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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002592

August 11, 2009

Subject: AP1000 Response to Request for Additional Information (SRP 3)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 3. This RAI response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in the response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

A response is provided for RAI-SRP3.7.1-SEB1-15 R2.

Enclosure 1 contains sensitive unclassified non-safeguards information relative to the physical protection of an AP1000 Nuclear Power Plant that should be withheld from public disclosure pursuant to 10 CFR 2.390(d). Enclosure 2 provides the redacted version (public version).

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

D063
NRO

1. RAI-SRP3.7.1-SEB1-15 R2 Security Related Information – Withhold Under 10 CFR 2.390

2. RAI-SRP3.7.1-SEB1-15 R2 Redacted Version – Withheld Under 10 CFR 2.390

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ENCLOSURE 2

RAI-SRP3.7.1-SEB1-15 R2 Redacted Version – Withheld Under 10 CFR 2.390

REDACTED VERSION – WITHHELD UNDER 10 CFR 2.390

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP3.7.1-SEB1-15
Revision: 2

Question (December 17, 2008):

(a) DCD Revision 16, Section 3.7.2.8.1, identifies that the portion of the Annex Building adjacent to the nuclear island is classified as SC-II, and describes the Annex Building seismic analysis models used for soil sites and for the hard rock site. There is no discussion of design allowables and acceptance criteria. The staff requests Westinghouse to confirm that SC-II structures are evaluated in accordance with the staff-accepted approach, as described in DCD Revision 16, Section 3.7.2.

DCD Revision 16, Section 3.7.2, states: "Seismic Category II building structures are designed for the safe shutdown earthquake using the same methods and design allowables as are used for Seismic Category I structures. The acceptance criteria are based on ACI 349 for concrete structures and on AISC N690 for steel structures including the supplemental requirements described in subsections 3.8.4.4.1 and 3.8.4.5."

(b) The staff requests Westinghouse to clarify the seismic classification of the remainder of the Annex Building, and also confirm that, for analysis purposes, the entire annex building has been treated as seismic Category II. If this is not the case, provide the technical basis for not treating it as such.

DCD Revision 15, Section 3.7.2.8.1, states "The annex building is classified as seismic Category II." DCD Revision 16, Section 3.7.2.8.1, states "The portion of the annex building adjacent to the nuclear island is classified as seismic Category II." It is silent about the seismic classification of the remainder of the Annex Building.

(c) Provide the technical basis for NOT classifying the turbine building as SC-II, considering its proximity to the nuclear island and the infeasibility of demonstrating the acceptability of a collapse.

DCD Revision 15, Section 3.7.2.8.3, states "...the major structure of the turbine building is separated from the nuclear island by approximately 18 feet." DCD Revision 16, Section 3.7.2.8.3, deleted this statement and additional descriptive information about the turbine building. Based on the information in DCD Revision 16, Section 3.7.2.8.3, the staff cannot determine whether the "non-seismic" classification is still valid.

Supplementary Request (Revision 2)

(a) DCD Revision 16, Section 3.7.2.8.1, identifies that the portion of the Annex Building adjacent to the nuclear island is classified as SC-II, and describes the Annex Building

seismic analysis models used for soil sites and for the hard rock site. There is no discussion of design allowables and acceptance criteria.

DCD Revision 16, Section 3.7.2, states: "Seismic Category II building structures are designed for the safe shutdown earthquake using the same methods and design allowables as are used for Seismic Category I structures. The acceptance criteria are based on ACI 349 for concrete structures and on AISC N690 for steel structures including the supplemental requirements described in subsections 3.8.4.4.1 and 3.8.4.5."

The staff requests Westinghouse to confirm that SC-II structures are evaluated in accordance with the staff-accepted approach, as described in DCD Revision 16, Section 3.7.2.

(b) DCD Revision 15, Section 3.7.2.8.1, states "The annex building is classified as seismic Category II."

DCD Revision 16, Section 3.7.2.8.1, states "The portion of the annex building adjacent to the nuclear island is classified as seismic Category II." It is silent about the seismic classification of the remainder of the Annex Building.

The staff requests Westinghouse to clarify the seismic classification of the remainder of the Annex Building, and also confirm that, for analysis purposes, the entire annex building has been treated as seismic Category II. If this is not the case, provide the technical basis for not treating it as such.

(c) DCD Revision 15, Section 3.7.2.8.3, states "....the major structure of the turbine building is separated from the nuclear island by approximately 18 feet."

DCD Revision 16, Section 3.7.2.8.3, deleted this statement and additional descriptive information about the turbine building. Based on the information in DCD Revision 16, Section 3.7.2.8.3, the staff cannot determine whether the "non-seismic" classification is still valid.

Provide the technical basis for NOT classifying the turbine building as SC-II, considering its proximity to the nuclear island and the infeasibility of demonstrating the acceptability of a collapse.

02/25/09 UPDATE: Response submitted 02/06/2009. Response to (a) is acceptable. Response to (b) is incomplete. Confirm that for analysis purposes, the entire Annex Bldg is modeled in accordance with Cat. I procedures. Response to (c) is not acceptable. Change from Rev.15 description of the location of the TB to Rev.16 description of the location TB has NOT been addressed. Define the new location of the TB, and justify why it does not need to be classified

as category II, similar to the portion of the Annex Bldg. in close proximity to the NI category I structures.

During the NRC audit of April 13 to the 17 the responses given by Westinghouse were discussed further. As a result this RAI is to be revised addressing the following:

1) Westinghouse will clarify SC of all non-NI buildings

2) Westinghouse committed to clarify the modeling non-NI buildings in RAI response and including DCD change

3) Westinghouse will submit revised RAI-SRP3.7.1.-SEB1-015 (including a DCD modification) to address application of 2D vs. 3D SASSI, how 2D & 3D will be used for building responses, how analyses will be done for various soil sites using CSDRS Ground motion input, evaluation of building response at hard rock sites using backfill with HRHF ground motion.

Westinghouse Response:

(a) It is confirmed that the statement made in DCD Section 3.7.2 that "Seismic Category II building structures are designed for the safe shutdown earthquake using the same methods and design allowables as are used for seismic Category I structures. The acceptance criteria are based on ACI 349 for concrete structures and on AISC N690 for steel structures including the supplemental requirements described in subsections 3.8.4.4.1 and 3.8.4.5," has been implemented.

(b) As stated in DCD Section 3.7.2.8.1, Annex Building, "The portion of the annex building adjacent to the nuclear island is classified as seismic Category II." As shown in DCD Table 3.2-2 the annex building area outlined by columns E-I.1 and 2-13 is classified as seismic Category II. The annex building area outlined by columns A-D and 8-13, as well as column A-G and 13-16 are classified as non-seismic. For design purposes, only the portion identified as seismic Category II are designed following the Seismic Category I structures acceptance criteria. This is acceptable since criteria listed in DCD Section 3.7.2.8 are satisfied. Specifically the portions of the annex building classified as nonseismic are not adjacent to the nuclear island, and their collapse will not cause the nonseismic structure to strike a seismic Category I structure, system or component, nor will their collapse impair the integrity of seismic Category I structures, systems or components. Further, the nonseismic portion of the annex building is only one story with roof elevations below 120'. If this portion of the annex building would fail it would not cause any failure to the seismic Category II portion that would impair the integrity of the seismic Category I structures.

(c) During the hard rock certification of the AP1000 the NRC reviewed the classification of the turbine building as a non-seismic structure. The NRC concluded from this review (AP1000 FSER) "that the method and criteria used for the design of the turbine building will prevent,

during a SSE event, the turbine building to jeopardize the safety function of the NI structure, and are therefore acceptable." This conclusion was reached after Westinghouse agreed to modify the analysis and design requirements to:

- Upgrade the Uniform Building Code (UBC) seismic design from Zone 2A, importance Factor of 1.25, to Zone 3 with an Importance Factor of 1.0 in order to provide margin against collapse during the safe shutdown earthquake, and

- To use eccentrically braced steel frame structures meeting the requirements given in DCD Section 3.7.2.8.3.

The turbine building is designed as an eccentrically braced frame structure under the guidance of the UBC and is, by the principal of the code, therefore designed to deform during the design seismic event rather than collapse.

The methods and criteria that were agreed to with the NRC have not changed and are given in DCD Section 3.7.2.8.3, Revision 17.

Westinghouse Response (Revision 2):

1) The safety class of all non-NI buildings is given in Table RAI-SRP3.7.1-SEB1-15-1. The portion of the Annex Building adjacent to the Nuclear Island is classified as seismic Category II. The other portions of the Annex building that is a low rise structure is classified as non-seismic (see Figure RAI-SRP3.7.1-SEB1-15-1). The Radwaste Building is non-seismic. A change is made in the seismic classification of the Turbine Building. The First Bay of the Turbine Building, adjacent to the Nuclear Island has been changed from non-seismic to seismic Category II. Outside of the First Bay, the remainder of the Turbine Building is non-seismic. The first bay of the Turbine Building has been expanded from 24' to 36'. This is shown in Figure RAI-SRP3.7.1-SEB1-15-2. The entire Turbine Building column lines from 11.2 and north are also moved 12'. All of the Turbine Building column line numbering remains the same.

2) Seismic Category I apply to both functionality and integrity, and seismic Category II applies only to integrity. Non-seismic items located in the proximity of safety-related items, the failure of which during a safe shutdown earthquake could result in loss of function of safety-related items, are designated as seismic Category II. Seismic Category II structures, systems, and components are designed so that the safe shutdown earthquake does not cause unacceptable structural failure of or interaction with seismic Category I items. Seismic Category II structures are analyzed and evaluated in the same manner as seismic Category I structures.

3) The seismic analyses performed for the adjacent seismic Category II structures will be a simulated 3D analysis. The seismic analyses will be performed primarily using 2D SASSI models. To properly account for 3D effects, the response from 2D and 3D SASSI analyses of the seismic Category II buildings on rigid foundations will be compared and a 3D effect factor will be developed from this comparison. Three soil cases [Upper Bound Soft to Medium (UBSM), Soft to Medium (SM), and Soft Soil (SS)] will be used to determine the 3D factor. Shown in Figures RAI-SRP3.7.1-SEB1-15-3 and RAI-SRP3.7.1-SEB1-15-4 are the 2D SASSI models with adjacent building structures. The seismic Category II buildings are modeled as stick models. The 3D model with adjacent structures is shown in Figure RAI-SRP3.7.1-SEB1-15-5.

Seismic Category II buildings are designed using envelope foundation response spectra (FRS). The development of these FRS shall be based on a number of analyses results from the SASSI analyses. The seismic Category II FRS,at the base of the seismic Category II structure, shall be the envelope of the SASSI seismic Category II foundation response spectra resulting from the following seismic inputs/soil profiles:

- AP1000 CSDRS – HR at El. 60.5;
- AP1000 CSDRS – FR, SR, UBSM, SM, SS soil profiles with AP1000 CSDRS spectra at plant grade;
- GMRS Deep Soil Site – Deep soil site profiles (LB, BE and UB) with deep soil site GMRS at plant grade; and
- AP1000 HRHF – For rock sites, HRHF at plant grade (HRHF-PG) shall be developed using AP1000 HRHF spectra at El. 60.5 and a range of backfill soil profiles in accordance with these procedures and Reg. Guide 1.208 Appendix E. The backfill soil under the Annex and Turbine buildings uses a parabolic soil profile as a function of depth (Elevation 100 ft to elevation 60.5 ft) and uses EPRI (1993) strain dependent curves. The HRHF-PG spectrum shall be generated using soil profiles corresponding to a shear wave velocity of 500 fps, 750 fps and 1000 fps at El. 100.

For each soil case, 2D SASSI analyses shall be performed and the results at three locations at the base of the seismic Category II structures are enveloped. The 3D effect factor is applied to the envelope foundation spectra and used for the design of the Annex Building and Turbine Building first bay.

Response spectrum analyses (using detailed finite element building models) shall be used to obtain seismic design loads for the seismic Category II building design. The seismic input to the response spectrum analyses are the envelope foundation seismic response spectra obtained from the SASSI analyses.

The maximum bearing demand and maximum relative displacement shall be established from the 2D SASSI analyses.

The COL applicant will perform the following screening criteria to determine if they have to perform further analysis for their site. If the requirements given below are not met, then the site applicant can perform site specific analyses to demonstrate that their site specific Seismic Category II foundation seismic response spectra are less than the AP1000 Annex Building and Turbine Building first bay generic design envelope foundation spectra.

- The site meets subsection 2.5.4.5 DCD soil uniformity requirements;
- For soil sites, the site GMRS is enveloped by either AP1000 CSDRS with soil profiles SS, SM, UBSM, SR, FR, HR or deep soil site profile with deep soil site GMRS at plant grade;
- For hard rock high frequency sites, the site FIRS is enveloped by the AP1000 HRHF response spectra with backfill soil profile for shear wave velocity of 500 fps, 750 fps and 1000 fps; and
- The Bearing Capacity with appropriate factor of safety is greater than or equal to the Bearing Demand.

Table RAI-SRP3.7.1-SEB1-15-1
Seismic Classification of Non-NI Building Structures

Structure	Category
Turbine Building – first bay adjacent to Nuclear Island	C-II
Turbine Building – All portions of the Turbine Building except the first bay adjacent to Nuclear Island	NS
Annex Building Area Outlined by Columns A - D and 8 – 13 Area Outlined by Columns A - G and 13 - 16	NS
Annex Building Area Outlined by Columns E - I.1 and 2 - 13	C-II
Radwaste Building	NS
Diesel-Generator Building	NS
Circulating Water Pumphouse and Towers	NS

C-I – Seismic Category I
C-II – Seismic Category II
NS – Non-seismic

Redacted Version, Withheld Under 10 CFR 2.390

Figure RAI-SRP3.7.1-SEB1-15-1 – Annex Building Seismic Classifications

SRI

Redacted Version, Withheld Under 10 CFR 2.390

Figure RAI-SRP3.7.1-SEB1-15-2 – Adjacent Building Seismic Classifications and Layout

SRI

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Figure RAI-SRP3.7.1-SEB1-15-3 – East-West 2D SASSI Model with Adjacent Buildings

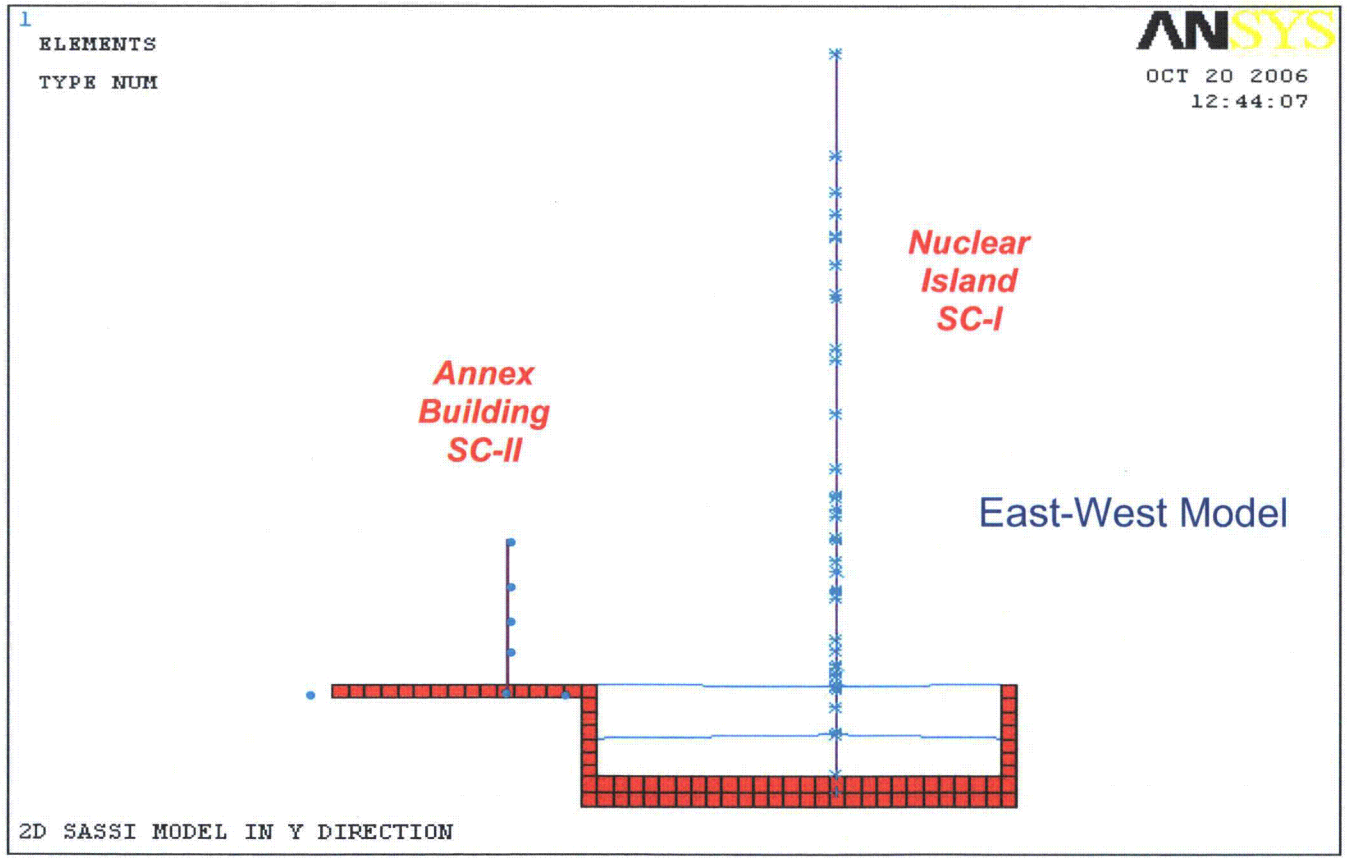


Figure RAI-SRP3.7.1-SEB1-15-4 – 2D North-South SASSI Model with Adjacent Buildings

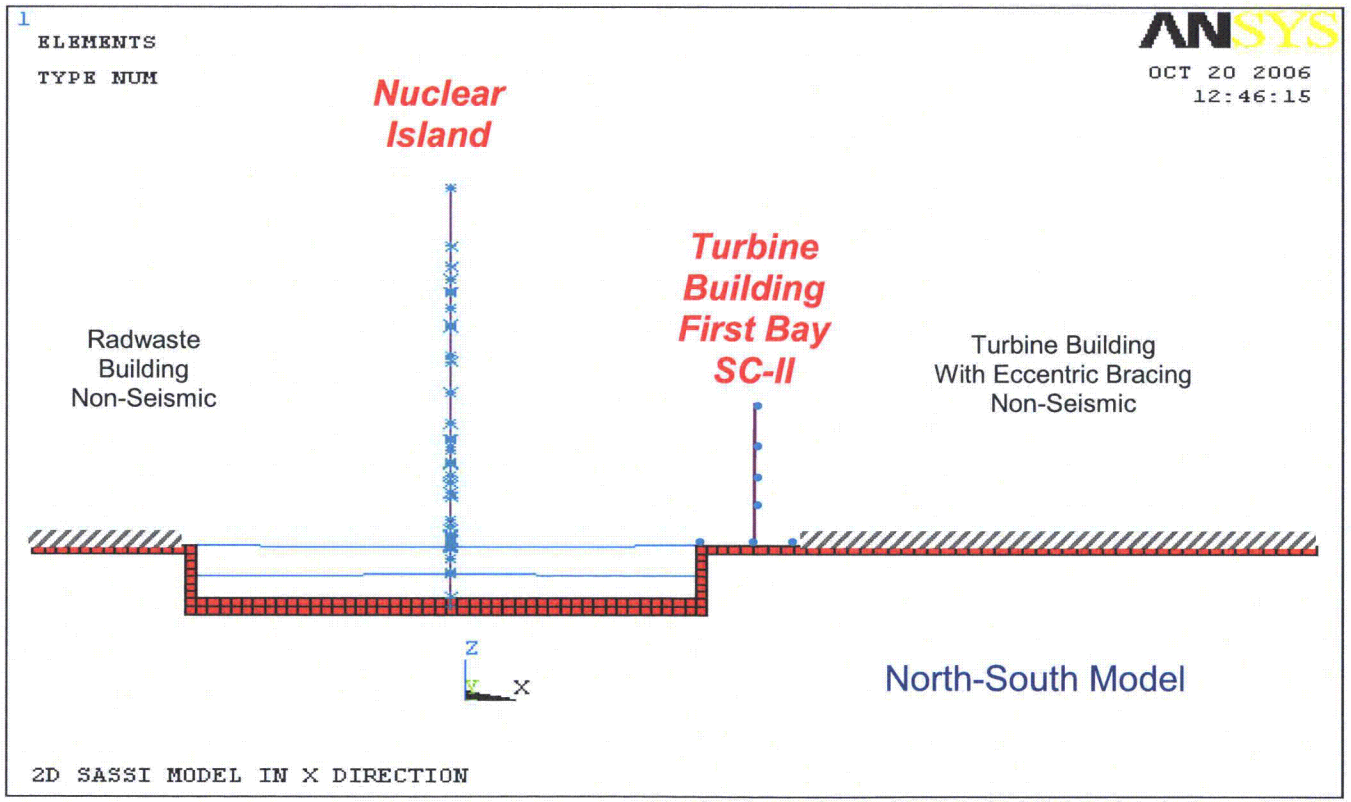
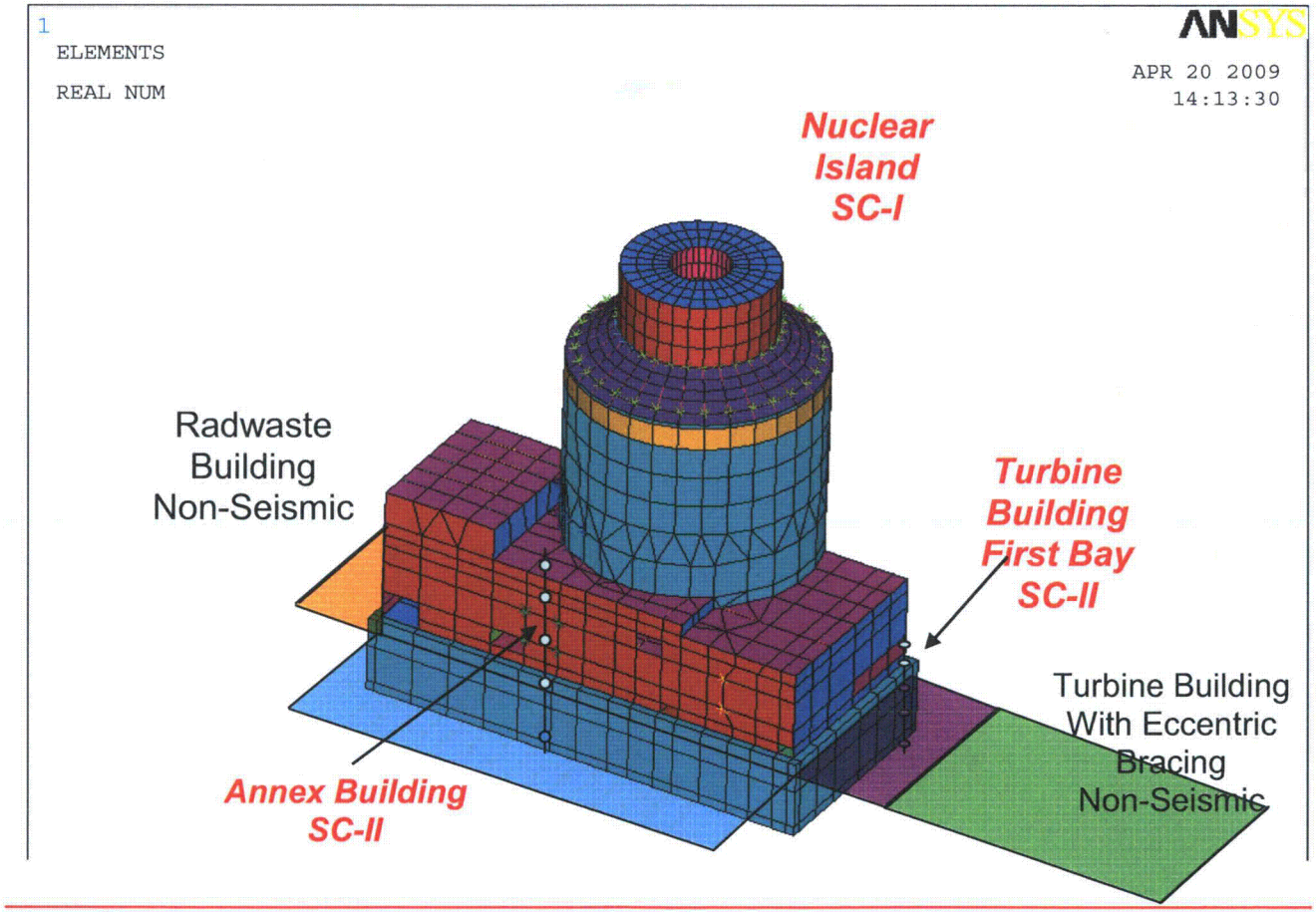


Figure RAI-SRP3.7.1-SEB1-15-5 – 3D SASSI Model with Adjacent Buildings



AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Reference(s): None

Design Control Document (DCD) Revision:

~~None~~
The following Tier 2 changes are made to post-DCD Revision 17 to reflect the change in seismic Category classification. Change Table 3.2-2 as shown below:

Table 3.2-2

SEISMIC CLASSIFICATION OF BUILDING STRUCTURES

Structure	Category[1]
Nuclear Island Basemat Containment Interior Shield Building Auxiliary Building Containment Air Baffle	C-I
Containment Vessel	C-I
Plant Vent and Stair Structure	C-II
Turbine Building – first bay adjacent to Nuclear Island outlined by Columns I.1 to R and 11.05 to 11.2	C-II
Turbine Building – All portions of the Turbine Building except the first bay adjacent to Nuclear Island as outlined by Columns H.05 to R and 12.1 to 20	NS[2]
Annex Building Area Outlined by Columns A - D and 8 – 13 Area Outlined by Columns A - G and 13 - 16	NS[2]
Annex Building Area Outlined by Columns E - I.1 and 2 - 13	C-II
Radwaste Building	NS[2]
Diesel-Generator Building	NS[3]
Circulating Water Pumphouse and Towers	NS

C-I – Seismic Category I
C-II – Seismic Category II
NS – Non-seismic

Note:

1. Within the broad definition of seismic Category I and II structures, these buildings contain members and structural subsystems the failure of which would not impair the capability for safe shutdown. Examples of such systems would be elevators, stairwells not required for access in the event of a postulated earthquake, and nonstructural partitions in nonsafety-related areas. These substructures are classified as non-seismic.
2. The NS designation for a portion of the turbine building, the radwaste building, and a portion of the annex building indicates that the buildings are not seismic Category I or seismic Category II. The seismic requirements for these buildings are outlined in subsection 3.7.2.8.
3. The NS designation for the diesel-generator building indicates that the building is not seismic Category I or seismic Category II. The seismic requirements for buildings containing Class D equipment, including the diesel generator building, are outlined in subsection 3.2.2.6.

The following changes are made to DCD subsections 1.2.8 and 3.7.2.8.

1.2.8 Turbine Building

Building Function

The turbine building houses the main turbine, generator, and associated fluid and electrical systems. It provides weather protection for the laydown and maintenance of major turbine/generator components. The turbine building also houses the makeup water purification system. No safety-related equipment is located in the turbine building.

Civil/Structure Features

The turbine building, shown in Figures 1.2-23 through 1.2-30, consists of two sections, the 1st bay and the main area which houses the turbine. The 1st bay is immediately adjacent to the auxiliary building and consists of reinforced concrete walls and steel framing with reinforced concrete and steel grated floors. The main area is a steel framed building with reinforced concrete and steel grated floors. The 1st bay and the main area are two independent structures. ~~is a steel column and beam structure.~~ The turbine building ground floor (structural mat) is a reinforced concrete slab shared by the 1st bay and main area structure. The seismic design of the turbine building can be found in Table 3.2-2.

The turbine-generator is low-tuned by means of spring supports. The design consists of a reinforced concrete deck mounted on springs. The springs are supported on a structural steel framework that forms an integral part of the turbine building structural system. Lateral bracing serves to provide lateral support for the building as well as the turbine-generator support. The spring-supported concept isolates dynamically the turbine-generator deck from the remainder of the structure for operating frequencies, thus allowing for an integrated structure below the deck. This includes an integrated reinforced concrete foundation mat that supports both the turbine generator and the building. The condenser is attached rigidly to the low pressure turbine exhaust and is supported on springs. The foundation for the entire building is a reinforced concrete mat.

3.7.2.8.1 Annex Building

The portion of the Annex Building adjacent to the Nuclear Island is classified as Seismic Category II. The structural configuration is shown in Figure 3.7.2-19. The Annex Building is analyzed for the safe shutdown earthquake for the six soil profiles described in subsection 3.7.1.4. For the hard rock site, a range of soil properties is assumed for the layer above rock at the level of the Nuclear Island foundation. Seismic input is defined by response spectra applied at the base of a dynamic model of the annex building. ~~The horizontal spectra are obtained from the 2D SASSI analyses and account for soil structure and structure soil structure interaction. Input in the east west direction uses the response spectra obtained from the two dimensional analyses for the annex building mat. Input in the north south direction uses the response spectra obtained from the two dimensional analyses for the turbine building mat. Vertical input is obtained from 2D SASSI finite element soil structure interaction analyses.~~ The seismic response

spectra input at the base of the Annex Building are the envelopes of the range of soil sites and also envelope the AP1000 design free field ground spectra shown in Figures 3.7.1-1 and 3.7-1-2. The envelope of the maximum building response acceleration values is applied as equivalent static loads to a more detailed static model. See subsection 3.7.2.8.4 for more discussion of modeling and seismic analysis.

The minimum space required between the Annex Building and the Nuclear Island to avoid contact is obtained by absolute summation of the deflections of each structure obtained from either a time history or a response spectrum analysis for each structure. The maximum displacement of the roof of the Annex Building is 1.6 inches in the east-west direction. The minimum clearance between the structural elements of the Annex Building above grade and the nuclear island is 4 inches

3.7.2.8.3 Turbine Building

The south end of the Turbine Building is separated from the rest of the turbine building by a 2'-0" thick reinforced concrete wall that provides a robust structure around the first bay. This wall isolates the first bay of the Turbine Building from the general area of the Turbine Building and from the adjacent yard area. The main segment of this wall is located on column line 11.2. This wall extends from El.100'-0" basemat to the El.161'-0" operating floor. The first bay of Turbine Building is classified as seismic Category II. The other bays are classified as non-seismic.

The first bay of Turbine Building is analyzed for the safe shutdown earthquake for the six soil profiles described in subsection 3.7.1.4. For the hard rock site, a range of soil properties is assumed for the layer above rock at the level of the Nuclear Island foundation. Seismic input is defined by response spectra applied at the base of a dynamic model of the first bay of Turbine Building. The seismic response spectra input at the base of the first bay of Turbine Building are the envelopes of the range of soil sites and also envelope the AP1000 design free field ground spectra shown in Figures 3.7.1-1 and 3.7-1-2. See subsection 3.7.2.8.4 for more discussion of modeling and seismic analysis.

The first bay is designed in accordance with ACI-349 for concrete features and AISC-N690 for steel features.

For the non-seismic portion of the Turbine Building, seismic design is upgraded from Zone 2A, Importance Factor of 1.25, to Zone 3 with an Importance Factor of 1.0 in order to provide margin against collapse during the safe shutdown earthquake. The non-seismic portion of the turbine building is an eccentrically braced steel frame structure designed to meet the following criteria:

- The turbine building is designed in accordance with ACI-318 for concrete structures and with AISC for steel structures. Seismic loads are defined in accordance with the 1997 Uniform Building Code provisions for Zone 3 with an Importance Factor of 1.0. For an eccentrically braced structure the resistance modification factor is 7 (UBC-97, reference 1) using strength design. When using allowable stress design, the allowable stresses are not increased by one third for seismic loads and the resistance modification factor is increased to 10 (UBC-91).

- ~~The nominal horizontal clearance between the structural elements of the turbine building above grade and the nuclear island and annex building is 12 inches.~~

- The design of the lateral bracing system complies with the seismic requirements for eccentrically braced frames given in section 9.3 of the AISC Seismic Provisions for Structural Steel Buildings (reference 34). Quality assurance is in accordance with ASCE 7-98 (reference 35) for the lateral bracing system.

3.7.2.8.4 Seismic Modeling and Analysis of Seismic Category II Building Structures

Seismic Category II structures, systems, and components are designed so that the safe shutdown earthquake does not cause unacceptable structural failure or interaction with seismic Category I items. Therefore, the seismic response of seismic Category II buildings must be obtained so that they can be designed to meet the seismic Category II requirements as given in DCD subsection 3.2.1.1.2. Seismic Category II structures are analyzed and evaluated in the same manner as seismic Category I structures. The foundation of the non-seismic portion is modeled with the associated mass distributed on it so that the soil structure interaction during a seismic event is reflected in the analysis.

The seismic analyses performed for the adjacent seismic Category II structures are a simulated 3D analysis. The seismic analyses are performed primarily using 2D SASSI models. To properly account for 3D effect, the response from 2D and 3D SASSI analyses of the Seismic Category II buildings on rigid foundations are compared and a 3D effects factor is developed from this comparison. Three soil cases [Upper Bound Soft to Medium (UBSM), Soft to Medium (SM), and Soft Soil (SS)] are used to determine the 3D factor. Shown in Figures 3.7.2-20 and 3.7.2-21 are the 2D SASSI models with adjacent building structures. The seismic Category II buildings are modeled as stick models. The 3D model with adjacent structures is shown in Figure 3.7.2-22.

Seismic Category II buildings are designed using envelope foundation response spectra (FRS). The development of these FRS shall be based on a number of analyses results from the SASSI analyses. The seismic Category II FRS, at the base of the seismic Category II structures, shall be the envelope of the SASSI seismic Category II foundation response spectra resulting from the following seismic inputs/soil profiles:

- AP1000 CSDRS – HR at El. 60.5;
- AP1000 CSDRS – FR, SR, UBSM, SM, SS soil profiles with AP1000 CSDRS spectra input at plant grade;
- GMRS Deep Soil Site – Deep soil site profiles (LB, BE and UB) with deep soil site GMRS at plant grade; and
- AP1000 HRHF – For rock sites, HRHF at plant grade (HRHF-PG) shall be developed using AP1000 HRHF spectra at El. 60.5 and a range of backfill soil profiles in accordance with

these procedures and Reg. Guide 1.208 Appendix E. The backfill soil under the Annex and Turbine buildings uses a parabolic soil profile as a function of depth (Elevation 100 ft to elevation 60.5 ft) and uses EPRI (1993) strain dependent curves. The HRHF-PG spectra are generated using soil profiles corresponding to a shear wave velocity of 500 fps, 750 fps and 1000 fps at El. 100.

For each soil case, 2D SASSI analyses are performed and the results at three locations at the base of the seismic Category II structures are enveloped. The 3D effect factor is applied to the envelope foundation spectra and used for the design of the Annex Building and Turbine Building first bay.

Response spectrum analyses (using detailed finite element building models) shall be used to obtain seismic design loads for the seismic Category II building design. The seismic input to the response spectrum analyses are the envelope foundation seismic response spectra obtained from the SASSI analyses.

The maximum bearing demand and maximum relative displacement shall be established from the 2D SASSI analyses.

The COL applicant performs the following screening criteria to determine if the applicant has to perform further analysis for its site. If the requirements given below are not met, then the site applicant can perform site specific analyses to demonstrate that its site-specific seismic Category II foundation seismic response spectra are less than the AP1000 Annex Building and Turbine Building first bay generic design envelope foundation spectra.

- The site meets subsection 2.5.4.5 DCD soil uniformity requirements;
- For soil sites, the site GMRS is enveloped by either AP1000 CSDRS with soil profiles SS, SM, UBSM, SR, FR, HR or deep soil site profile with deep soil site GMRS at plant grade;
- For hard rock high frequency sites, the site FIRS is enveloped by the AP1000 HRHF response spectra with backfill soil profile for shear wave velocity of 500 fps, 750 fps and 1000 fps; and
- The Bearing Capacity with appropriate factor of safety is greater than or equal to the Bearing Demand.

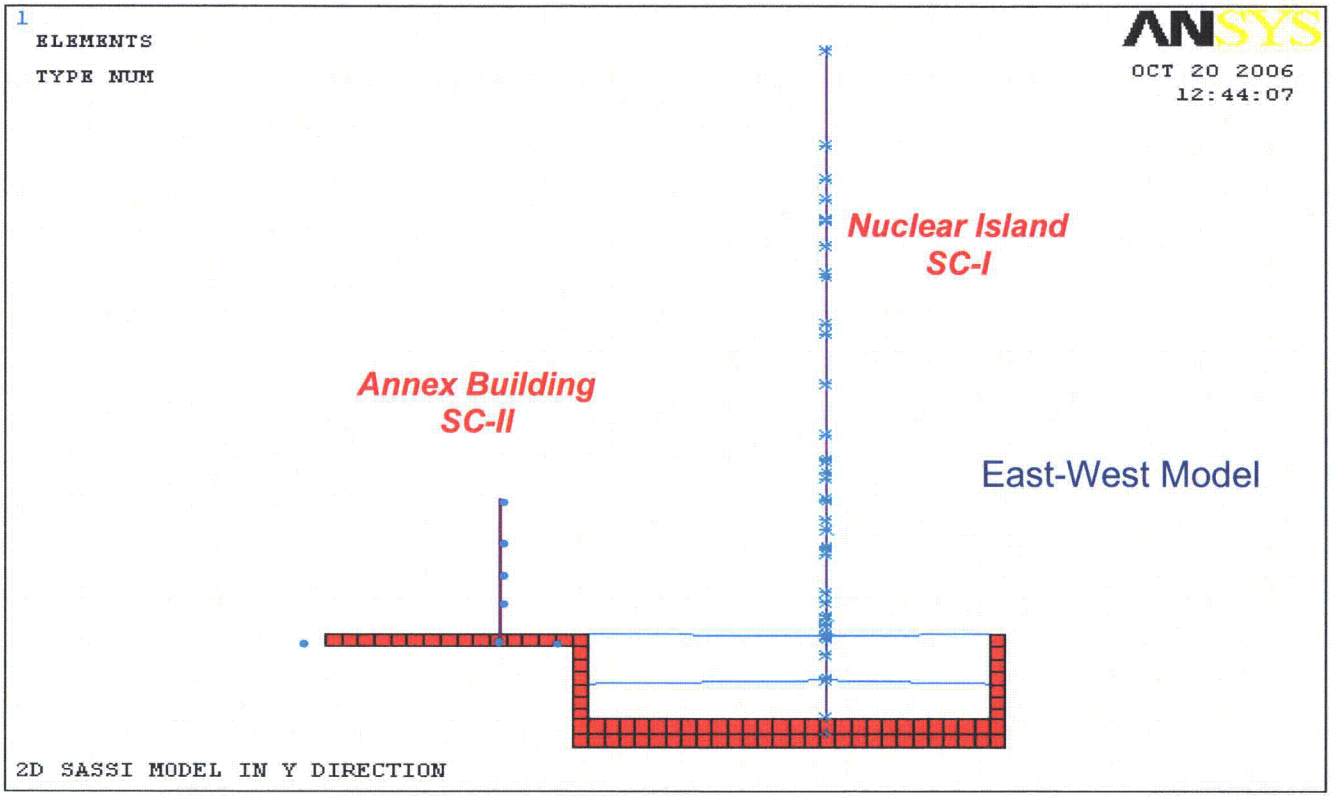


Figure 3.7.2-20

East-West 2D SASSI Model with Adjacent Buildings

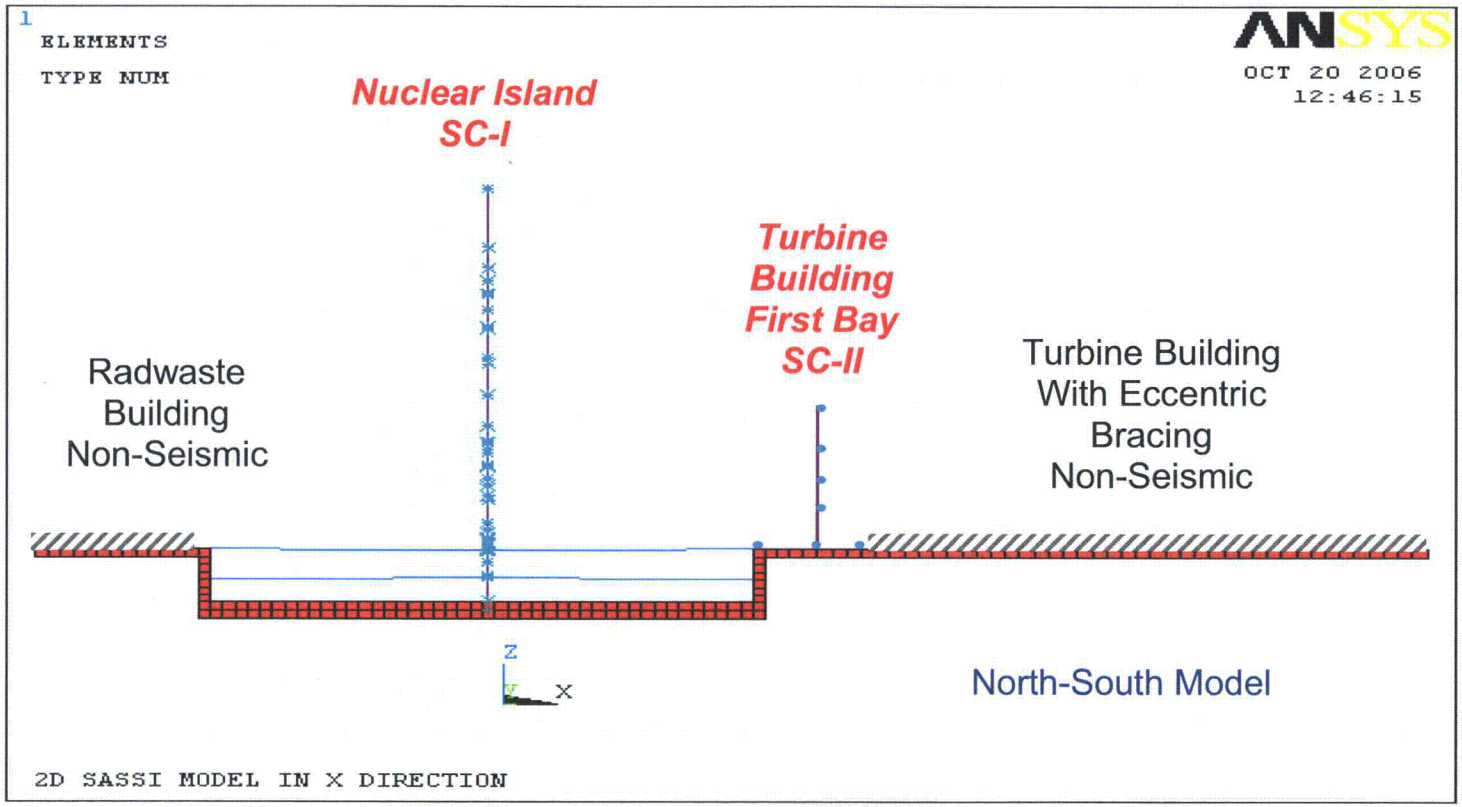


Figure 3.7.2-21

2D North-South SASSI Model with Adjacent Buildings

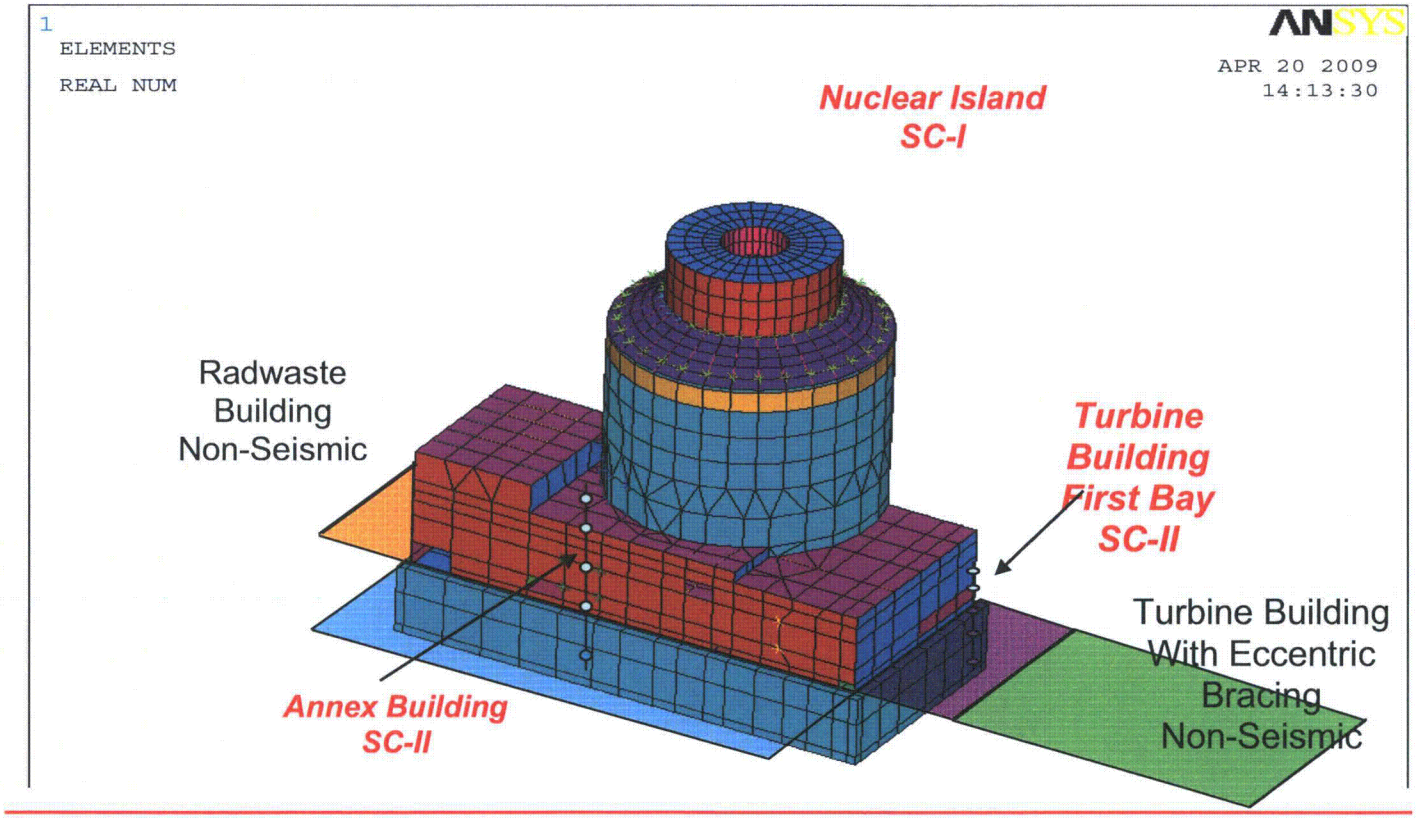


Figure 3.7.2-22

3D SASSI Model with Adjacent Buildings

The following Tier 1 changes are made to Section 3.3. Modify the fourth paragraph as follows:

The ~~turbine~~ Turbine ~~building~~ Building is a non-safety related structure that houses the main turbine generator and the power conversion cycle equipment and auxiliaries. There is no safety-related equipment in the T~~t~~urbine B~~b~~uilding. The T~~t~~urbine B~~b~~uilding is located on a separate foundation. The T~~t~~urbine B~~b~~uilding structure is adjacent to the nuclear island structures consisting of the auxiliary building to the south and the Annex Building to the south and east. The Turbine Building consists of two separate superstructures, the first bay and the main area, both supported on a common reinforced concrete basemat. The first bay, next to the Auxiliary Building, consists of a combination of reinforced concrete walls and steel framing with reinforced concrete and steel grated floors. It is classified as a seismic Category II structure due to its immediate proximity to the Auxiliary Building. The main area of the Turbine Building, immediately to the north of the first bay, is a steel framed building with reinforced concrete and steel grated floors. It is classified as a non-seismic structure. The non-seismic portion of the Turbine Building is designed with eccentrically braced framing (EBF).

Change the title of Table 3.3-1 to the following:

Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building(1)

Modify Table 3.3-1 related to the Turbine Building as follows:

Table 3.3-1 (cont.)
Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building[1]

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness[2][3]	Applicable Radiation Shielding Wall (Yes/No)
Turbine Building				
Wall adjacent to Column Line I.2	From Col. Line 11.05 to 11.2	From 100'-0" to 161'-0"	2'-0"	No
Wall along Column Line 11.2	From near I.2 to near Col. Line R	From 100'-0" to 161'-0"	2'-0"	No
Wall adjacent to Column line R	From Col. Line 11.2 to Col. Line 11.05	From 100'-0" to 161'-0"	2'-0"	No
Wall along Column Line 11.05	From near Col. Line R to Col. Line Q	From 100'-0" to 161'-0"	2'-0"	No
	From Col. Line K.4 to near Col. Line I.2	From 100'-0" to 161'-0"	2'-0"	No

The following drawings in the DCD associated with the buildings adjacent to the Nuclear Island have been revised and are attached reflecting layout changes (e.g., expansion of Turbine Building first bay by 12') and column line changes to the Annex Building. It was necessary to change column line numbers because of the widening of the Turbine Building first bay to avoid column identification conflict with the Turbine Building column lines. The following changes are made to the Annex Building column identifications:

- Column line 12 becomes 11.15
- Column line 14.1 becomes 13.3
- Column line 14.2 becomes 14.1
- Column line 16 on the Annex Building becomes 15.2

Tier 1 Figures: Figures 3.3-11 through 3.3-13

Tier 2 Figures:

- Figure 1.2-2
- Figure 1.2-23 through Figure 1.2-28
- Figure 1.2-30
- Figure 3.7.2-19 (Sheets 1 to 3, 5 to 8, and 10)
- Figure 9A-2 (Sheets 1 to 5)
- Figure 12.3-1 (Sheets 2, 15, 16)
- Figure 12.3-2 (Sheets 2-, 15)
- Figure 12.3-3 (Sheets 2, 15, 16)

PRA Revision:

None

Technical Report (TR) Revision:

None

Tier 1 Figures

Figures 3.3-11 through 3.3-13

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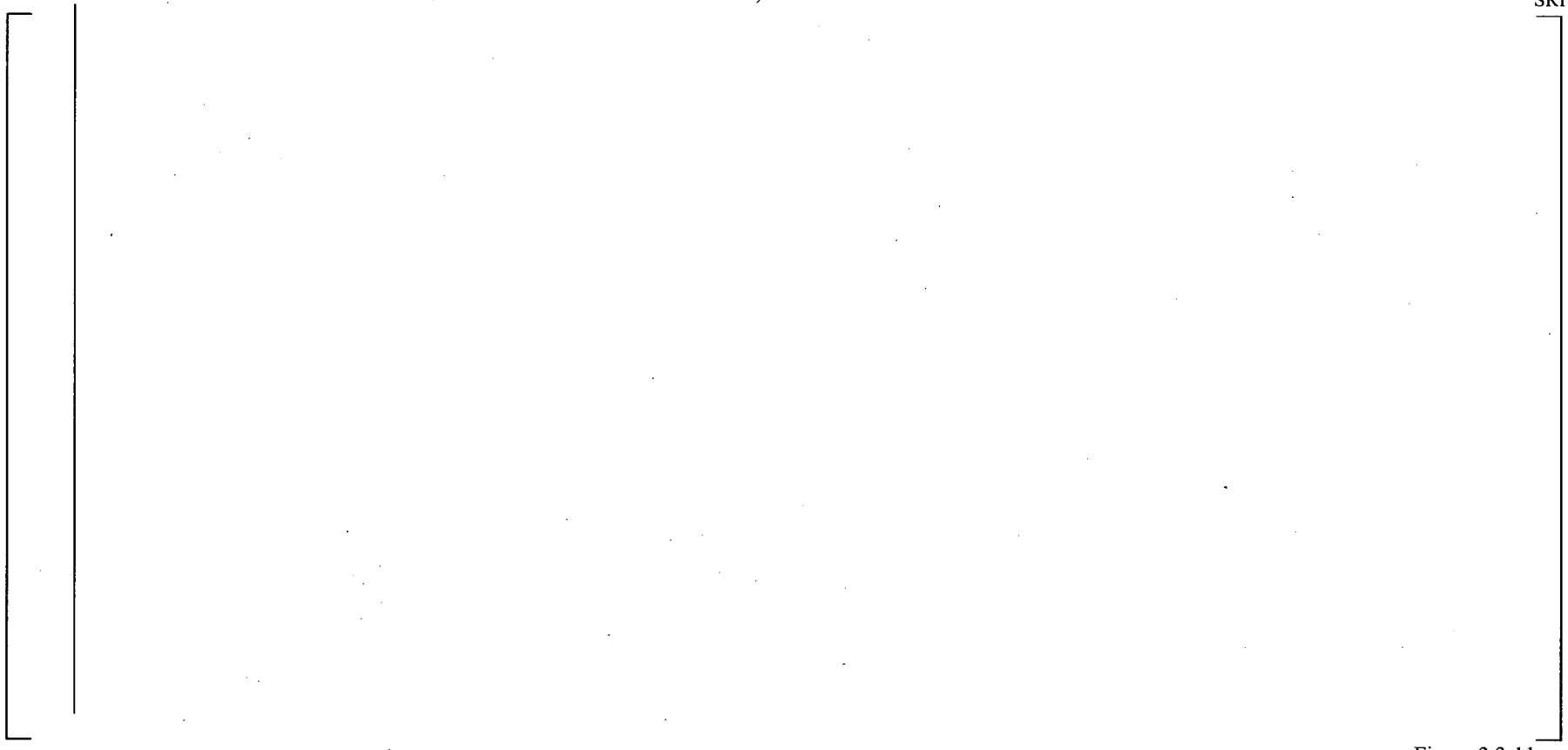

Figure 3.3-11

Annex Building Plan View at Elevation 100′-0″

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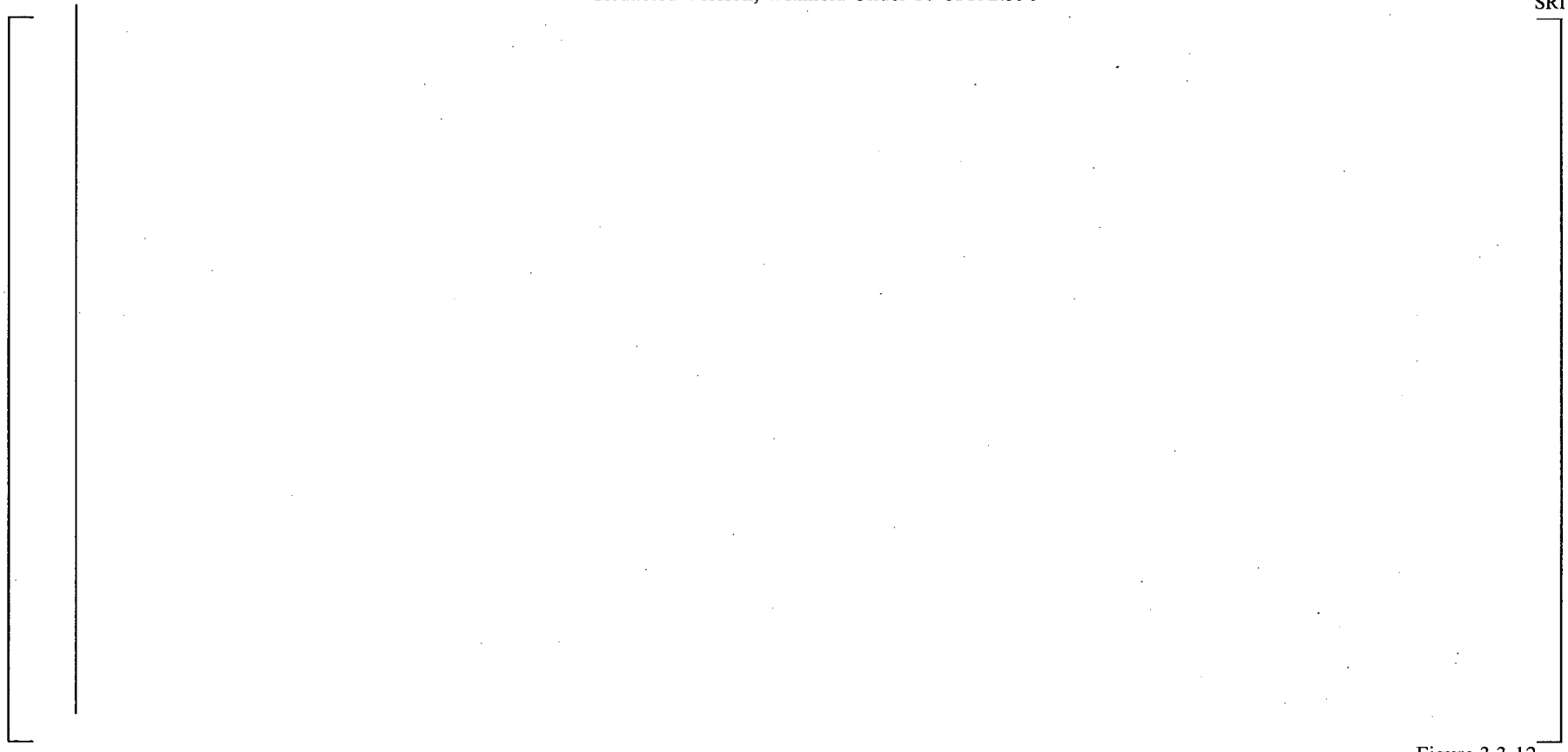

Figure 3.3-12

Annex Building Plan View at Elevation 117′-6″

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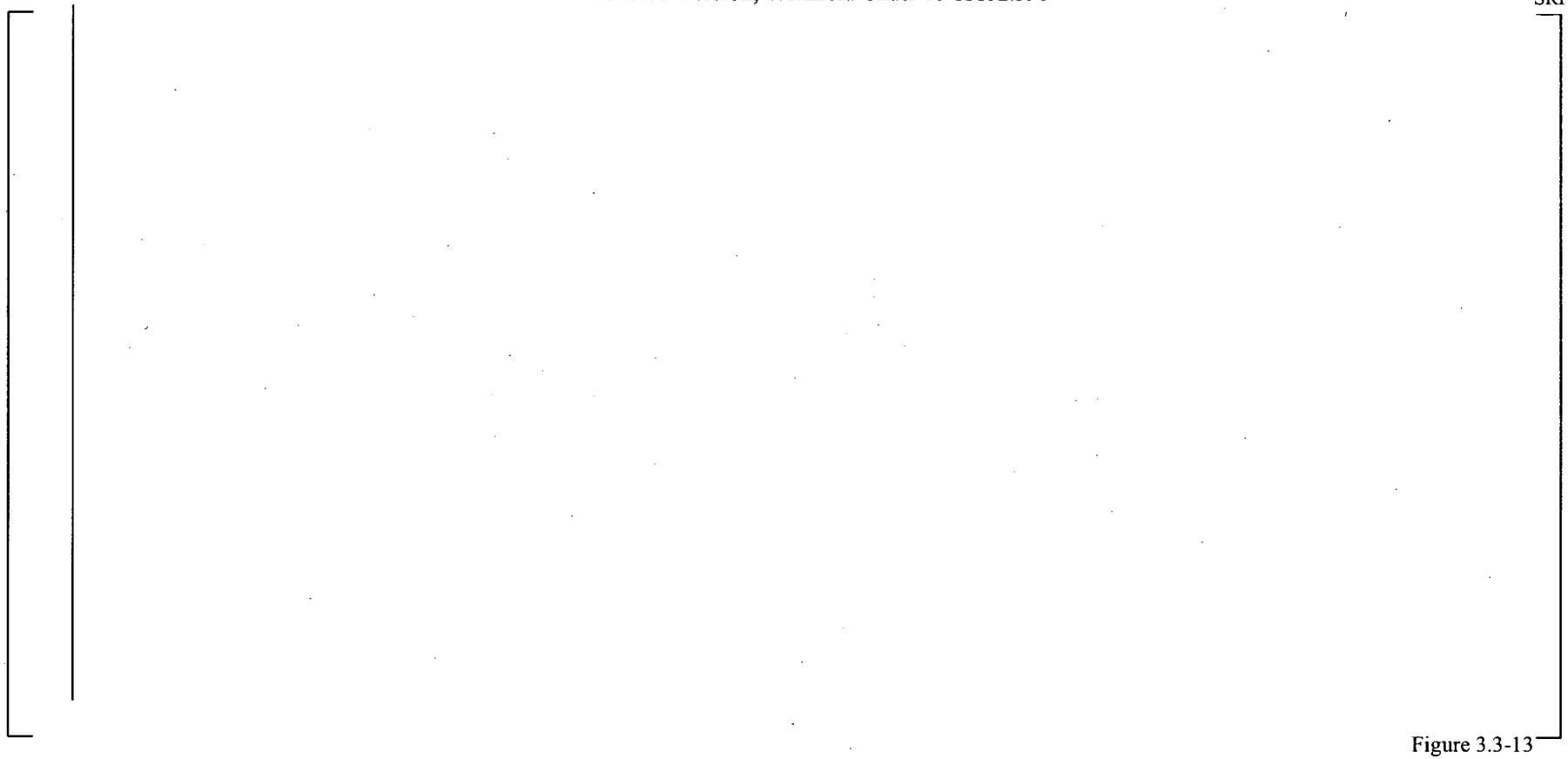

Figure 3.3-13

Annex Building Plan View at Elevation 135′-3″

Tier 2 Figures

- Figure 1.2-2
- Figure 1.2-23 through Figure 1.2-28
- Figure 1.2-30
- Figure 3.7.2-19 (Sheets 1 to 3, 5 to 8, and 10)
- Figure 9A-2 (Sheets 1 to 5)
- Figure 12.3-1 (Sheets 2, 15, 16)
- Figure 12.3-2 (Sheets 2, 15)
- Figure 12.3-3 (Sheets 2, 15, 16)

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Figure 1.2-2

Site Plan

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Figure 1.2-23
Turbine Building General Arrangement
Plan at Elevation 100′-0″

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Figure 1.2-24
Turbine Building General Arrangement
Plan at Elevation 117′-6″

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Figure 1.2-25
Turbine Building General Arrangement
Plan at Elevation 135′-3″

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Figure 1.2-26
Turbine Building General Arrangement
Plan at Elevation 161′-0″

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Figure 1.2-27
Turbine Building General Arrangement
Plan at Elevation 161′-0″ with Equipment

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Figure 1.2-28
Turbine Building General Arrangement
Plan at Elevation 245′-0″ & 226′-0″

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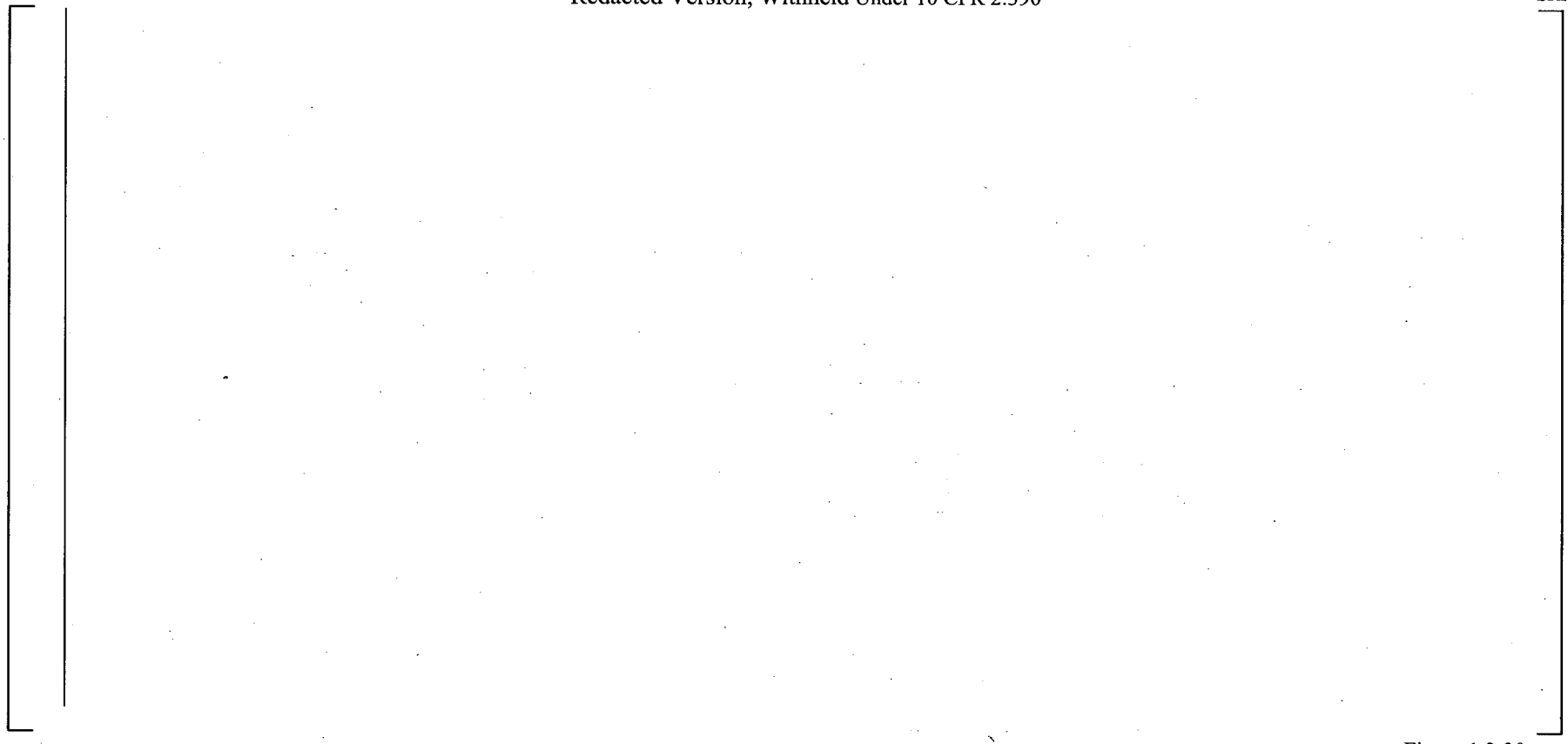

Figure 1.2-30
Turbine Building General Arrangement
Section B-B

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Figure 3.7.2-19 (Sheet 1 of 10)
Annex Building Key Structural Dimensions
Plan at Elevation 100′-0″

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Figure 3.7.2-19 (Sheet 2 of 10)
Annex Building Key Structural Dimensions
Plan at Elevation 107′-2″ and 117′-6″

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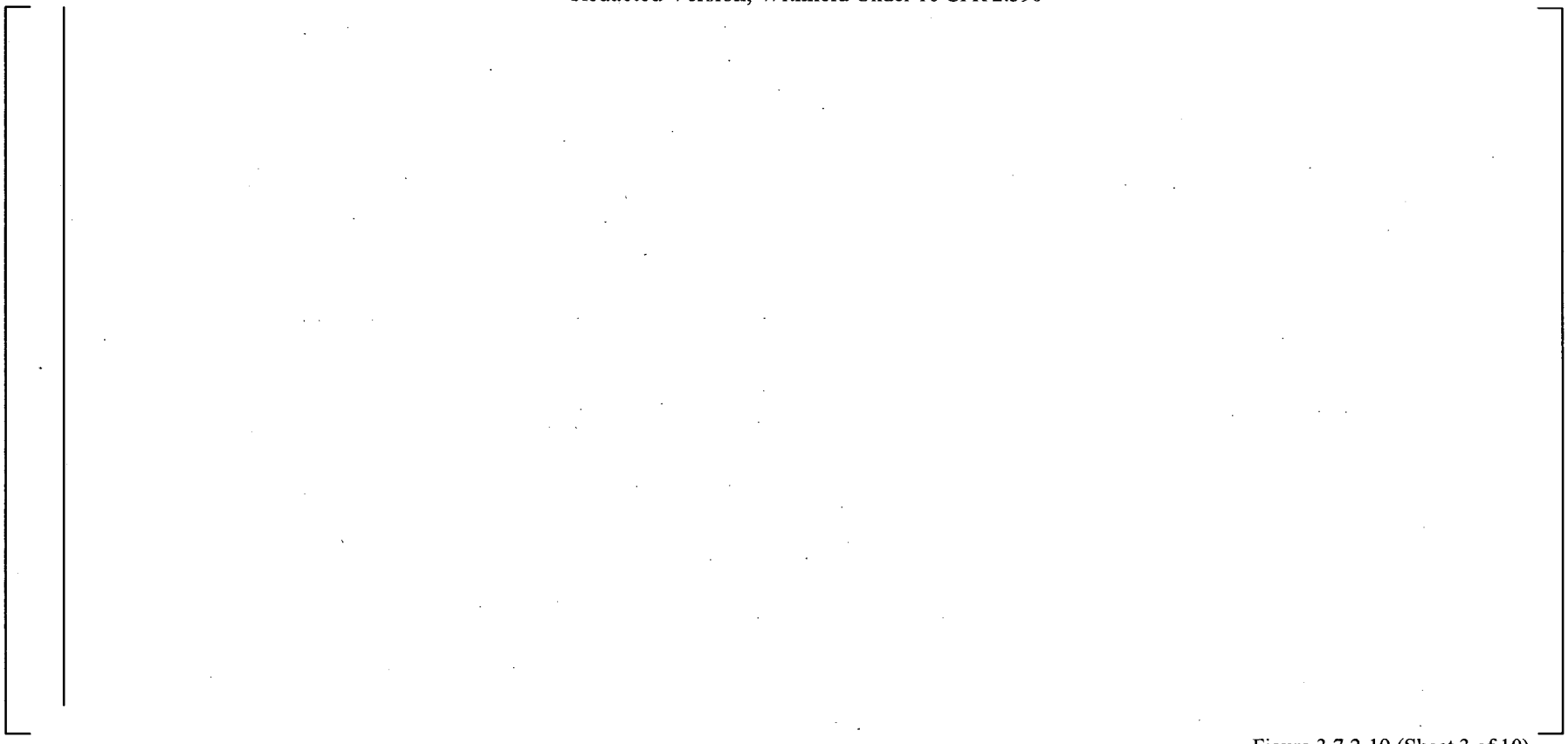

Figure 3.7.2-19 (Sheet 3 of 10)
Annex Building Key Structural Dimensions
Plan at Elevation 135′-3″

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Figure 3.7.2-19 (Sheet 5 of 10)
Annex Building Key Structural Dimensions
Roof Plan at Elevation 154′-0″ and 181′-11 3/4″

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Figure 3.7.2-19 (Sheet 6 of 10)
Annex Building Key Structural Dimensions
Section A – A

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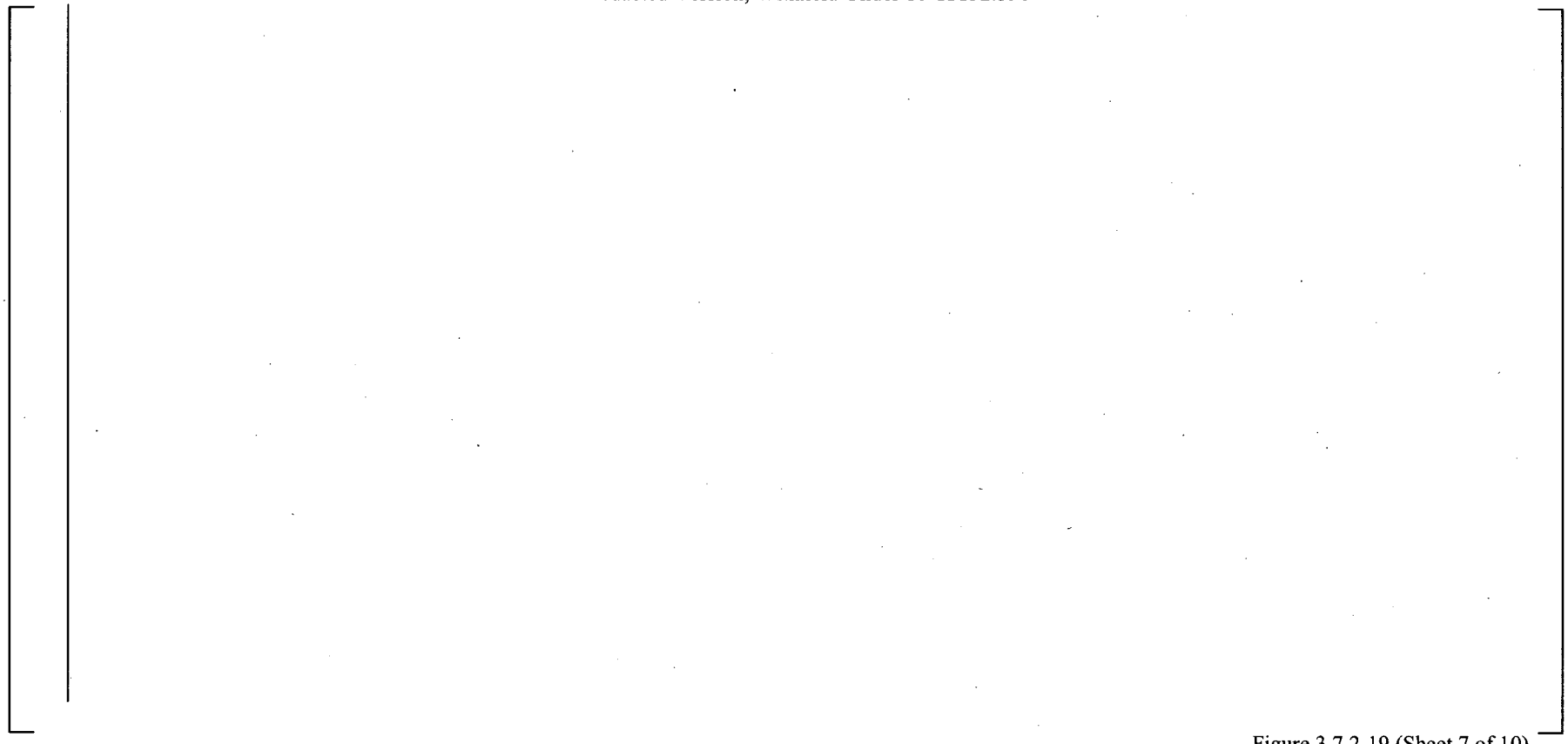

Figure 3.7.2-19 (Sheet 7 of 10)
Annex Building Key Structural Dimensions
Section B – B

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Figure 3.7.2-19 (Sheet 8 of 10)
Annex Building Key Structural Dimensions
Section C - C

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Figure 3.7.2-19 (Sheet 10 of 10)
Annex Building Key Structural Dimensions
Sections G - G, H - H, & J – J

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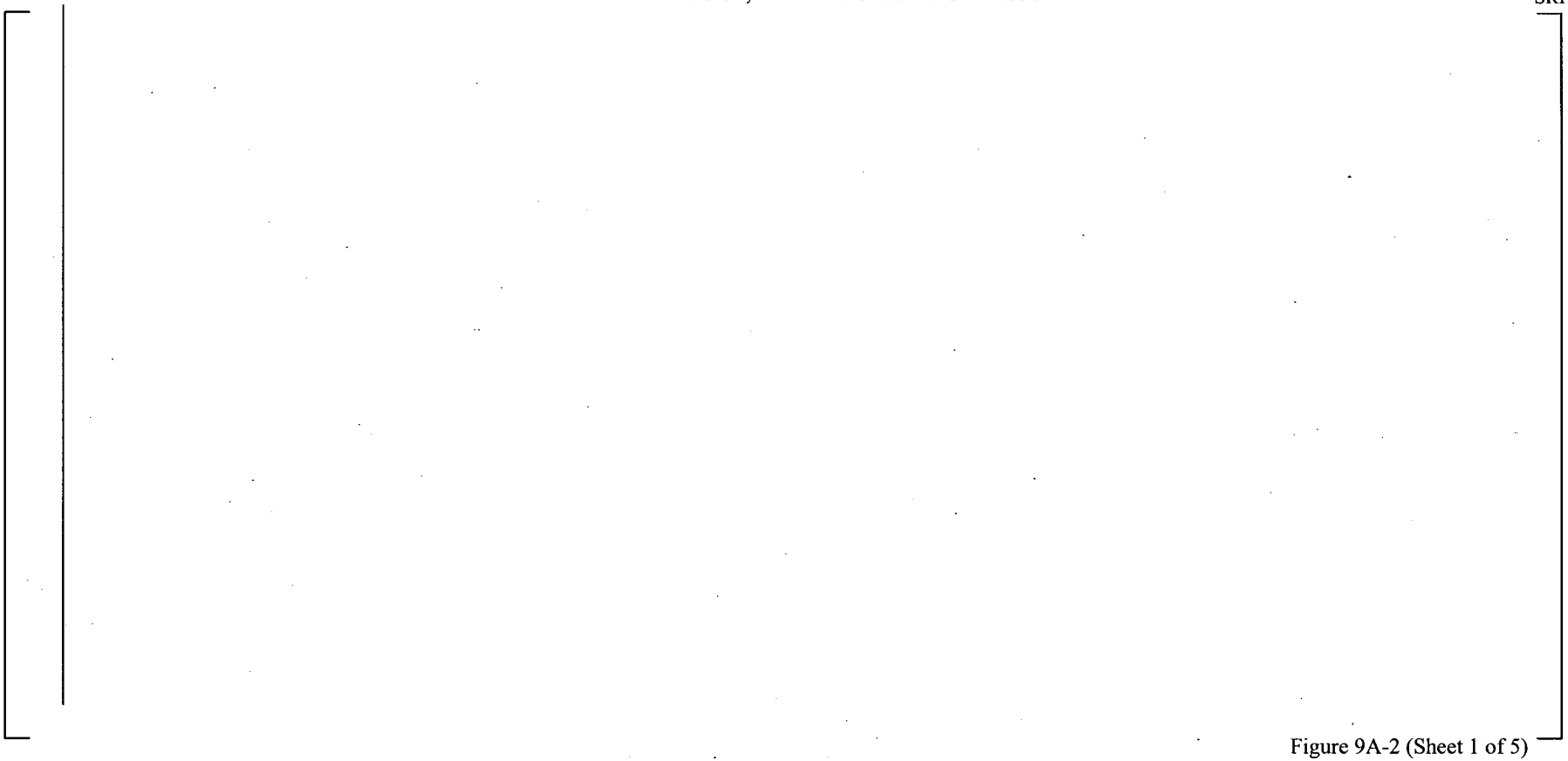

Figure 9A-2 (Sheet 1 of 5)
Turbine Building Fire Area
Plan at Elevation 100′-0″

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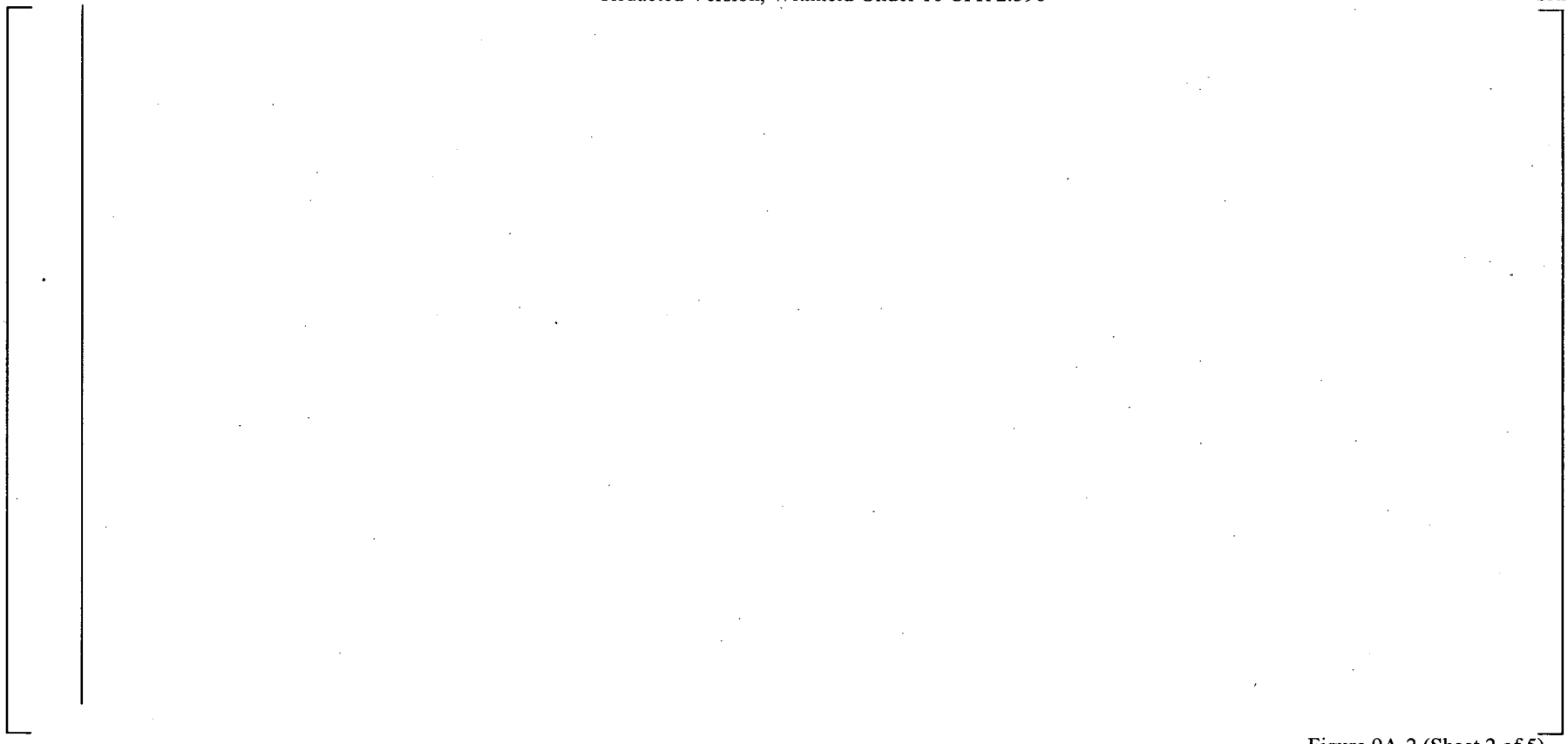

Figure 9A-2 (Sheet 2 of 5)
Turbine Building Fire Area
Plan at Elevation 117′-6″

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Figure 9A-2 (Sheet 3 of 5)
Turbine Building Fire Area
Plan at Elevation 135′-3″

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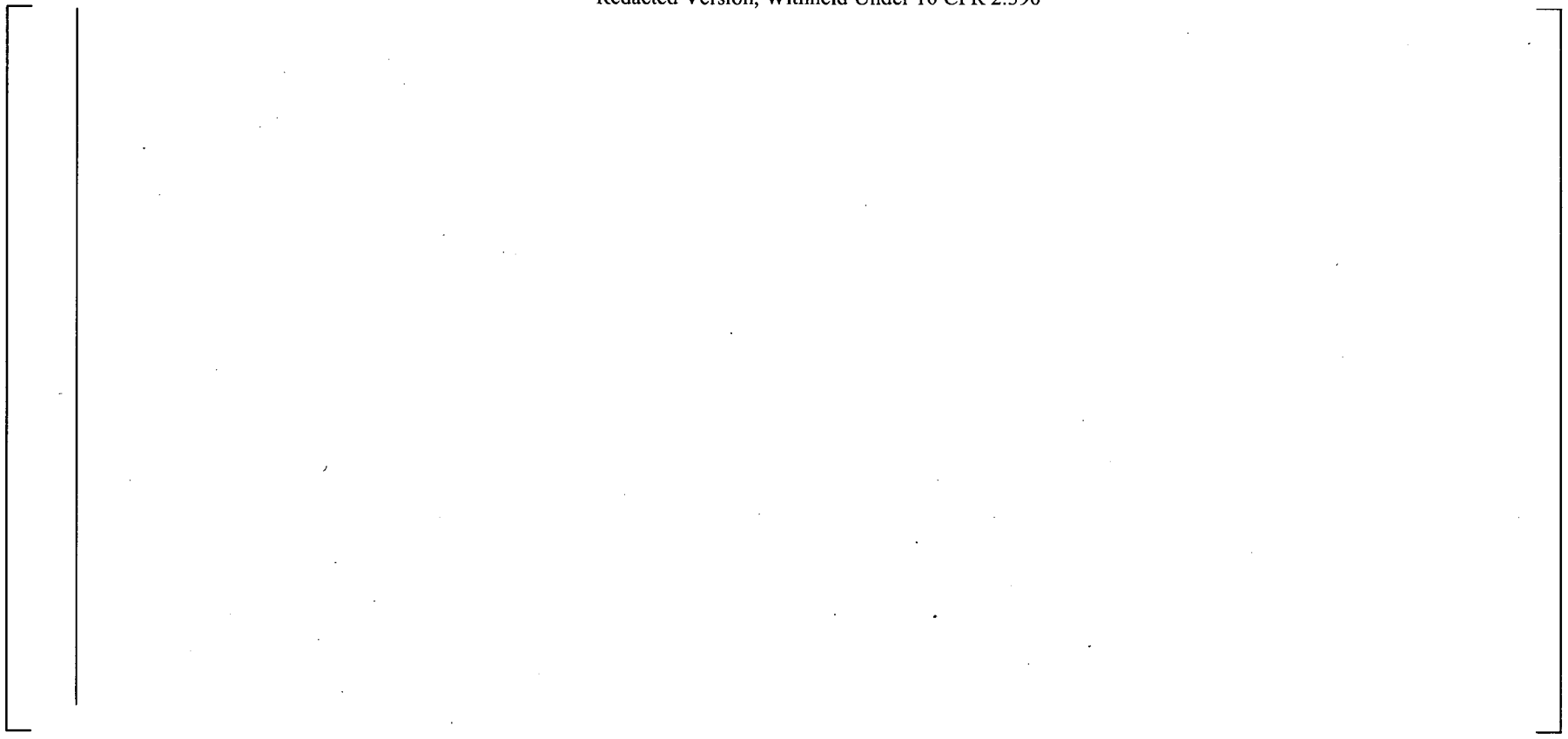

Figure 9A-2 (Sheet 4 of 5)
Turbine Building Fire Area
Plan at Elevation 161′-0″

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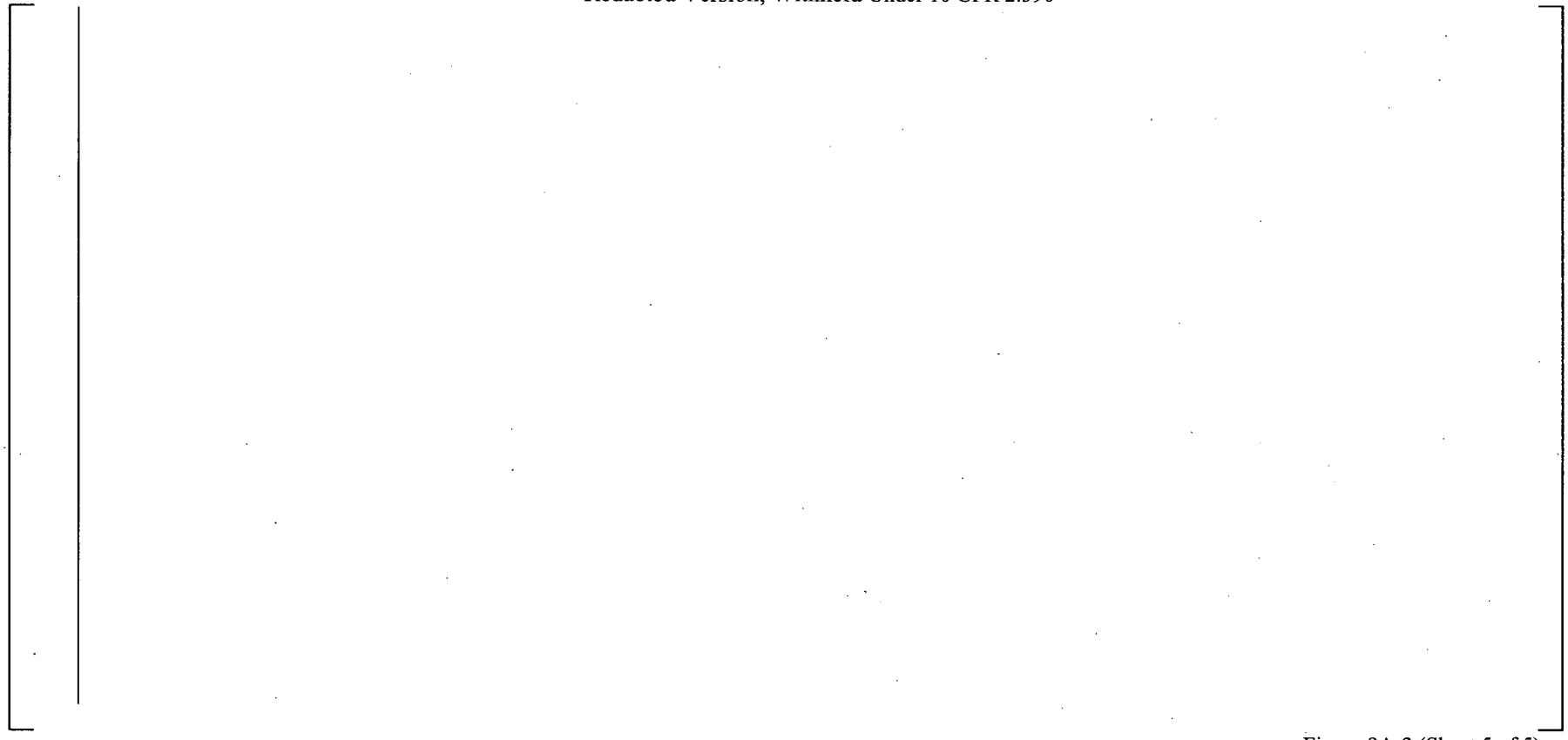

Figure 9A-2 (Sheet 5 of 5)
Turbine Building Fire Areas
Plan at Elevation 245′-0″ & 226′-10″

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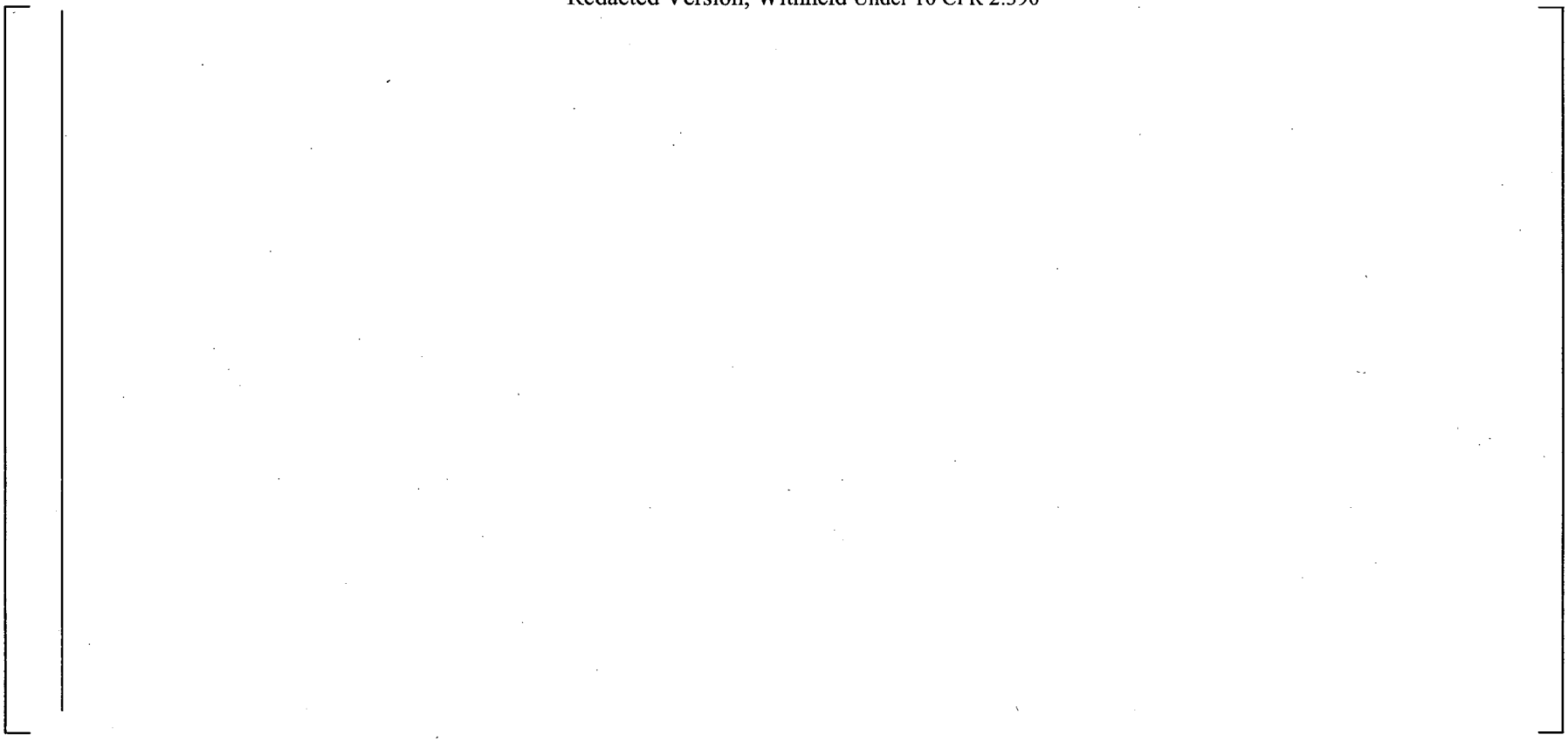

Figure 12.3-1 (Sheet 2 of 16)
Site Radiation Zones, Normal Operations/Shutdown

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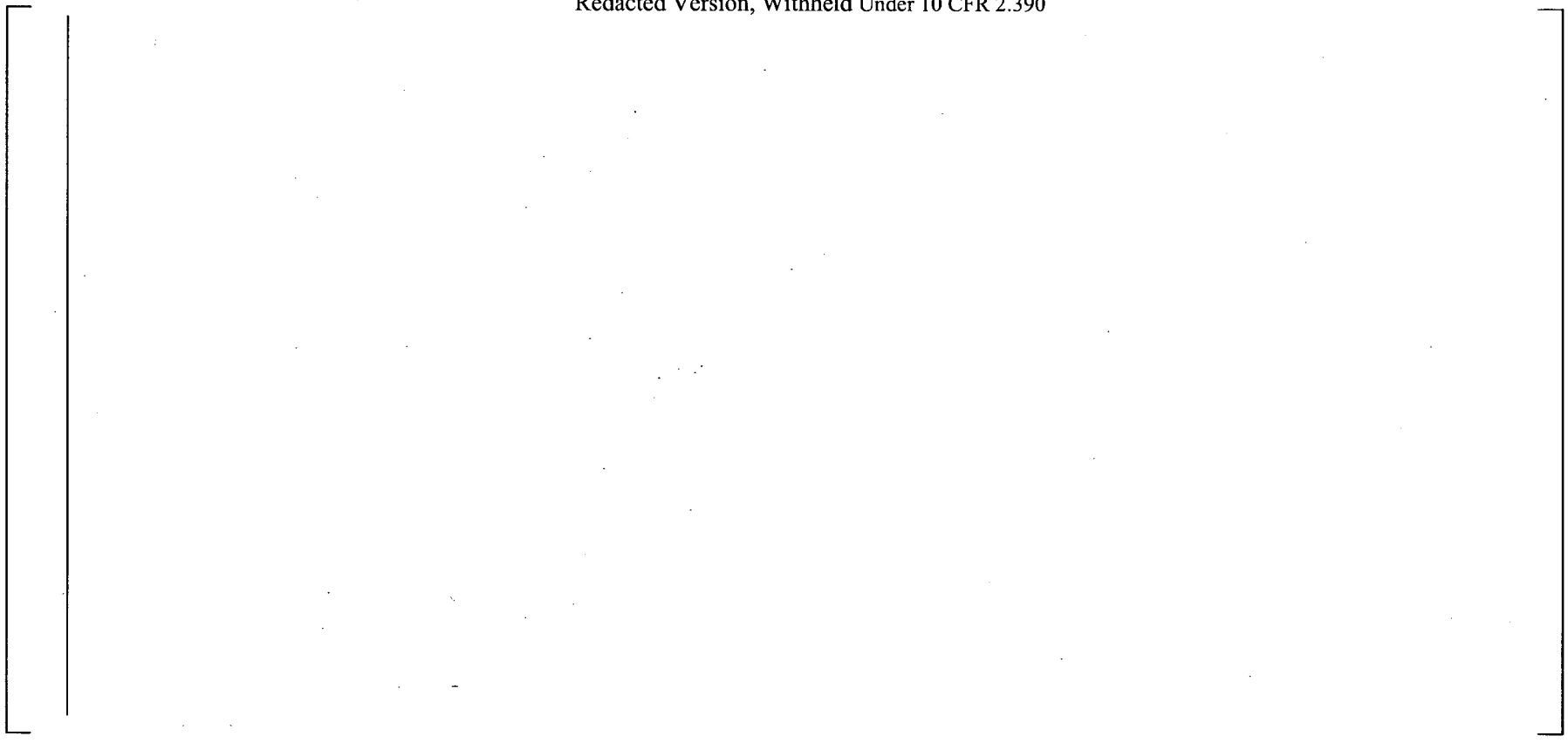

Figure 12.3-1 (Sheet 15 of 16)
Radiation Zones, Normal Operations/Shutdown
Turbine Building, Elevation 100′-0″

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Figure 12.3-1 (Sheet 16 of 16)
Radiation Zones, Normal Operations/Shutdown
Turbine Building, Elevation 117′-6″

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Figure 12.3-2 (Sheet 2 of 15)
Site Radiation Zones, Post-Accident

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Figure 12.3-2 (Sheet 15 of 15)
Radiation Zones, Post-Accident
Turbine Building, Elevation 100′-0″

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Figure 12.3-3 (Sheet 2 of 16)
Site Radiation Access Controls, Normal Operations/Shutdown

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Figure 12.3-3 (Sheet 15 of 16)
Radiological Access Controls, Normal Operations/Shutdown
Turbine Building, Elevation 100′-0″

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Figure 12.3-3 (Sheet 16 of 16)
Radiological Access Controls, Normal Operations/Shutdown
Turbine Building, Elevation 117′-6″