without scram (ATWS) (10 CFR 50.62), and the station blackout (SBO) (10 CFR 50.63) SSCs that are not safety-related:

Dominion implements quality requirements for the fire protection system in accordance with Regulatory Position 1.7, “Quality Assurance,” in Regulatory Guide 1.189, “Fire Protection for Operating Nuclear Power Plants.”

Dominion implements the quality requirements for ATWS equipment in accordance with Generic Letter 85-06, “Quality Assurance Guidance for ATWS Equipment That Is Not Safety Related.”

Dominion implements quality requirements for SBO equipment in accordance with Regulatory Position 3.5, “Quality Assurance and Specific Guidance for SBO Equipment That Is Not Safety Related,” and Appendix A, “Quality Assurance Guidance for Non-Safety Systems and Equipment,” in Regulatory Guide 1.155, “Station Blackout.”

Part IV Regulatory Commitments

Section 1 NRC Regulatory Guides and Quality Assurance Standards

This section identifies the NRC Regulatory Guides and the other quality assurance standards which have been selected to supplement and support the North Anna Unit 3 QAPD. North Anna Unit 3 commits to compliance with these standards to the extent described herein. Commitment to a particular Regulatory Guide or other QA standard does not constitute a commitment to the Regulatory Guides or QA standards that may be referenced therein.

1.1 Regulatory Guides

Regulatory Guide 1.26, Revision 4, March 2007- Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants

Regulatory Guide 1.26 defines classification of systems and components.

Dominion commits to the applicable regulatory position guidance provided in this regulatory guide for North Anna Unit 3 components outside the scope of the DCD. The requirements for quality group classifications and standerds defined by the DCD meet the regulatory guidance of Revision 3.

Regulatory Guide 1.26, Revision 3, February 1976 - Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants

Regulatory Guide 1.26 defines classification of systems and components.

Dominion commits to the applicable regulatory position guidance provided in this regulatory guide for North Anna Unit 3 components within the scope of the DCD with the exceptions described in the ESBWR DCD Table 1.9-21, Table 1.9-21a, and Table 1.9-21b.

Regulatory Guide 1.29, Revision 4, March 2007- Seismic Design Classification

Regulatory Guide 1.29 defines systems required to withstand a safe shutdown earthquake (SSE).

Dominion commits to the applicable regulatory position guidance provided in this regulatory guide for North Anna Unit 3 systems outside the scope of the DCD. The requirements for seismic design classification defined by the DCD meet the regulatory guidance of Revision 3.

Regulatory Guide 1.29, Revision 3, September 1978 - Seismic Design Classification

Regulatory Guide 1.29 defines systems required to withstand a safe shutdown earthquake (SSE).

Dominion commits to the applicable regulatory position guidance provided in this regulatory guide for North Anna Unit 3 systems within the scope of the DCD with the exceptions described in the ESBWR DCD Table 1.9-21, Table 1.9-21a, and Table 1.9-21b.

Regulatory Guide 1.37, Revision 1, March 2007 - Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants

Regulatory Guide 1.37 provides guidance on specifying water quality and precautions related to the use of alkaline cleaning solutions and chelating agents. 17.05-6

Dominion commits to the applicable regulatory position guidance provided in this regulatory guide for North Anna Unit 3 during the construction and preoperational phase of the plant.

1.2 Standards

ASME NQA-1-1994 Edition - Quality Assurance Requirements for Nuclear Facility Applications

Dominion commits to NQA-1-1994, Parts I and II, as described in the foregoing sections of this document.

Nuclear Information and Records Management Association, Inc. (NIRMA) Technical Guides (TGs)

Dominion commits to NIRMA TGs as described in Part II, Section 17.

Chapter 18 Human Factors Engineering

This chapter of the referenced DCD is incorporated by reference with the following departures and/or supplements. S083

18.13 Human Performance Monitoring S083

18.13.3 Elements of Human Performance Monitoring Process

Delete the first sentence in the fourth paragraph. Add the following to the end of this section: S083

STD COL 18.13-1-H The HPM program will be implemented prior to the beginning of the first licensed operator training class. S083

18.13.5 COL Information S083

18.13-1-H Milestone for HPM Implementation

STD COL 18.13-1-H This COL item is addressed in Section 18.13.3. S083

Chapter 19 Probabilistic Risk Assessment and Severe Accidents

19.1 Introduction

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

19.2 PRA Results and Insights

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

19.2.3.2.4 Evaluation of External Event Seismic

Significant Core Damage Sequences of External Event Seismic

Replace the second and third sentences of the first paragraph with the following.

STD COL 19.2.6-1-H As-built SSC High Confidence Low Probability of Failure (HCLPF)s will be compared to those assumed in the ESBWR seismic margin analysis shown in DCD Table 19.2-4. Deviations from the HCLPF values or other assumptions in the seismic margins evaluation will be analyzed to determine if any new vulnerabilities have been introduced. This comparison and analysis will be completed prior to fuel load.

19.2.6 COL Information

19.2.6-1-H Seismic High Confidence Low Probability of Failure Margins

STD COL 19.2.6-1-H This COL Item is addressed in Section 19.2.3.2.4.

19.3 Severe Accident Evaluations

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

19.4 PRA Maintenance

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

19.5 Conclusions

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

NAPS SUP 19.5-1 In accordance with 10 CFR 52.79(a)(46), this report is required to contain a description of the plant-specific PRA and its results. As part of the development of the certified design PRA, site and plant-specific information were reviewed to determine if any changes from the certified design PRA were warranted. This review included consideration of site-specific information such as site meteorological data and site-specific population distributions, as well as plant-specific design information that replaced conceptual design information described in the DCD. Section 1.8.5 was also reviewed to determine if there were any departures affecting the PRA results. This review is summarized in Appendix 19AA. 19-1

The review of site-specific information and plant-specific design information determined that: 1) the DCD PRA bounds site-specific and plant-specific design parameters and design features and 2) these parameters and features have no significant impact on the DCD PRA results and insights. Therefore, based on this review, it is concluded that there is no significant change from the certified design PRA. In that there are no significant changes from the certified design PRA, incorporation of DCD Chapter 19 into the FSAR satisfies the requirement of 10 CFR 52.79(a)(46) for a description of the plant-specific PRA and its results.

Appendix 19A Regulatory Treatment of Non-Safety Systems (RTNSS)

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

Appendix 19ACM Availability Controls Manual

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

Appendix 19B Deterministic Analysis for Containment Pressure Capability

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

Appendix 19C Probabilistic Analysis for Containment Pressure Fragility

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

NAPS SUP 19.5-1

Appendix 19AA Summary of Plant-Specific PRA Review

19-1
19-2

19AA.1 Introduction

In accordance with 10 CFR 52.79(a)(46), this appendix provides a summary of the plant-specific PRA and its results.

19-1
19-2

19AA.2 Development of the ESBWR and Plant-Specific PRAs

The ESBWR PRA used the following North Anna site-specific PRA information to develop bounding PRA parameters:

- Loss of Preferred Power (LOPP) frequency - to determine if the site has unusual off-site power availability problems. The LOPP frequency is divided into plant-centered, switchyard, grid-related, and weather-related initiating events.
- Loss of Service Water frequency - to determine if any unusual characteristics would apply to a particular site, with consideration to loss of ultimate heat sink, and the effects of extreme seasonal temperatures.
- Seismic fragilities - to determine if Early Site Permit fragilities can be applied. Note that High Confidence Low Probability of Failure (HCLPF) values will be confirmed as described in Section 19.2.3.2.4.
- Other Known Site-Specific Issues - to identify site-specific initiating events that are not identified in the ESBWR PRA, such as unique offsite consequence issues.

These parameters represent site-specific features that have the potential to affect the PRA. To ensure that the ESBWR PRA is a bounding standard design, the site-specific values for these parameters were used to develop the ESBWR PRA standard values.

The ESBWR LOPP frequencies are based on NUREG/CR-6890, "Reevaluation of Station Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004." The Grand Gulf and North Anna LOPP frequencies were compared to the ESBWR frequencies to identify any outliers. The data shows that grid-related losses of power are significantly more frequent than plant-centered, switchyard, or weather-related losses of power. Although there is a variance in the values for the LOPP frequencies, their range is acceptable. The conclusions in ESBWR DCD Section 19.2.3.1, Risk from Internal Events, remain valid for the minor variances in LOPP frequencies. 19-1 19-2

The ESBWR Loss of Service Water frequency is based on NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995." The contribution of Loss of Service Water is less than one percent of core damage frequency (CDF). Variances between the reported values depend on the design configuration (e.g., redundancy) of the current plants versus the ESBWR design, or external influences such as loss or degradation of heat sink. Although there is a variance in the values for the Loss of Service Water frequencies, their range is acceptable. The conclusions in DCD Section 19.2.3.1, Risk from Internal Events, also remain valid for the minor variances in Loss of Service Water frequencies.

The ESBWR design incorporates a seismic response spectrum that bounds the potential U.S. sites. The conclusions in DCD Section 19.2.3.2.4, Evaluation of External Event Seismic, remain valid for site-specific differences in seismic response.

There are no unusual terrain features that would affect meteorological data or plume dispersion. The conclusions in DCD Section 19.2.5 for offsite consequences remain valid for any potential differences between site features.

In addition to the bounding treatment of PRA parameters, there are no departures from the standard design in any systems considered in the PRA model. Therefore, there are no site-specific design features that affect the PRA because the boundary of the certified design covers all of the SSCs necessary for the PRA.

19AA.3 Internal Flooding

19AA.3.1 Internal Flooding Associated with the Yard Area

The yard flood zone is essentially all outside areas of the site, and thus the site plot drawing (FSAR Figure 2.1-201) illustrates the areas of concern. In addition DCD Section 3.4.1.1 stipulates that the plant grade level is above the design flood level. The only components located in the yard that support a safety function are the manual fire hose connections to the Reactor Building and Fuel Building. They provide the capability to connect another source of water to the IC/PCCS pools and the Spent Fuel Pool after seven days following a postulated accident. This timeframe is beyond the time required to be considered for the PRA; therefore, external flooding in the yard does not affect PRA equipment.

19-1
19-2

19AA.3.2 Internal Flooding Associated with the Service Water Building

The Service Water Structure is a site-specific design feature. It is treated in a bounding manner in the ESBWR PRA to demonstrate that site-specific differences in Service Water Structure design do not have a significant effect on the PRA results. The Service Water Structure houses the four Service Water pumps and their associated power supplies and controls. Because Service Water is a RTNSS function, in accordance with DCD Table 19A-4, the design and installation of the Service Water Structure is required to include protection from the effects of external and internal flooding.

In the ESBWR PRA model, the Service Water Structure is conservatively considered to be one flood zone. All four pumps are assumed to fail in an internal flood. Thus, the ESBWR PRA is bounding for design differences in the Service Water Structure. In addition, the ESBWR PRA model does not credit operator actions to mitigate a flooding event, so differences in building location are not significant.

The conclusion in DCD Section 19.2.3.2.2 is that there are no significant flood-initiated accident sequences due to the low CDF. Overall, the potential effects of Service Water Structure design differences are accounted for by using a bounding analysis, and therefore, are not significant to the ESBWR PRA.

In summary, the ESBWR PRA provides a reasonable representation of the parameters and conditions that are specific to the North Anna site.