
REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

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

Docket No. 52-046

RAI No.: 116-8054
SRP Section: 14.03.08 – Inspections, Tests, Analyses, and Acceptance Criteria
Application Section: 14.03.08
Date of RAI Issue: 07/27/2015

Question No. 14.03.08-1

10 CFR 50, GDC 61, requires that the fuel storage and handling, radioactive waste, and other systems which may contain radioactivity shall be designed to assure adequate safety under normal and postulated accident conditions. These systems shall be designed (1) with a capability to permit appropriate periodic inspection and testing of components important to safety, (2) with suitable shielding for radiation protection, (3) with appropriate containment, confinement, and filtering systems, (4) with a residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat and other residual heat removal, and (5) to prevent significant reduction in fuel storage coolant inventory under accident conditions.

SRP Section 14.3 indicates that the purpose of inspections, tests, analysis, and acceptance criteria (ITAAC), is to verify that a facility referencing the design certification is built and operates in accordance with the design certification and applicable regulations.

In addition, SRP Section 14.3.8 indicates that the reviewer should ensure that Tier 1 identifies and describes, commensurate with their safety significance, those SSCs that provide radiation shielding, confinement or containment of radioactivity, ventilation of airborne contamination, or radiation (or radioactivity concentration) monitoring for normal operations and during accidents.

SRP Section 14.3.8 also indicates that the criteria in Tier 1 should ensure that the radiation shielding design (as provided by the plant structures or by permanent or temporary shielding included in the design) is adequate so that the maximum radiation levels in plant areas are commensurate with the areas' access requirements; that adequate shielding is provided for those plant areas that may require occupancy to permit an operator to aid in the mitigation of or the recovery from an accident; and that the contribution of gamma shine to the radiation dose to a member of the public (off site) will be a small fraction of the U.S. Environmental Protection Agency's dose limits in found at 40 CFR Part 190.

Tier 1, Table 2.8-2, "Radiation Protection ITAAC," item 1, is associated with radiation shielding. The acceptance criteria indicates that a report exists which verifies that radiation levels are within those levels specified in Tier 1, Table 2.8-1. Table 2.8-1 only provides the dose rate range for each zone designation and does not provide the specific zoning for any of the rooms in the plant. Therefore, there is no way for anyone to verify that this ITAAC has been completed during facility construction. In addition, Tier 1, Table 2.8-2, item 1, indicates that the plant will be built and then a report will be completed to determine that radiation zoning requirements are met. Therefore, Tier 1, Table 2.8-2, Item 1, is written as a design acceptance criteria (DAC), instead of an ITAAC. It is unclear why a DAC would be needed for radiation shielding when Tier 2 already provides minimum radiation shielding thicknesses for radiation sources large enough to require shielding.

Therefore, Tier 1, Table 2.8-2, item 1 is unacceptable. To provide appropriate ITAAC for radiation shielding, staff suggests the following:

1. The applicant should modify or replace Tier 1, Table 2.8-2, item 1 with an ITAAC to verify that minimum shielding requirements are met for significant radiation sources which require radiation shielding. Using this approach, Tier 1, Section 2.8 and item 1 in Table 2.8-2 should provide the shielding material for each room (for example, concrete) as well as the thickness of each shield, for significant sources which require shielding.
2. If shielding material other than concrete or steel is being relied upon for limiting radiation exposure to workers or members of the public, or for limiting exposure to equipment in the equipment qualification program, the applicant should discuss the material used in Tier 1 and Tier 2 of the application and include an ITAAC to verify that the shield material maintains its integrity during normal operation and accident conditions, as appropriate.
3. Provide figures of the general arrangement of the plant in Tier 1, which should also be referenced in the shielding ITAAC, making it clear what areas of the plant are being shielded and where the major radiation sources are located.
4. Finally, if any doors are required to provide radiation shielding from significant plant sources Tier 1 should discuss the radiation attenuation capabilities of those doors and ITAAC should be provided to verify the attenuation capabilities. The ITAAC should verify that the doors provide equal or greater attenuation than that of the wall to which they are installed.

Response – Rev. 1

1. KHNP will revise the ITAAC in Table 2.8-2, item 1 to reflect an inspection and analysis based on the type of construction material used for the shielding and the [thicknesses](#) of the floors and walls for rooms that contain significant radiation sources which require shielding.

[Tier 1 Table 2.2.1-1 will also be revised to indicate the specific thicknesses of floors and walls. The information on the design basis radiation shield thicknesses around the major cubicles and the other structure thicknesses will be added to Tier 1. In addition,](#)

new table will be added, Table 2.2.1-1a, which provides the shield thicknesses for the compound building and tanks located in the yard area.

2. Steel reinforced concrete is used for all shield walls and floors. The radwaste truck bay door is designed for shielding during waste handling. Please refer to item 4 below.
3. In addition to general arrangement drawings, other drawings such as radiation zone drawings, radiation shield barrier drawings, and concrete outline drawings are to be used for inspecting the thicknesses of the shield walls and floors. The radiation shield barrier drawings provides clear areas of the facility being shielded, and the minimum shield wall thicknesses are also indicated on the drawings. A paragraph will be added to the end of DCD Tier 1 Subsection 2.8.2 to reference the type of drawings and construction reports (for verification of concrete densities and reinforced steel bars) for inspection and analysis.

Due to the large number of drawings that will be used for the shielding inspections, only the types of drawings are noted in the DCD Tier 1 subsection.

4. The compound building truck bay door is designed to provide shielding during waste loading and unloading operations. The truck bay door will be inspected against the technical specifications for its attenuation capability through the comparison to its manufacturer's test report. An ITAAC will be added to Table 2.8-2 for the compound building truck bay door.

Impact on DCD

DCD Tier 1, Subsections 2.8.1, 2.8.2, [Table 2.2.1-1](#), and Table 2.8-2 will be revised and [Table 2.2.1-1a will be added](#) as indicated in the Attachment.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

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

2.8 Radiation Protection2.8.1 Design Description

Radiation protection design features in the APR1400 provide the limitation of radiation exposures to plant personnel and to the public complying with the NRC RG and as low as reasonably achievable (ALARA) principles.

The design commitments for radiation protection are as follows:

1. Shielding design of rooms, corridors, cubicles, labyrinth access, and operating areas is commensurate with ~~their access requirement and radiation levels for walls surrounding very high radiation areas and significantly high radiation areas.~~
2. Ventilation systems for the radiological controlled areas are designed to keep the radiation exposure below the limits specified in 10 CFR Part 20, Appendix B.
3. Area and airborne radioactivity monitoring systems are located in the plant areas where personnel access can be restricted by the airborne contamination.
4. Radiation shielding design is provided to protect the operators so that they could take actions to mitigate or recover from the design basis accidents.

the minimum shielding requirements for significant radiation sources which require shielding

Delete

2.8.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.8-2 provides the inspections, tests, analyses and associated acceptance criteria, which will be undertaken for radiation protection.

5. Compound building truck bay door is provided for radiation shielding during waste loading and unloading operations.

The following drawing types are to be used for inspection and analysis of as-built shield walls and floors as applicable :

- General arrangement drawings
- Radiation zone drawings
- Radiation shield barrier drawings
- Concrete outline drawings
- Construction reports

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Table 2.8-2

Radiation Protection ITAAC

the minimum shielding requirements for significant radiation sources which require shielding

materials of construction and the thickness of all shield walls and floors are as-built for confirmation of the

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. Shielding design of rooms, corridors, cubicles, labyrinth access, and operating areas is commensurate with their access requirement and radiation levels for walls surrounding very high radiation areas and significantly high radiation areas.	1. Inspections and analysis based upon the as-built shielding structure will be conducted to verify the adequacy of the shielding design in plant area.	1. A report exists and concludes that maximum radiation levels are less than or equal to the radiation levels in the radiation zones specified in Table 2.8-1.
2. Ventilation systems for the radiological controlled areas are designed to keep the radioactivity concentration below the limits specified in 10 CFR Part 20, Appendix B.	2. Analysis will be performed to predict radioactivity concentrations and to control ventilation by considering flow rates and equipment leakages in the plant areas during normal operations.	2. Analysis exists and concludes that ventilation the lower concentrations of airborne radionuclides are in the limit specified in 10 CFR Part 20, Appendix B.
3. Area and airborne radioactivity monitoring systems are located in the plant areas where personnel access can be restricted by the airborne contamination.	3. Refer to Table 2.7.6.4-3 ITAAC # 1 and Table 2.7.6.5-3 ITAAC # 1.	3. Refer to Table 2.7.6.4-3 ITAAC # 1 and Table 2.7.6.5-3 ITAAC # 1.
4. Radiation shielding design is provided to protect the operators so that they could take actions to mitigate or recover from the design basis accidents.	4. Analysis will be performed to predict maximum radiation exposure to the operators during the design basis accidents.	4. A report exists and concludes that maximum radiation exposure dose to operators is less than the limits specified in GDC 19.

in accordance with the shield barrier drawings

the shielding materials and the thicknesses of walls and floors are as-built for the shielding of all radiation areas

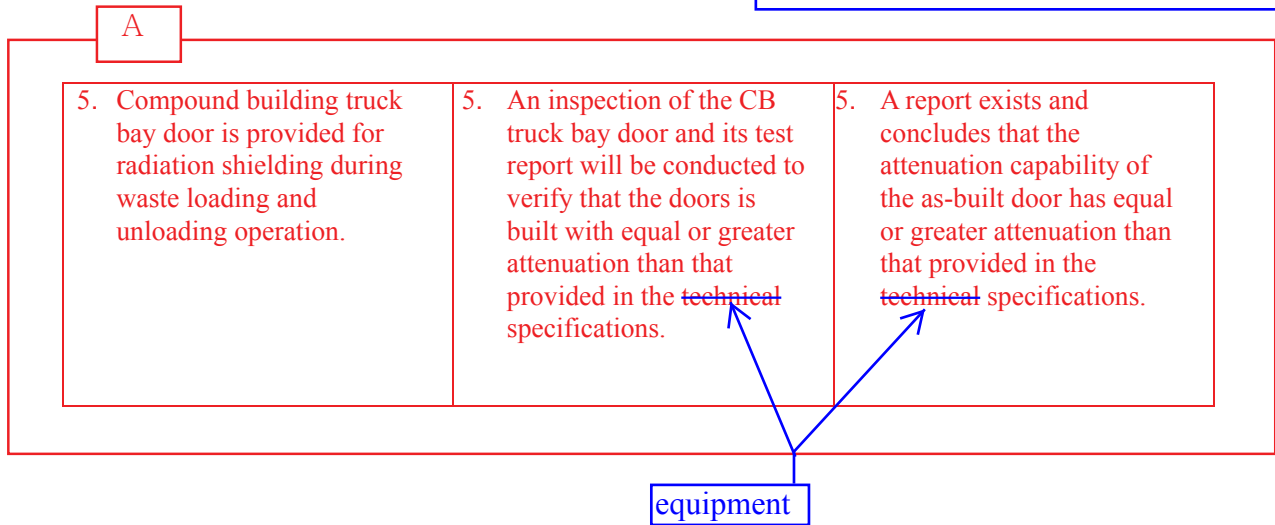
of

thicknesses

Add "A" after this table

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APR1400 DCD TIER 1

Table 2.2.1-1 (7 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness ⁽¹⁾	Applicable Radiation Shielding Wall (Yes/No)
Column Line AA Wall	From 12 to 17 From 20 to 26	From 55'-0" to 156'-0"	4'-0"	Yes
Column Line AA Wall	From 17 to 20	From 55'-0" to 175'-0"	5'-0"	Yes
Column Line AB Wall	From 12 to 15	From 55'-0" to 100'-0"	3'-0"	Yes
Column Line AB Wall	From 15 to 22	From 55'-0" to 137'-6"	4'-0"	Yes
Column Line AB Wall	From 23 to 26	From 55'-0" to 137'-6"	3'-0"	Yes
Column Line AB Wall	From 22 to 23	From 78'-0" to 156'-0"	3'-6"/3'-0"	Yes
Column Line AB Wall	From 12 to 18	From 137'-6" to 156'-0"	4'-0"	No
Column Line AB Wall	From 12 to 17	From 156'-0" to 195'-0"	3'-0"	Yes
Column Line AB Wall	From 20 to 22	From 137'-6" to 156'-0"	3'-6"	Yes
Column Line AB Wall	From 20 to 22	From 156'-0" to 180'-0"	3'-0"	Yes
Column Line AC Wall	From 12 to 14	From 55'-0" to 100'-0"	2'-6"	Yes
Column Line AC Wall	From 15 to 26	From 55'-0" to 68'-0"	4'-0"	Yes
Column Line AC Wall	From 15 to 23	From 68'-0" to 137'-6"	4'-0"	Yes
Column Line AC Wall	From 23 to 26	From 100'-0" to 156'-0"	3'-0"	Yes
Column Line AC Wall	From 12 to 14	From 137'-6" to 156'-0"	2'-6"	No
Column Line AC Wall	From 15 to 18	From 137'-6" to 156'-0"	4'-0"	No
Column Line AC Wall	From 20 to 22	From 137'-6" to 169'-6"	3'-0"	Yes
Column Line AC Wall	From 24 to 26	From 137'-6" to 156'-0"	3'-0"	No
Column Line AC Wall	From 15 to 17	From 156'-0" to 195'-0"	3'-0"	No



Column Line AB Wall From 22 to 26 From 156'-0" to 174'-0" 2'-0" Yes

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Table 2.2.1-1 (10 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness ⁽¹⁾	Applicable Radiation Shielding Wall (Yes/No)
Column Line AK Wall	From 12 to 17 From 20 to 26	From 55'-0" to 156'-0" From 55'-0" to 174'-0"	4'-0"	Yes
Column Line AK Wall	From 17 to 20	From 55'-0" to 175'-0"	5'-0"	Yes
Column Line AK Wall	From 20 to 23	From 174'-0" to 216'-9"	3'-0"	Yes
Column Line AK Wall	From 23 to 26	From 174'-0" to 213'-6"	4'-0"	Yes
Floors	Not Applicable	68'-0"	Variable From 2'-0" to 2'-6"	Yes
Floors	Not Applicable	78'-0"	Variable From 1'-6" to 3'-3"	Yes
Floors	Not Applicable	100'-0"	Variable From 1'-6" to 4'-0"	Yes
Floors	Not Applicable	120'-0"	Variable From 1'-6" to 6'-1"	Yes
Floors	Not Applicable	137'-6"	Variable From 1'-6" to 4'-6"	Yes
Floors	Not Applicable	156'-0"	Variable From 1'-0" to 3'-0"	Yes
Floors	Not Applicable	174'-0"	Variable From 1'-0" to 1'-6"	Yes
Floors	Not Applicable	From 195'-0" to 216'-9"	Variable From 1'-6" to 2'-9"	Yes

- (1) Tolerance for the thickness of the walls and slabs is -1/4 inch and + 1 inch.
- (2) Reduction of the basemat thickness is less than - 5 % of specified thickness.

Add table contents for the AB floors as indicated in "A"

Add new table "Table 2.2.1-1a" as shown in "B" following Table 2.2.1-1.

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Wall located between Column Lines	From AB to AE From 23 to 24	From 68'-0" to 78'-0"	3'-0"	Yes
Wall located between Column Lines	From AB to AD From 24 to 25	From 68'-0" to 78'-0"	3'-0"	Yes
Wall located between Column Lines	From AA to AB From 24 to 25	From 77'-0" to 100'-0"	3'-6"	Yes
Wall located between Column Lines	From AD to AE From 25 to 26	From 78'-0" to 100'-0"	3'-0"	Yes
Wall located between Column Lines	From AD to AE From 24 to 25	From 78'-0" to 100'-0"	2'-0"	Yes
Wall located between Column Lines	From AC to AD From 23 to 24	From 86'-0" to 100'-0"	3'-0"	Yes
Wall located between Column Lines	From AG to AI From 21 to 22	From 100'-0" to 120'-0"	3'-0"	Yes
Wall located between Column Lines	From AA to AB From 20 to 22	From 156'-0" to 174'-0"	2'-0"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AJ to AK From 25 to 26	68'-0"	1'-6"	Yes
Floors	From AI to AJ From 23 to 26	68'-0"	2'-0", 2'-6"	Yes
Floors	From AF to AI From 23 to 26	68'-0"	2'-0", 2'-6"	Yes
Floors	From AE to AF From 23 to 25	68'-0"	2'-0"	Yes
Floors	From AD to AE From 23 to 25	68'-0"	2'-0", 2'-6"	Yes
Floors	From AE to AF From 25 to 26	68'-0"	2'-0", 2'-6"	Yes
Floors	From AB to AD From 23 to 24	68'-0"	2'-6"	Yes
Floors	From AD to AE From 25 to 26	68'-0"	2'-0", 2'-6"	Yes
Floors	From AA to AD From 24 to 26	68'-0"	2'-4", 2'-6"	Yes
Floors	From AB to AD From 24 to 25	77'-0"	2'-0", 2'-6", 3'-3"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AK to Above AK From 15 TO 19	78'-0"	1'-6"	Yes
Floors	From AJ to AK From 13 to 15	78'-0"	2'-6"	Yes
Floors	From AH to AJ From 15 to 19	78'-0"	2'-6"	Yes
Floors	From AB to AJ From 23 to 26	78'-0"	2'-0"	Yes
Floors	From AA to AB From 25 to 26	78'-0"	2'-0"	Yes
Floors	From AA to AB From 24 to 25	78'-0"	2'-6", 3'-0"	Yes
Floors	From AA to AB From 23 to 24	78'-0"	2'-6"	Yes
Floors	From AE to AG From 22 to 23	78'-0"	2'-0"	Yes
Floors	From AG to AI From 20 to 23	78'-0"	3'-0"	Yes
Floors	From AC to AE From 20 to 23	78'-0"	3'-0"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AI to AJ From 19 to 22	78'-0"	2'-6"	Yes
Floors	From AB to AC From 19 to 22	78'-0"	2'-6"	Yes
Floors	From AB to AD From 15 to 19	78'-0"	2'-6"	Yes
Floors	From Below AA to AA From 15 to 19	78'-0"	1'-6"	Yes
Floors	From AA to AB From 13 to 15	78'-0"	2'-6"	Yes
Floors	From AJ to AK From 23 to 26	78'-0"	2'-6"	Yes
Floors	From AJ to AK From 14 to 15	78'-0"	2'-6"	No
Floors	From AJ to AK From 22 to 23	78'-0"	2'-6"	No
Floors	From AJ to AK From 12 to 13	78'-0"	1'-6"	No
Floors	From AJ to Ak From 15 to 22	78'-0"	1'-6"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AB to AJ From 12 to 15	78'-0"	1'-6"	No
Floors	From AE to AG From 15 to 17	78'-0"	1'-6"	No
Floors	From AA to AB From 12 to 13	78'-0"	1'-6"	No
Floors	From AA to AB From 14 to 15	78'-0"	2'-6"	No
Floors	From AA to AB From 15 to 16	78'-0"	1'-6", 2'-6"	No
Floors	From AA to AB From 16 to 22	78'-0"	1'-6"	No
Floors	From AA to AB From 22 to 23	78'-0"	2'-6"	No
Floors	From AB to AC From 22 to 23	78'-0"	1'-6"	No
Floors	From AB to AD From 24 to 26	86'-0"	2'-0", 3'-3"	Yes
Floors	From AH to AI From 17 to 19	100'-0"	2'-0"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AC to AD From 17 to 19	100'-0"	2'-0"	Yes
Floors	From AE to AF From 22 to 23	100'-0"	2'-0"	Yes
Floors	From AJ to AK From 24 to 26	100'-0"	2'-0"	Yes
Floors	From AC to AD From 24 to 26	100'-0"	2'-0"	Yes
Floors	From AD to AE From 24 to 25	100'-0"	4'-0"	Yes
Floors	From AG to AI From 21 to 23	100'-0"	3'-0"	Yes
Floors	From AD to AJ From 25 to 26	100'-0"	2'-0"	Yes
Floors	From AC to AE From 21 to 23	100'-0"	3'-0"	Yes
Floors	From AE to AF From 24 to 25	100'-0"	3'-0"	Yes
Floors	From AH to AI From 23 to 25	100'-0"	2'-0"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AI to AJ From 23 to 25	100'-0"	3'-6"	Yes
Floors	From AG to AH From 21 to 23	100'-0"	3'-0"	Yes
Floors	From AE to AF From 24 to 25	100'-0"	3'-0"	Yes
Floors	From AH to AK From 12 to 13	100'-0"	2'-0"	No
Floors	From AH to AK From 14 to 15	100'-0"	2'-0"	No
Floors	From AJ to AK From 15 to 24	100'-0"	2'-0"	No
Floors	From AI to AJ From 21 to 23	100'-0"	2'-0"	No
Floors	From AG to AI From 15 to 17	100'-0"	2'-0"	No
Floors	From AH to AI From 19 to 20	100'-0"	2'-0"	No
Floors	From AD to AH From 12 to 15	100'-0"	2'-0"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AA to AD From 12 to 13	100'-0"	2'-0"	No
Floors	From AA to AD From 14 to 15	100'-0"	2'-0"	No
Floors	From AC to AE From 15 to 17	100'-0"	2'-0"	No
Floors	From AA to AB From 15 to 23	100'-0"	2'-0"	No
Floors	From AC to AD From 19 to 20	100'-0"	2'-0"	No
Floors	From AB to AC From 21 to 22	100'-0"	2'-0"	No
Floors	From AA to AF From 23 to 24	100'-0"	2'-0"	No
Floors	From AA to AC From 24 to 26	100'-0"	2'-0"	No
Floors	From AI to AJ From 23 to 24	100'-0"	3'-6"	No
Floors	From AH to AK From 13 to 14	100'-0"	4'-0"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AA to AD From 13 to 14	100'-0"	4'-0"	No
Floors	From AI to AJ From 15 to 21	100'-0"	4'-0"	No
Floors	From AB to AC From 15 to 21	100'-0"	4'-0"	No
Floors	From AH to AI From 20 to 22	100'-0"	2'-6"	No
Floors	From AG to AI From 22 to 23	100'-0"	2'-6"	No
Floors	From AC to AD From 20 to 22	100'-0"	2'-6"	No
Floors	From AF to AG From 22.4 to 24	113'-0", 114'-6"	5'-4"	Yes
Floors	From AG to AH From 23 to 25	114'-0"	6'-1"	Yes
Floors	From AD to AE From 25 to 26	117'-0"	1'-6"	Yes
Floors	From AF to AG From 24 to 25	118'-5"	4'-6"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AH to AI From 17 to 19	120'-0"	1'-6"	Yes
Floors	From AC to AD From 17 to 19	120'-0"	1'-6"	Yes
Floors	From AE to AF From 25 to 26	120'-0"	1'-6"	Yes
Floors	From AB to AC From 21 to 22	120'-0"	2'-0"	Yes
Floors	From AC to AD From 22 to 23	120'-0"	1'-6"	Yes
Floors	From AD to AF From 21 to 23	120'-0"	1'-6"	Yes
Floors	From AG to AK From 25 to 26	120'-0"	1'-6"	Yes
Floors	From AH to AJ From 12 to 13	120'-0"	1'-6"	No
Floors	From AH to AK From 14 to 15	120'-0"	1'-6"	No
Floors	From AJ to AK From 19 to 25	120'-0"	1'-6"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AG to AI From 15 to 17	120'-0"	1'-6"	No
Floors	From AH to AI From 21 to 22	120'-0"	1'-6"	No
Floors	From AD to AH From 12 to 15	120'-0"	1'-6"	No
Floors	From AC to AE From 15 to 17	120'-0"	1'-6"	No
Floors	From AB to AD From 12 to 13	120'-0"	1'-6"	No
Floors	From AA to AD From 14 to 15	120'-0"	1'-6"	No
Floors	From AA to AB From 18 to 23	120'-0"	1'-6"	No
Floors	From AA to AD From 23 to 26	120'-0"	1'-6"	No
Floors	From AD to AF From 23 to 24	120'-0"	1'-6"	No
Floors	From AE to AF From 24 to 25	120'-0"	1'-6"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AJ to AK From 15 to 19	120'-0"	2'-6"	No
Floors	From AA to AB From 15 to 19	120'-0"	2'-6"	No
Floors	From AB to AC From 20 to 21	137'-6"	4'-0"	Yes
Floors	From AH to AI From 22 to 23	137'-6"	2'-3"	Yes
Floors	From AA to AE From 23 to 26	137'-6"	1'-6", 4'-6"	Yes
Floors	From AD to AF From 22 to 23	137'-6"	2'-0"	Yes
Floors	From AA to AE From 23 to 26	137'-6"	1'-6", 4'-6"	Yes
Floors	From AD to AF From 22 to 23	137'-6"	2'-0"	Yes
Floors	From AG to AH From 22 to 23	137'-6"	2'-6"	Yes
Floors	From AC to AD From 18 to 20	137'-6"	1'-6"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AH to AI From 18 to 20	137'-6"	1'-6"	Yes
Floors	From AG to AK From 24 to 26	137'-6"	1'-6"	Yes
Floors	From AC to AD From 22 to 23	137'-6"	2'-0"	Yes
Floors	From AB to AJ From 12 to 15	137'-6"	1'-6"	No
Floors	From AG to AI From 15 to 17	137'-6"	1'-6"	No
Floors	From AC to AE From 15 to 17	137'-6"	1'-6"	No
Floors	From AA to AB From 20 to 23	137'-6"	1'-6"	No
Floors	From AE to AF From 25 to 26	137'-6"	1'-6"	No
Floors	From AH to AJ From 21 to 22	137'-6"	1'-6"	No
Floors	From AJ to AK From 20 to 23	137'-6"	1'-6"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AJ to AK From 12 to 20	137'-6"	4'-0"	No
Floors	From AI to AJ From 17 to 21	137'-6"	4'-0"	No
Floors	From AA to AB From 12 to 20	137'-6"	4'-0"	No
Floors	From AB to AC From 17 to 20	137'-6"	4'-0"	No
Floors	From AI to AJ From 15 to 17	137'-6"	2'-0"	No
Floors	From AB to AC From 15 to 17	137'-6"	2'-0"	No
Floors	From AE to AF From 23 to 26	154'-6"	3'-0"	Yes
Floors	From AA to AB From 20 to 21	156'-0"	1'-6", 2'-0"	Yes
Floors	From AA to AB From 21 to 25	156'-0"	2'-0"	Yes
Floors	From AB to AI From 12 to 15	156'-0"	1'-6"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AI to AK From 20 to 21	156'-0"	1'-6"	Yes
Floors	From AJ to AK From 21 to 22	156'-0"	1'-6"	Yes
Floors	From AI to AJ From 12 to 15	156'-0"	1'-6"	No
Floors	From AG to AJ From 15 to 17	156'-0"	1'-6"	No
Floors	From AJ to AK From 22 to 26	156'-0"	1'-6"	No
Floors	From AG to AJ From 21 to 23	156'-0"	1'-6"	No
Floors	From AG to AI From 24 to 26	156'-0"	1'-6"	No
Floors	From AI to AJ From 25 to 26	156'-0"	1'-6"	No
Floors	From AI to AJ From 23 to 25	156'-0"	1'-6", 2'-0", 4'-0"	No
Floors	From AB to AD From 14 to 15	156'-0"	1'-6"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AB to AE From 15 to 17	156'-0"	1'-6"	No
Floors	From AA to AB From 21 to 26	156'-0"	1'-6"	No
Floors	From AB to AD From 22 to 26	156'-0"	1'-6"	No
Floors	From AD to AE From 24 to 26	156'-0"	3'-0"	No
Floors	From AB to AC From 20 to 22	169'-6"	1'-6"	Yes
Floors	From AC to AI From 12 to 15	174'-0"	1'-6"	Yes
Floors	From AI to AK From 20 to 23	174'-0"	1'-6"	Yes
Floors	From AA to AB From 21 to 26	174'-0"	1'-6"	Yes
Floors	From AI to AJ From 12 to 15	174'-0"	1'-6"	No
Floors	From AG to AJ From 15 to 18	174'-0"	1'-6"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AJ to AK From 17 to 18	174'-0"	1'-6"	No
Floors	From AH to AK From 18 to 20	174'-0"	1'-6"	No
Floors	From AG to AI From 21 to 23	174'-0"	1'-6"	No
Floors	From AB to AC From 12 to 15	174'-0"	1'-6"	No
Floors	From AB to AE From 15 to 17	174'-0"	1'-6"	No
Floors	From AA to AD From 17 to 20	174'-0"	1'-6"	No
Floors	From AA to AB From 20 to 25	174'-0"	2'-0"	No
Floors	From AB to AC From 22 to 23	180'-0"	1'-6"	Yes
Floors	From AI to AK From 20 to 22	195'-0"	1'-6"	Yes
Floors	From AJ to AK From 22 to 23	195'-0"	1'-6"	Yes

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AI to AJ From 13 to 15	195'-0"	1'-6"	No
Floors	From AH to AJ From 16 to 18	195'-0"	1'-6"	No
Floors	From AJ to AK From 17 to 18	195'-0"	1'-6"	No
Floors	From AH to AI From 13 to 14	195'-0"	1'-6"	No
Floors	From AG to AI From 20 to 23	195'-0"	1'-6"	No
Floors	From AD to AH From 12 to 14	195'-0"	1'-6"	No
Floors	From AB to AD From 13 to 14	195'-0"	1'-6"	No
Floors	From AB to AC From 14 to 15	195'-0"	1'-6"	No
Floors	From AA to AB From 17 to 18	195'-0"	1'-6"	No
Floors	From AB to AD From 16 to 18	195'-0"	1'-6"	No

A

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AI to AJ From 12 to 13	195'-0"	2'-9"	No
Floors	From AB to AC From 12 to 13	195'-0"	2'-9"	No
Floors	From AC to AD From 12 to 13	195'-0"	1'-6",2'-9"	No
Floors	From AH to AI From 12 to 13	195'-0"	1'-6",2'-9"	No
Floors	From AH to AJ From 15 to 16	213'-0"	1'-6"	No
Floors	From AC to AI From 14 to 15	213'-0"	1'-6"	No
Floors	From AB to AD From 15 to 16	213'-0"	1'-6"	No
Floors	From AI to AK From 20 to 22	215'-0"	2'-0"	Yes
Floors	From AF to AK From 23 to 26	215'-0"	1'-6"	Yes
Floors	From AI to AJ From 22 to 23	226'-6"	1'-6"	Yes

B

Table 2.2.1-1a (1 of 2)

Design Basis Radiation Shield Thicknesses of Compound Building and Yard Area

Room Number	Room Name	Minimum Required Shield Thickness (inches)					
		North	South	East	West	Floor	Ceiling
Compound Building							
063-P01	Hot Pipe Chase	10	28	28	10	Ground	17
063-P02	GRS Header Drain Tank Room	35	40	48	36	Ground	18
063-P03	Valve Room	27	30	37	10	Ground	10
063-P04	GRS Inlet Skid Room	21	32	10	21	Ground	13
063-P05	Spent Resin Long-term Storage Tank Room	27	35	48	36	Ground	46
063-P06	Future Use	36	27	48	36	Ground	39
063-P07	Valve Room	16	29	36	30	Ground	14
063-P08	Low-activity Spent Resin Tank Room	27	32	35	10	Ground	10
063-P09	Valve Room	16	36	10	16	Ground	18
063-P13	Hot Pipe Chase	40	33	40	33	Ground	19
063-P23	Equip. Waste Tank Room	13	33	20	22	Ground	27
063-P24	Equip. Waste Tank Room	16	13	21	22	Ground	27
063-P28	Floor Drain Tank Room	16	16	19	20	Ground	29
063-P29	Floor Drain Tank Room	16	16	19	20	Ground	29
063-P30	Chemical Waste Tank Room	10	16	15	10	Ground	15
063-P31	Chemical Waste Tank Room	10	10	15	10	Ground	15
063-P37	Monitor Tank Room	10	18	11	18	Ground	10
063-P38	PSS-Solidification & Drum Conveyer Room	17	24	24	21	Ground	14
063-P39	Spent Resin Long-term Storage Tank Sump Pump Room	18	20	18	21	Ground	18
063-P41	Concentrate Holding Tank Room	21	27	33	28	Ground	10
063-P44	IX Feed Tank Room	14	16	11	10	Ground	23
063-P47	CTS HEPA Vacuum Skid Room	24	10	21	10	Ground	10
063-P48	CTS Dryer Skid Room	31	24	17	21	Ground	15
063-P49	CTS Vacuum Skid Room	10	10	21	10	Ground	18
063-P54	Monitor Tank Pump Room	10	10	10	10	Ground	14

B

Table 2.2.1-1a (2 of 2)

Room Number	Room Name	Minimum Required Shield Thickness (inches)					
		North	South	East	West	Floor	Ceiling
Compound Building (Cont.)							
063-P73	Future Use	36	43	18	48	Ground	36
085-P01	Waste Gas Dryer Skid Room	17	25	25	19	17	22
085-P02	Waste Gas Dryer Skid Room	11	17	10	19	17	22
085-P03	Valve Room	48	11	30	26	18	36
085-P04	Charcoal Guard Bed Room	26	26	34	18	10	23
085-P06	Valve Room	19	26	36	30	19	27
085-P08	Valve Room	24	19	22	24	19	24
085-P17	Valve Room	10	10	10	14	10	17
085-P20	Valve Room	16	16	16	16	10	16
085-P21	Charcoal Guard Bed Room	26	26	18	34	10	23
085-P42	IX Module Room	10	30	30	27	14	28
085-P43	IX Module Room	30	10	30	30	14	28
085-P44	RO Feed Tank Room	10	27	32	22	19	25
085-P46	MF Membrane Module Room	23	10	20	15	18	16
085-P47	MF Membrane Module Room	23	16	10	12	15	16
085-P48	RO Membrane Module and Valve Skid Room	43	24	43	34	32	36
096-P01	Charcoal Delay Bed Room	22	19	21	14	28	17
096-P02	Charcoal Delay Bed Room	47	44	14	38	36	42
100-P08	Truck Bay	24	24	36	37	36	31
100-P09	Waste Drum Storage Area	28	24	36	26	34	31
100-P10	Spent Filter Drum Storage Area	36	28	48	37	36	43
Yard Area							
-	Boric Acid Storage Tank	16				Ground	-
-	Holdup Tank	14.75				Ground	-