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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002976

July 20, 2010

Subject: AP1000 Response to Request for Additional Information

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section TR54. This RAI response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in this response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following RAI(s):

RAI-TR54-015 R3
RAI-TR54-026 R2

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 Strategy

/Enclosure

1. Response to Request for Additional Information on SRP Section TR54

D063
NRO

cc:	D. Jaffe	-	U.S. NRC	1E
	E. McKenna	-	U.S. NRC	1E
	P. Buckberg	-	U.S. NRC	1E
	T. Spink	-	TVA	1E
	P. Hastings	-	Duke Power	1E
	R. Kitchen	-	Progress Energy	1E
	A. Monroe	-	SCANA	1E
	P. Jacobs	-	Florida Power & Light	1E
	C. Pierce	-	Southern Company	1E
	E. Schmiech	-	Westinghouse	1E
	G. Zinke	-	NuStart/Entergy	1E
	R. Grumbir	-	NuStart	1E
	S. Altmayer	-	Westinghouse	1E

ENCLOSURE 1

Response to Request for Additional Information on SRP Section TR54

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-TR54-026
Revision: 2

Question:

(Revision 0) What are the gaps and tolerances for each of the gaps between the fuel to cell wall, rack to rack, and rack to wall? What are the assumed initial locations of the various components (fuel assemblies and each rack) and what is the technical basis for this assumption. Were any studies done for different initial conditions (considering tolerances); if not, explain why. What requirements are in the DCD to ensure that the assumed gaps (considering tolerances) will always be maintained throughout the licensing period?

(Revision 1 – noted from Revision 1 response below) *During the August 6-7, 2009 meeting with the NRC a new question was raised about the tool storage area*

New Question: (Revision 2)

During the June 2010 audit, the NRC requested that dimension and gap information for the spent fuel racks be clarified between the two similar RAIs (RAI-TR54-15, RAI-TR54-026) to show consistency and alignment to the current design basis shown in DCD Figure 9.1-2, 9.1-3, and 9.1-4.

Westinghouse Response:

(Revision 0) (Superseded by Revision 2)

~~All gaps between fuel assemblies and cell walls, between racks, and between racks and pool walls are set to match the nominal gaps provided on the Westinghouse Drawing APP-FS02-V2-002 Revision 0 "Discrete Zone Two Region Spent Fuel Rack Pool Layout. The following table summarizes the gap information used in the dynamic analyses.~~

	~~Fuel to Cell Wall~~	~~Rack to Rack~~	~~Rack to Wall~~
~~Nominal Gap (inch)~~	~~(8.8"-8.1")/2 = 0.35"~~	~~1" or 1.25"~~	~~North – 3.2"~~ ~~East – 2.75"~~ ~~South – 2.7"~~ ~~West – 3.2"~~

~~Fuel is assumed centrally located in cell. This is conservative since minimizing gap on one or two walls will generally produce a larger hydrodynamic coupling effect.~~

~~Numerical studies were done on other Holtec rack projects; the results generally showed a small influence on results. A larger influence occurs if the gaps are assumed to be displacement dependent, rather than always being held constant at their initial value. The neglect of this effect is conservative.~~

~~Once racks are installed, the "as-built" gaps are reconciled with the gaps initially used for analysis by evaluation of the numerical results and the predicted motions. Once the "as-builts" are accepted by evaluation of the current results, the only way the gaps would change over time would be by the action of a seismic event. Combined License applicants will have a procedure in place to address measurement of the post design-basis seismic event gaps, and to evaluate the acceptability of the configuration showing it is acceptable, or to take appropriate corrective actions. A statement will be added to both the Technical Report and DCD addressing the design-basis seismic event potential change in gaps between the spent fuel racks.~~

Response: (Revision 1) ***(Superseded by Revision 2B)***

~~During the August 6-7, 2009 meeting with the NRC it was identified that spent fuel rack A1 is shown to slide into the area of the spent fuel pool designated as the "Tool Storage Area". To eliminate this from happening, the Tool Storage Area has been resized from 34 inches wide with a 3.2 inch gap from the tool storage area to rack A1, to 33 inches wide with a 4.2 inch gap. This increase in gap size precludes rack A1 from entering the tool storage area as the result of a seismic event.~~

~~The DCD and TR Revision sections below have been updated accordingly to reflect this change.~~

Response: (Revision 2)

The figures and related discussion included in the previous revisions of this RAI response are out dated and superseded (due to design changes that strengthened the racks) as follows:

- The current versions of DCD Figures 9.1-2 (both sheets) and 9.1-3 (both sheets) were included in the response to RAI-SRP9.1.2-SEB1-06 (Letter DCP_NRC_002690, issued 11/11/09).
- The current version of DCD Figure 9.1-4 is included as part of design change proposal (DCP 1185 dated 12/18/09).

The basis of the latest versions of DCD Figures 9.1-2 (both sheets), 9.1-3 (both sheets), and Figure 9.1-4 were included in APP-GW-GLR-033 (Revision 3, November 2009) and are retained in TR54 (Reference 1).

Additionally, the fuel-to-cell wall gap has been recalculated as follows:

- Maximum (nominal) fuel-to-cell wall gap: (8.8"-8.404")/2 = 0.198".
- Minimum (nominal) fuel-to-cell wall gap: (8.8"-8.426)/2 = 0.187".

Reference:

1. APP-GW-GLR-033, Revision 4, May 2010, "Spent Fuel Storage Rack Structural/Seismic Analysis," (Technical Report Number 54, TR54)

Design Control Document (DCD) Revision:

DCD Changes: (Revision 0 and 1) ***(Superseded by Revision 2)***

~~(The Revision 0 response was incorporated into DCD R17.)~~

~~DCD Changes: The markup of DCD Rev. 17 Figure 9.1-4 below shows the modification in the tool storage area size.~~

DCD Changes: (Revision 2)

None.

PRA Revision:
None.

Technical Report (TR) Revision:

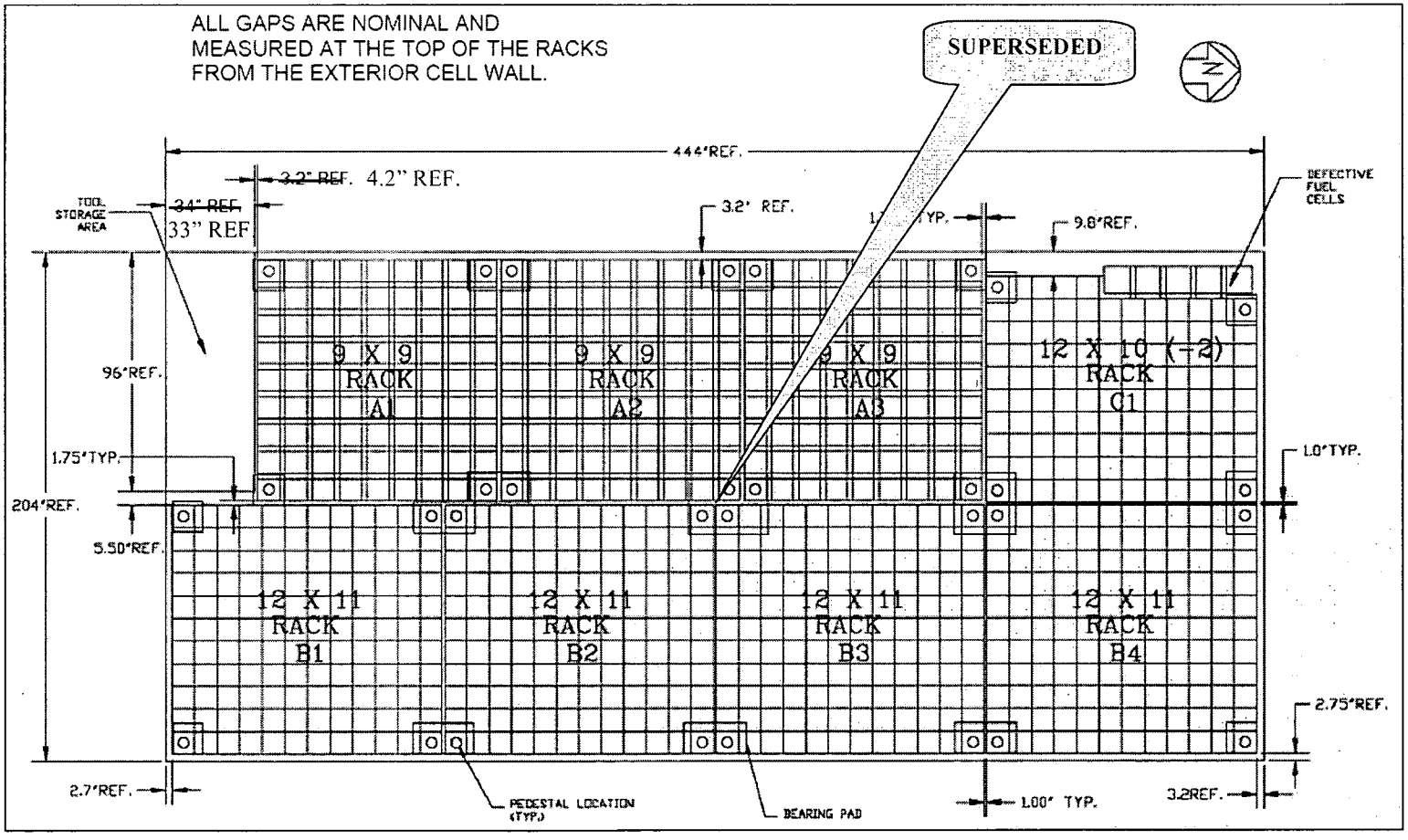
TR Changes: (Revision 0, 1) ***(Superseded by Revision 2)***

~~(The Revision 0 response was incorporated into APP-GW-GLR-033 R1)~~
~~The markup of TR-54 Rev. 2 and Figure 2-1 below shows the modification in the tool storage area size.~~

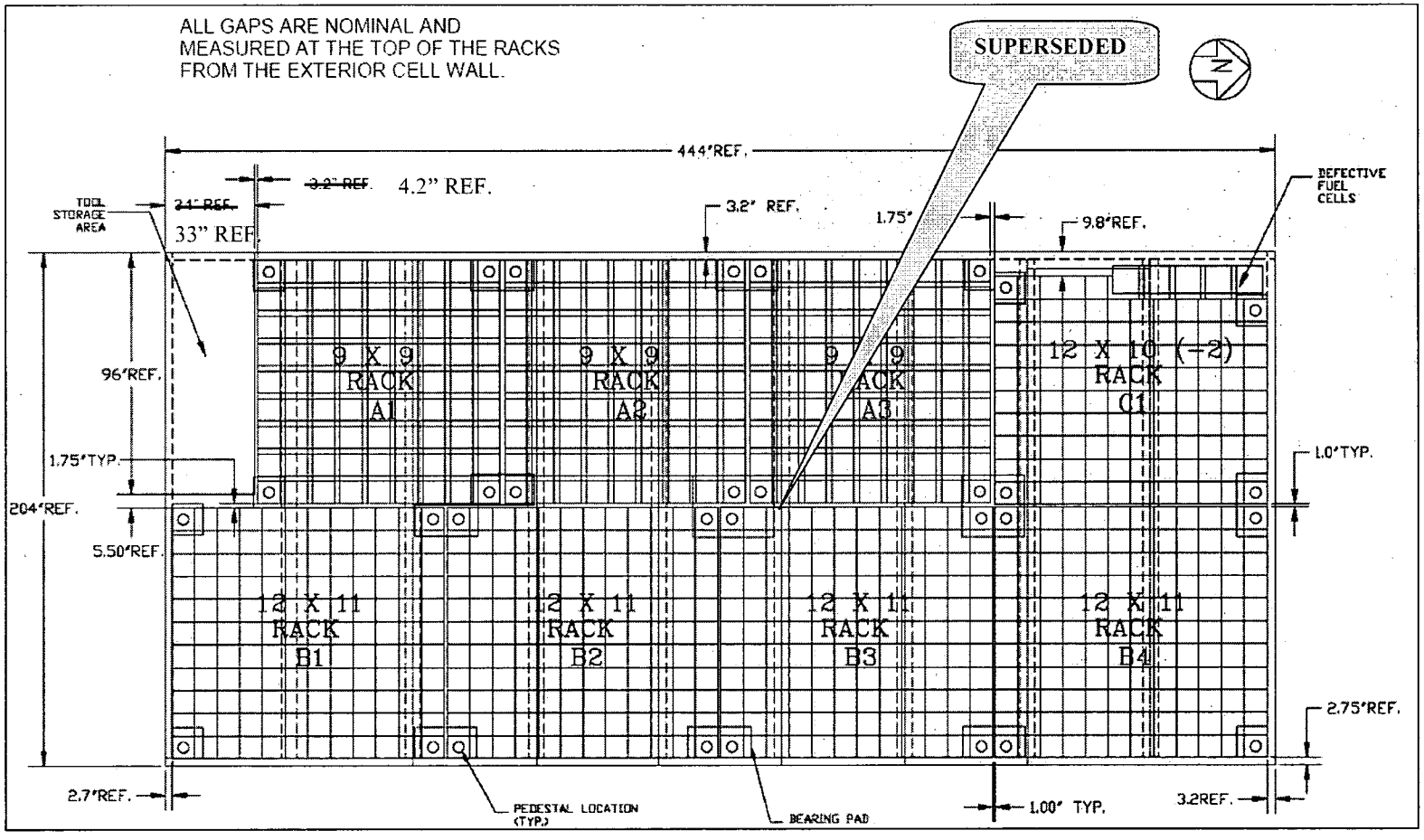
TR Changes: (Revision 2)

None.

~~Markup of DCD Rev. 17 Figure 9.1-4:~~



~~Markup of TR-54 Rev. 2 Figure 2-1:~~



AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-TR54-015
Revision: 3

Question: (Revision 0)

Insufficient descriptive information has been included in the spent fuel report to permit an adequate review of the structural/seismic analysis of the spent fuel racks. As indicated in SRP 3.8.4, App. D, provide descriptive information including plans and sections showing the spent fuel racks and pool walls, liner, and concrete walls. All of the major features of the racks including the cell walls, baseplate, pedestals, bearing pads, neutron absorber sheathing, any impact bars, welds connecting these parts, and any other elements in the load path of the racks should be shown on one or several sketches. These sketches should also indicate related information which includes key: cutouts, dimensions, material thicknesses, and gaps (fuel to cell, rack to rack, rack to walls, and rack to equipment area). In addition to the above, for review of postulated fuel handling drop accident and quantification of the drop parameters, sketches with sufficient details for the fuel handling system should be provided to facilitate the review as indicated in SRP 3.8.4, App. D.

October 8-12, 2007 Audit: (Revision 1)

Based on the original request made in the RAI, the review of the RAI response and the revised details in Section 9.1 of DCD Rev. 16, the following items still need to be provided or clarified in the TR and DCD:

(1) The key dimensions of the male and female pedestal components and bearing plates should be shown in the figures provided in the RAI response.

(2) The welds connecting the pedestals to the baseplate and the baseplate to the fuel cell walls are not shown. The information for the welds should indicate the type of the weld (e.g., fillet) and whether they are all around or the extent of the welds.

(3) Figure TR54-15.6 (in the RAI response) does not show any leak chase channels in the spent fuel pool floor. W indicated that there are leak chase channels; however they are not shown in rack layout figure. W confirmed that the fuel rack analyses did not consider the possible impact loading of a rack pedestal over the leak chase channel. Therefore, the staff request W to explain why the effects of the leak chase channel were not considered in the fuel rack analyses and the calculation that demonstrates the adequacy of the liner/concrete in the local region around the pedestal which is part of the TR report. Also, Figure TR54-15.6 which will be included in the TR should be revised to show the leak chase channels if they are used.

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

(Revision 2) Supplemental Question from May 2008 Meetings: general

New Question: (Revision 3)

During the June 2010 audit, the NRC requested that dimension and gap information for the spent fuel racks be clarified between the two similar RAIs (RAI-TR54-15, RAI-TR54-026) to show consistency and alignment to the current design basis shown in DCD Figure 9.1-2, 9.1-3, and 9.1-4.

Westinghouse Response:

(Revision 0) ***(Superseded by Revision 3)***

~~Westinghouse has provided sketches in the attachment to RAI-TR54-15 response showing the major features of the racks and spent fuel pool. These sketches will be incorporated in Technical Report 54. Westinghouse has not finished the detailed design of fuel handling equipment and detailed sketches are not available at this time. However, the quantification of the drop parameters has been established in the DCD (both maximum drop weights and heights). The DCD drop heights are much greater than what is being designed for the fuel handling equipment. This is stated in the RAI-TR-54-1 response. During the NRC Structural/Seismic audit of April 16th, the complete design drawings of the spent and new fuel racks were available to the NRC for review. Holtec explained how the rack features were incorporated into the seismic/structural models.~~

October 8-12, 2007 Audit: (Revision 1) ***(Superseded by Revision 3)***

~~Westinghouse has revised the layout figures for Region 1 and Region 2 spent fuel racks as requested. These figures are presented below in the DCD Revision and TR Revision sections below. Leak chases are used in the spent fuel pool. The plates making up the spent fuel pool liner have been designed such that no rack pedestals are over leak chases.~~

Westinghouse supplemental response to NRC Technical Review Meetings May 21 & May 22, 2008: (Revision 2) ***(Superseded by Revision 3)***

~~Westinghouse agreed to change spent fuel pool rack layout shown in Figure 2-1 of TR-54 Rev 2 and DCD Figure 9.1-4 to change note to "All gaps are nominal and measured at the top of the rack from the exterior cell wall". Also from RAI-TR54-36 Rev 2 response, the tool area is shown to be 34 inches rather than 36 inches. In addition, Figure 2-3 and DCD Figure 9.1-3 (sheet 1 of 2) have been changed to correctly reflect the distance from the TOP of the bearing pad (not the bottom of the bearing pad) to the top of the rack.~~

New Response: (Revision 3)

The figures and related discussion included in the previous revisions of this RAI response are out dated and superseded (due to design changes that strengthened the racks) as follows:

- The current versions of DCD Figures 9.1-2 (both sheets) and 9.1-3 (both sheets) were included in the response to RAI-SRP9.1.2-SEB1-06 (Letter DCP_NRC_002690, issued 11/11/09).
- The current version of DCD Figure 9.1-4 is included as part of design change proposal (DCP 1185 dated 12/18/09).

The basis of the latest versions of DCD Figures 9.1-2 (both sheets), 9.1-3 (both sheets), and Figure 9.1-4 were included in APP-GW-GLR-033 (Revision 3, November 2009) and are retained in TR54 (Reference 1).

Reference:

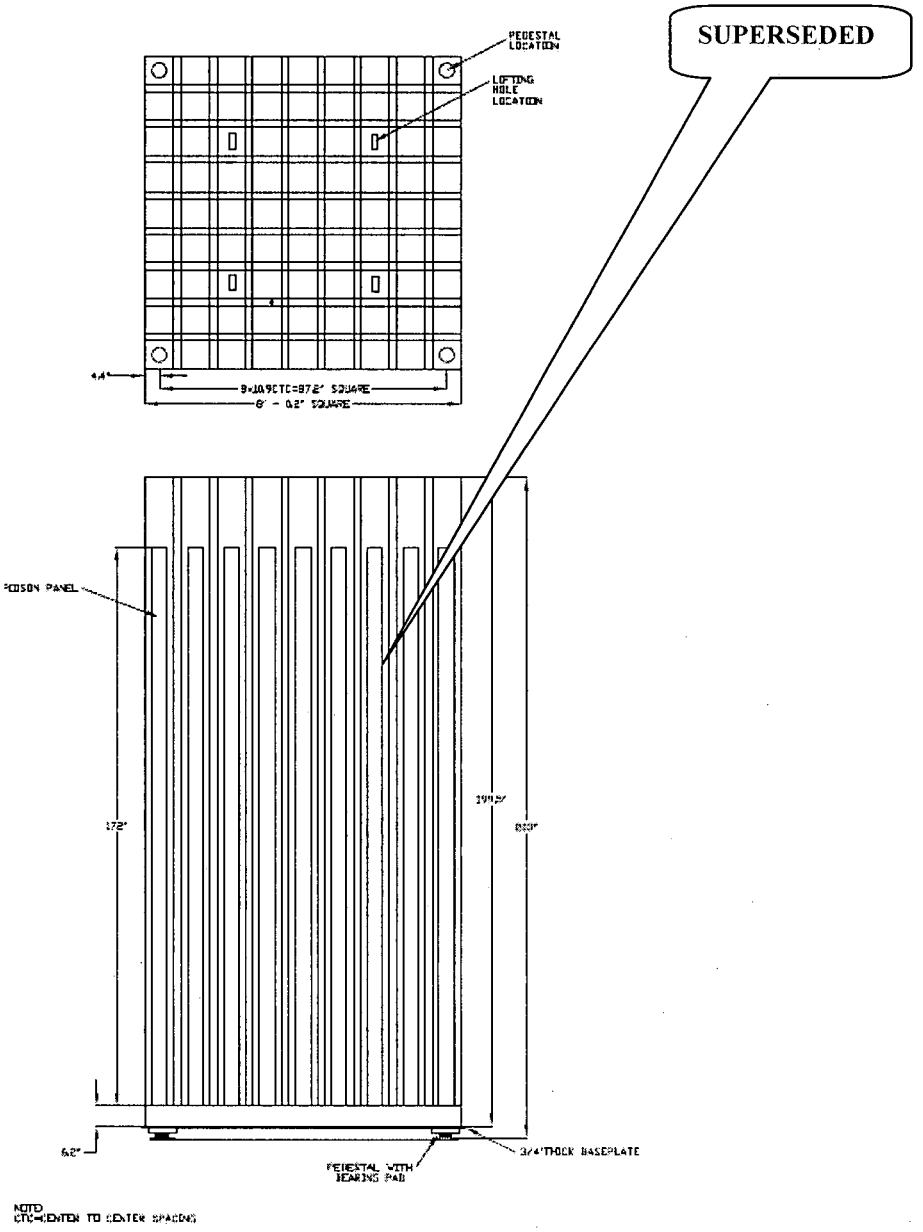
1. APP-GW-GLR-033, Revision 4, May 2010, "Spent Fuel Storage Rack Structural/Seismic Analysis," (Technical Report Number 54, TR54)

Design Control Document (DCD) Revision:

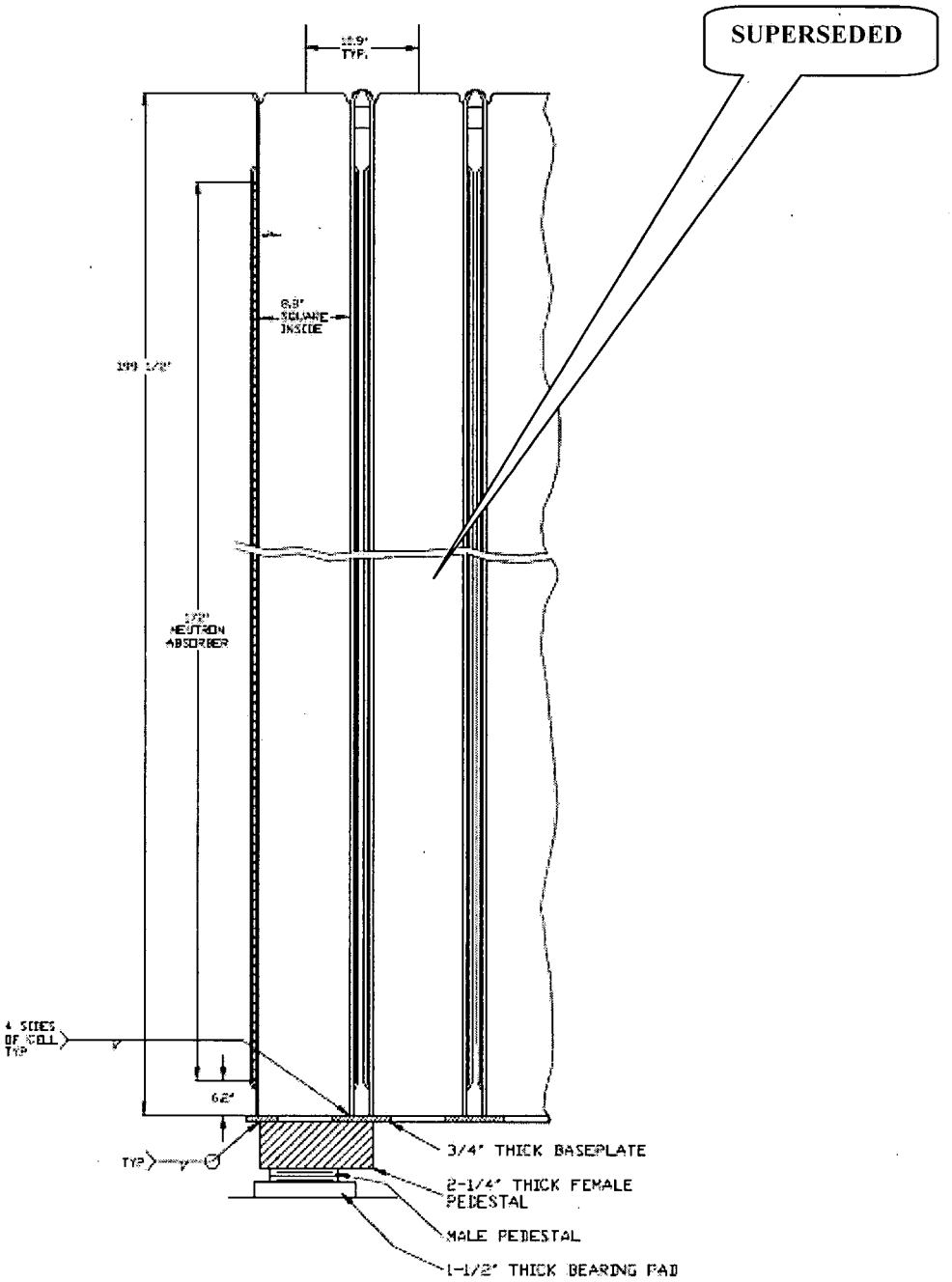
(Revision 0 and 1) ***(Superseded by Revision 3)***

~~The spent fuel rack figures in section 9.1 of DCD revision 16 are replaced with the following figures:~~

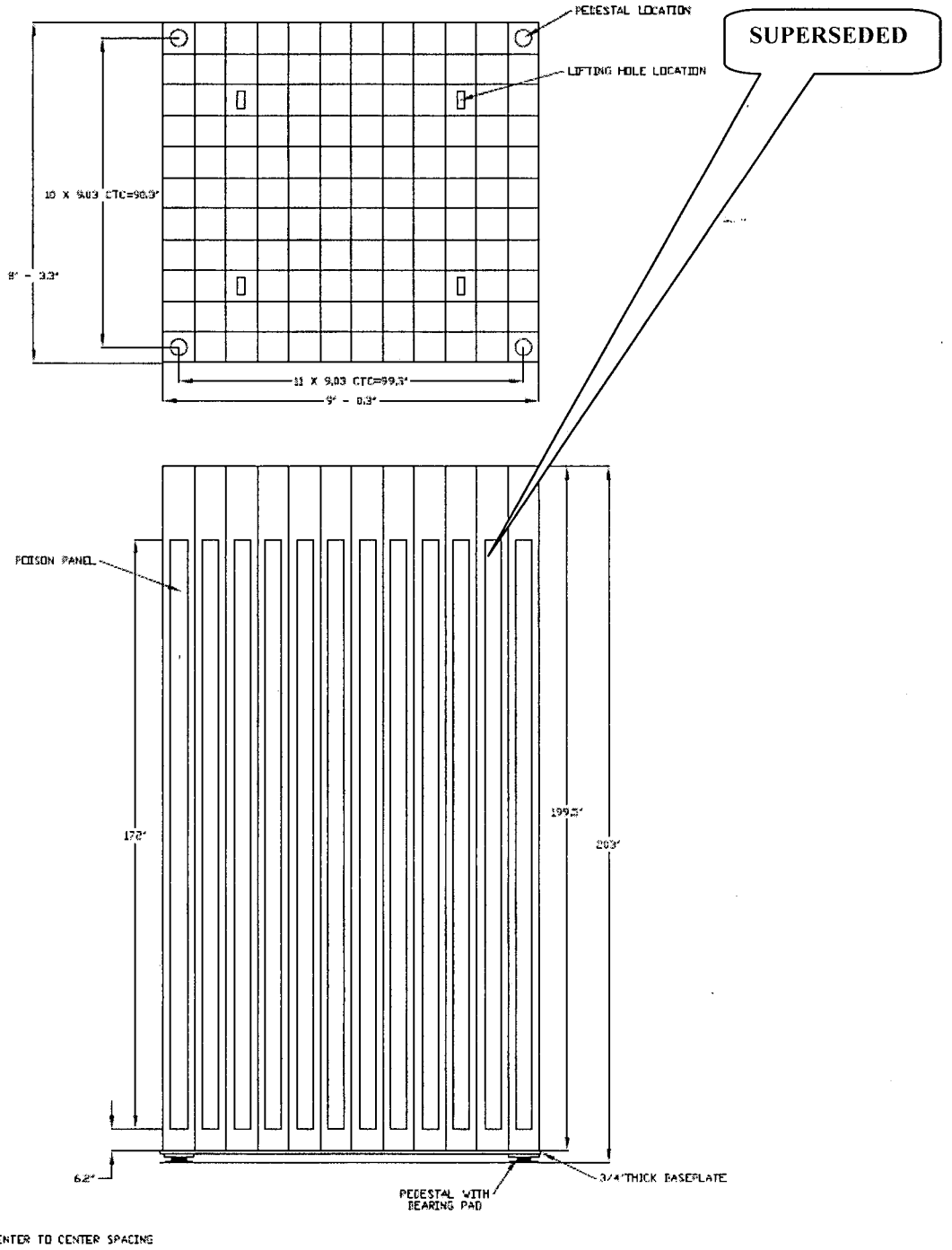
~~Figure 9.1-2 (Sheet 1 of 2) Region 1 Spent Fuel Storage Rack Layout~~



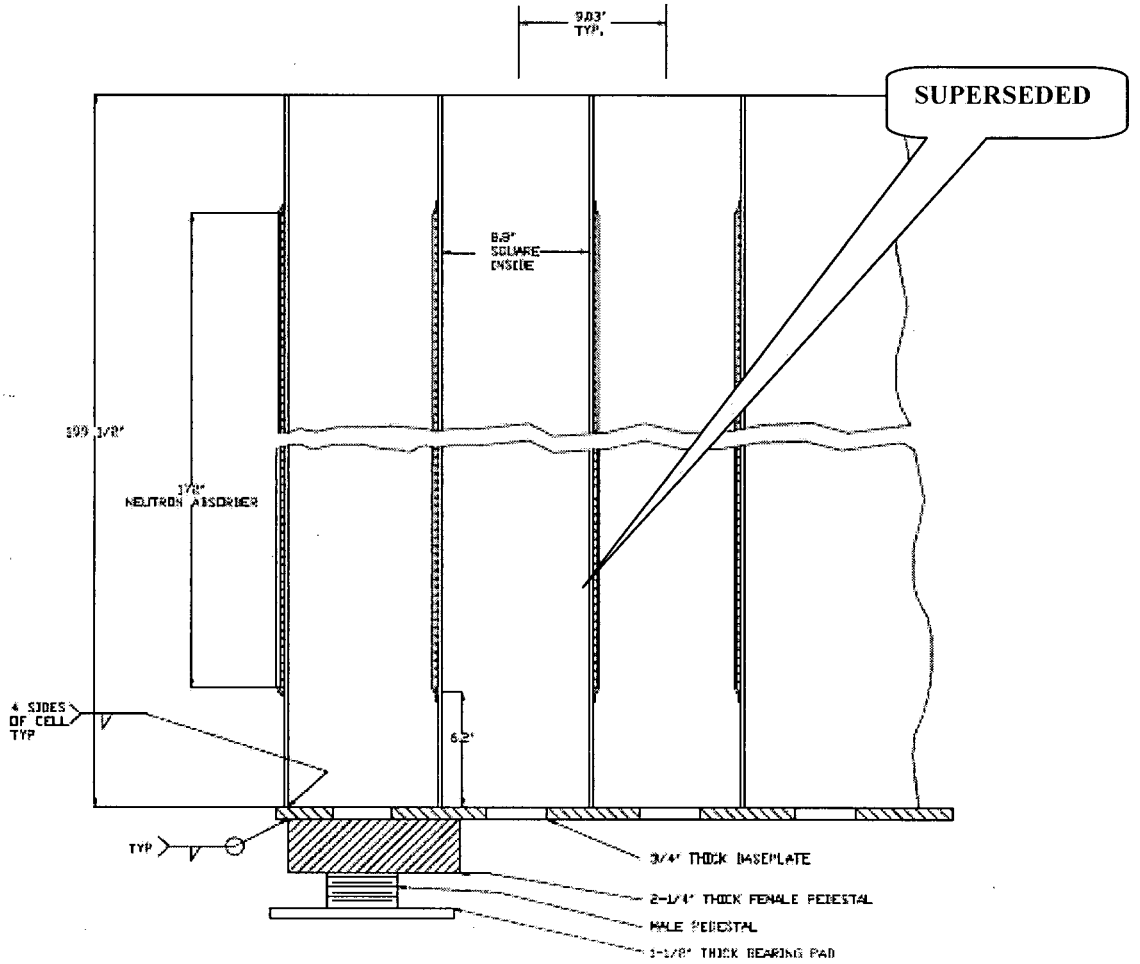
~~Figure 9.1-2 (Sheet 2 of 2) Region 1 Spent Fuel Storage Rack Cross-Section~~



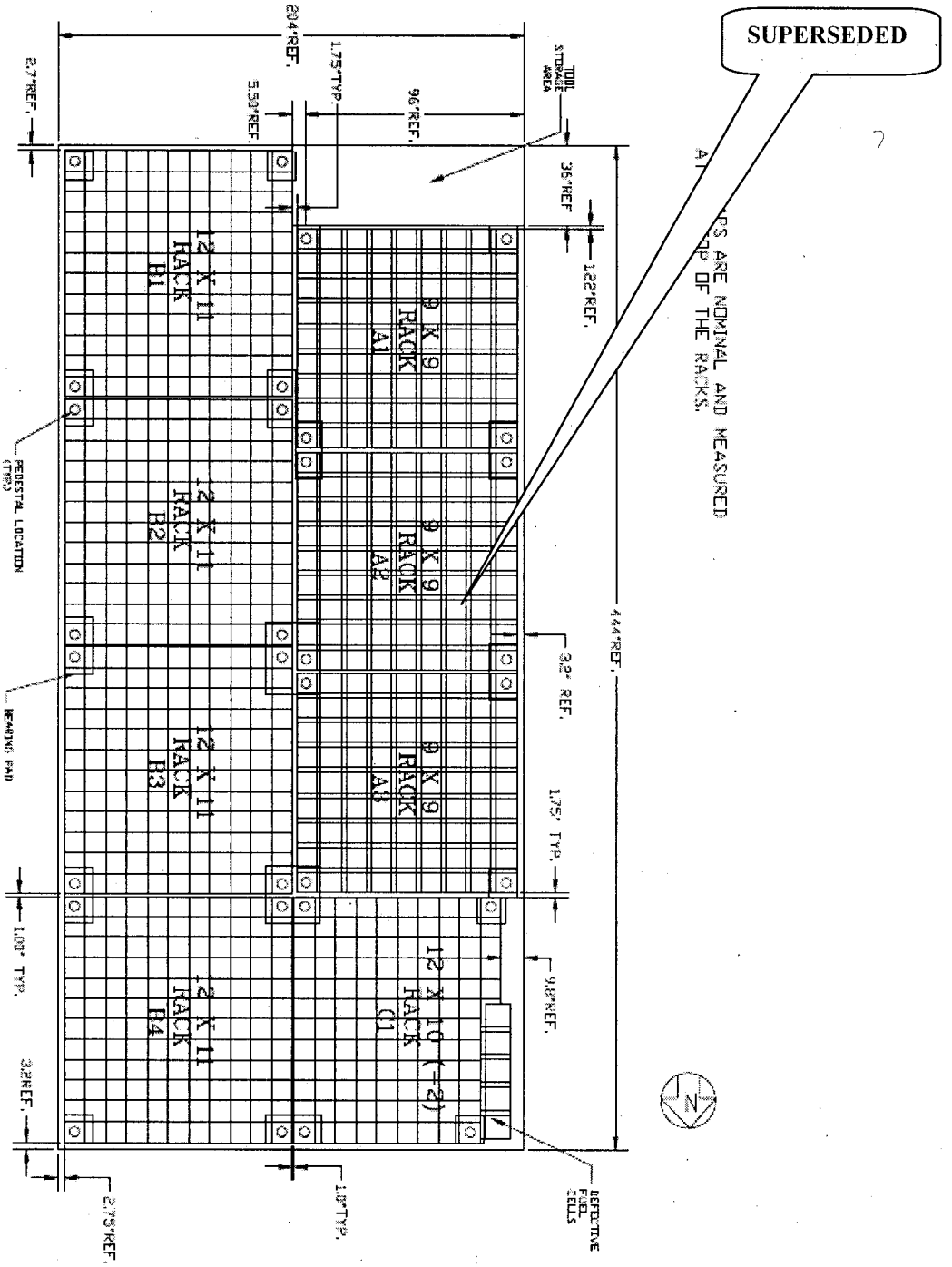
~~Figure 9.1.3 (Sheet 1 of 2) Region 2 Spent Fuel Storage Rack Layout~~



~~Figure 9.1-3 (Sheet 2 of 2) Region 2 Spent Fuel Storage Rack Cross Section~~

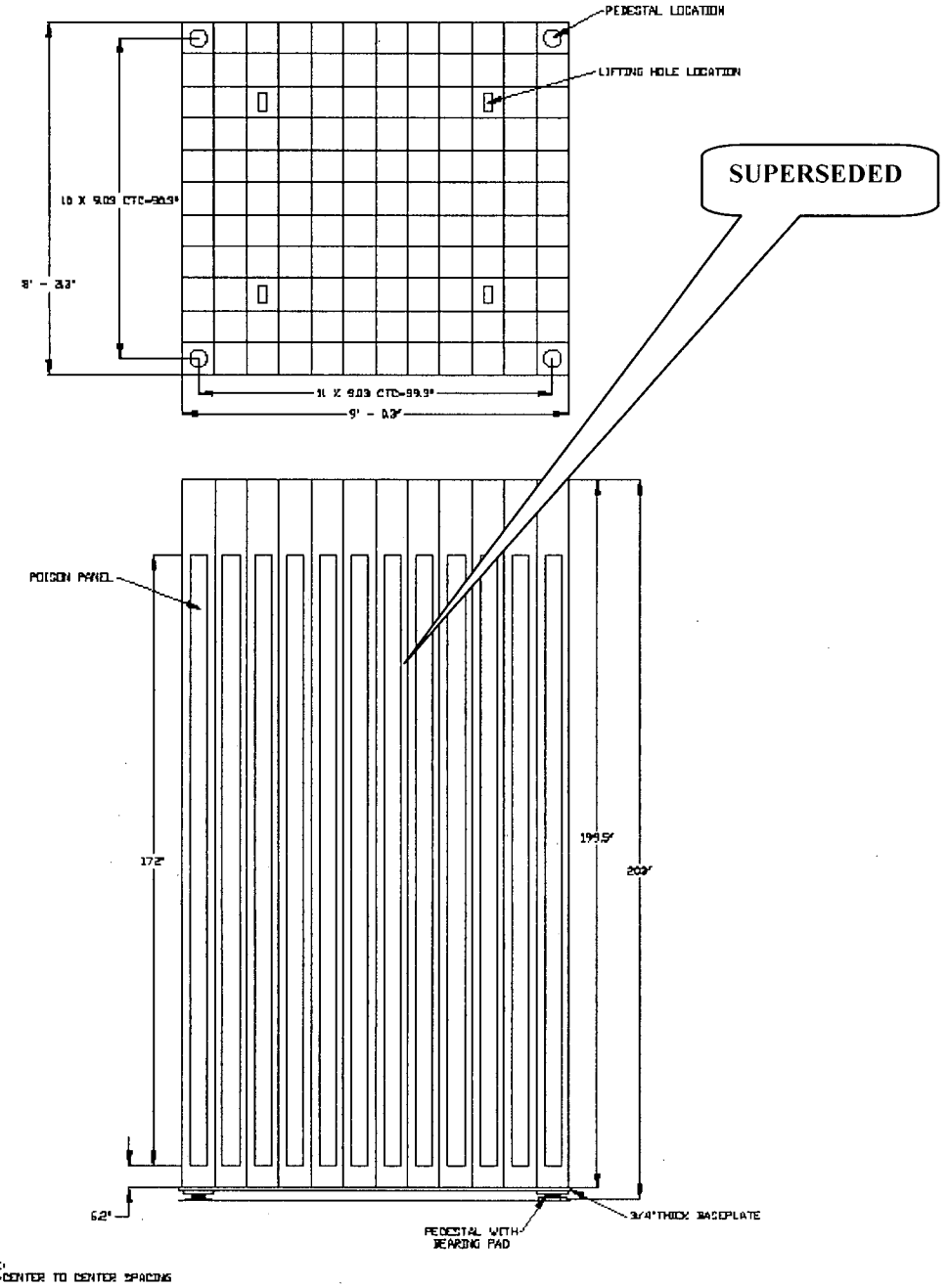


~~Figure 9.1-4 Spent Fuel Storage Pool Layout (889 Storage Locations)~~



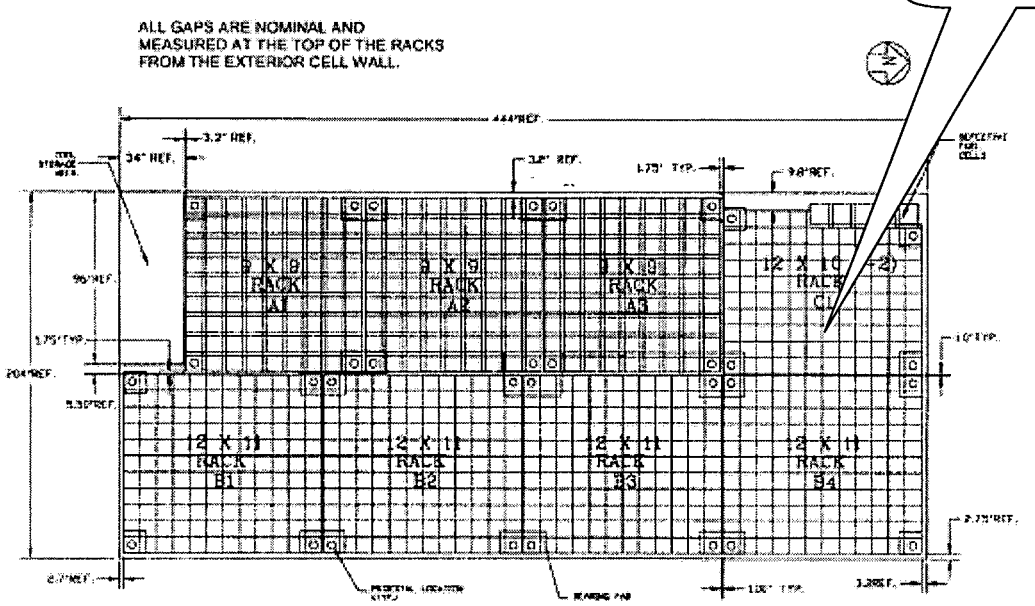
DCD Revision from RAI-TR54-15: (Revision 2) (Superseded by Revision 3)

~~Replace Figures 9.1-3 (Sheet 1 of 2) and 9.1-4 with the following:~~



~~Figure 9.1-3 (Sheet 1 of 2) Region 2 Spent fuel Storage Rack Layout~~

SUPERSEDED



~~Figure 9.1-4 Spent Fuel Storage Pool Layout (889 Storage Locations)~~

DCD Changes: (Revision 3)

None.

PRA Revision:

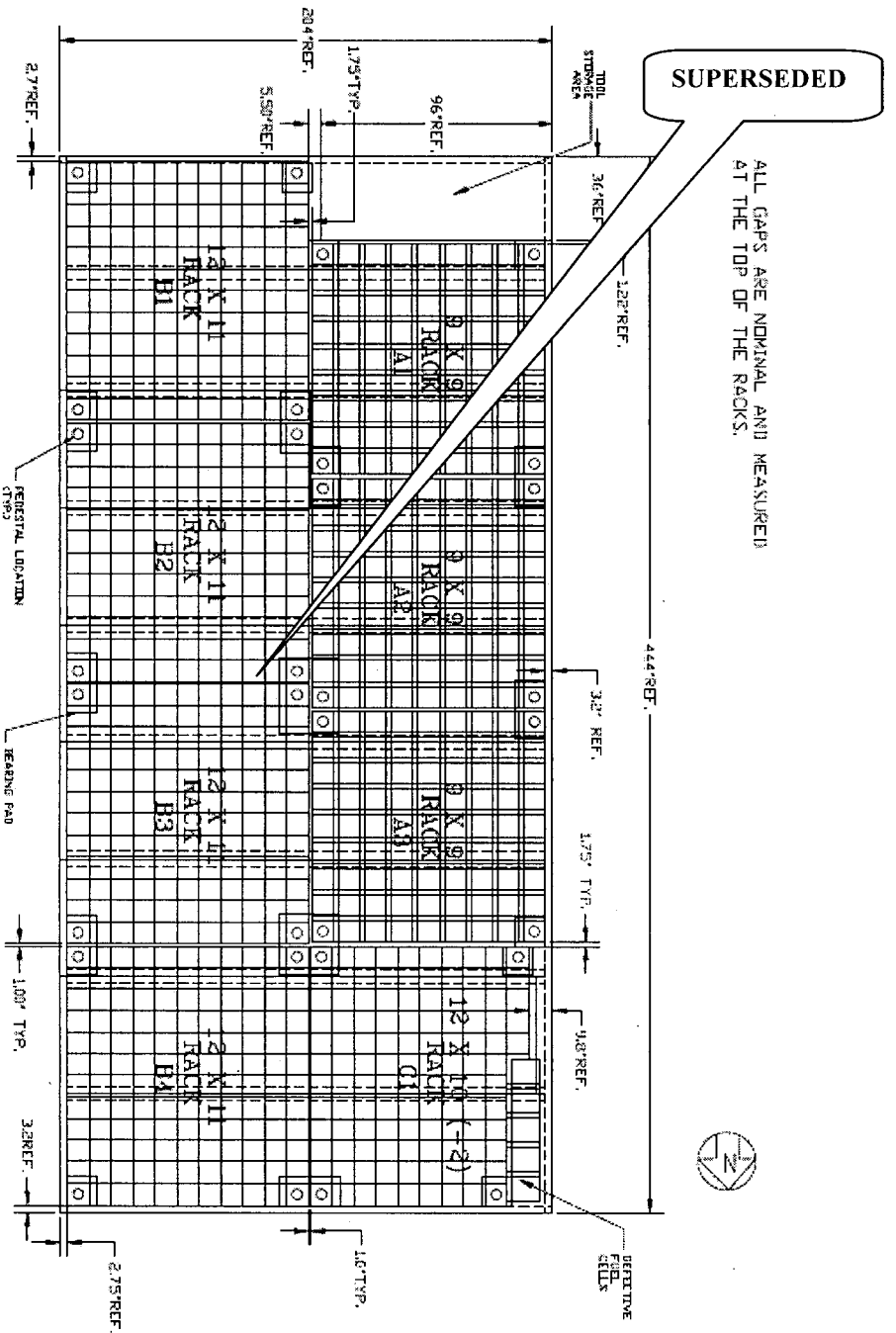
None

Technical Report (TR) Revision:

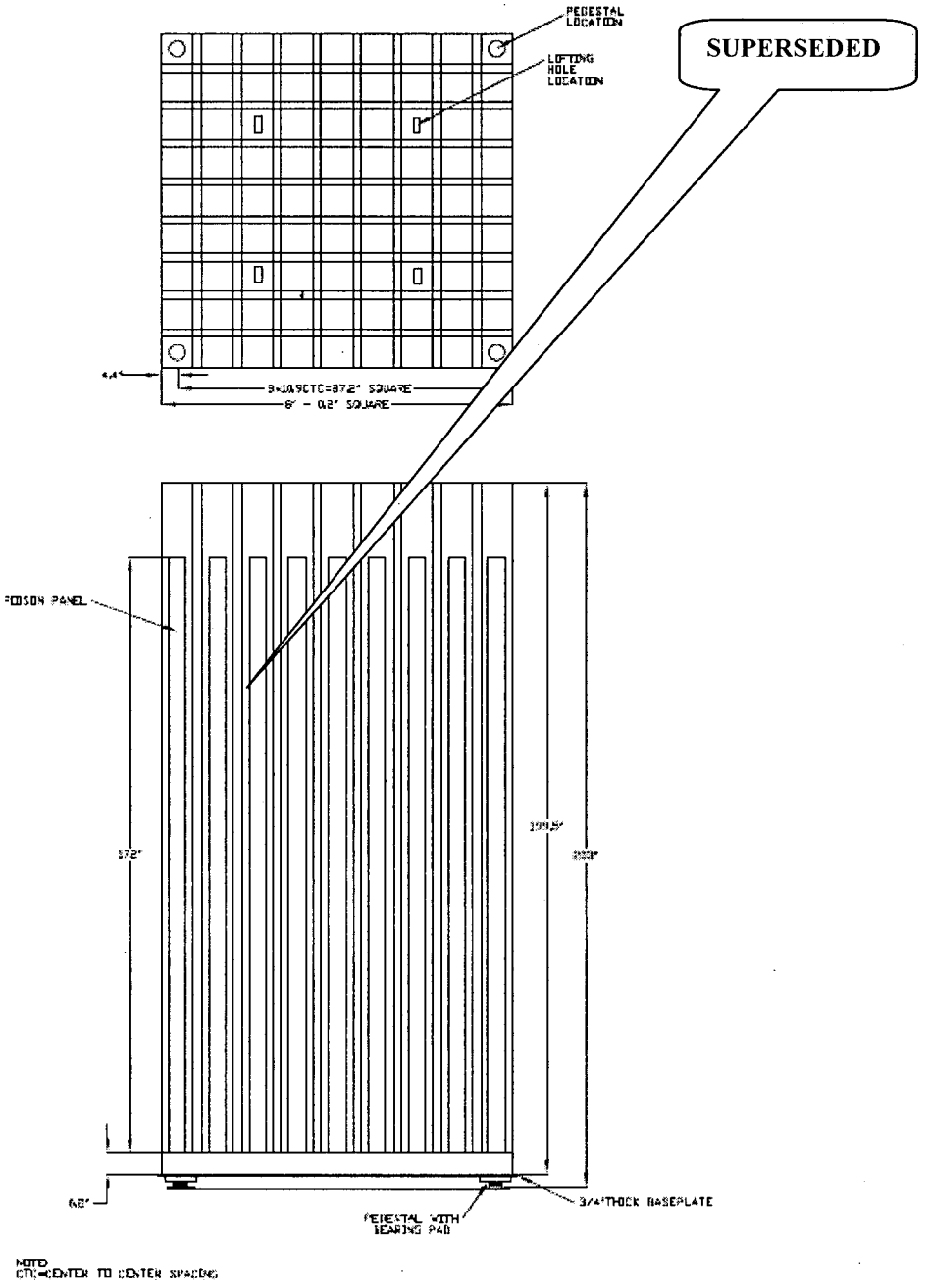
(Revision 0 and 1) ***(Superseded by Revision 3)***

~~The following Figures have been incorporated into Technical Report 54 Revision 1:~~

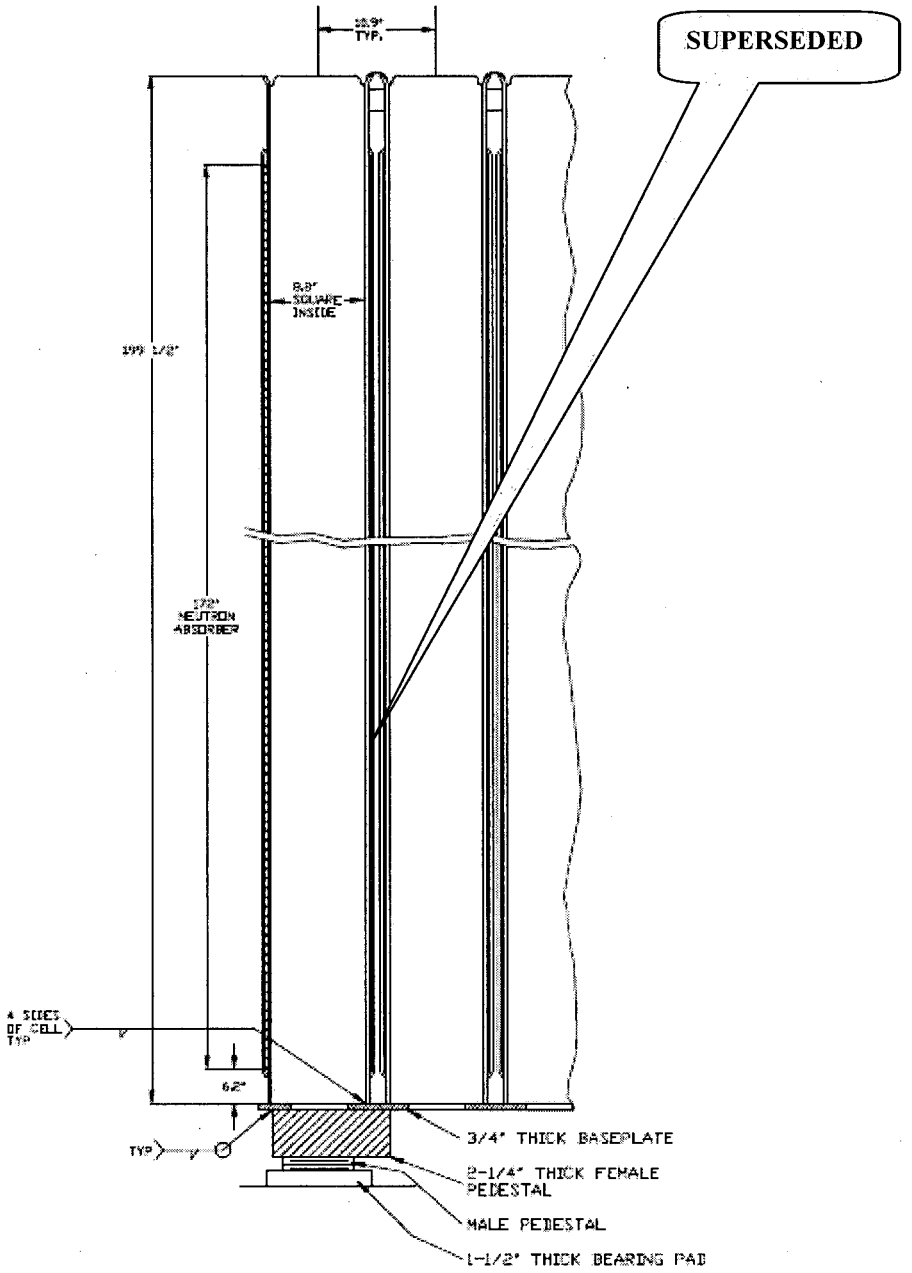
~~Figure 2-1 Spent Fuel Pool Storage Layout (889 Total Storage Locations)~~
~~Note: leak chases shown in phantom~~



~~Figure 2-2 Configuration of a Region 1 Storage Cell (Sheet 1 of 2)~~

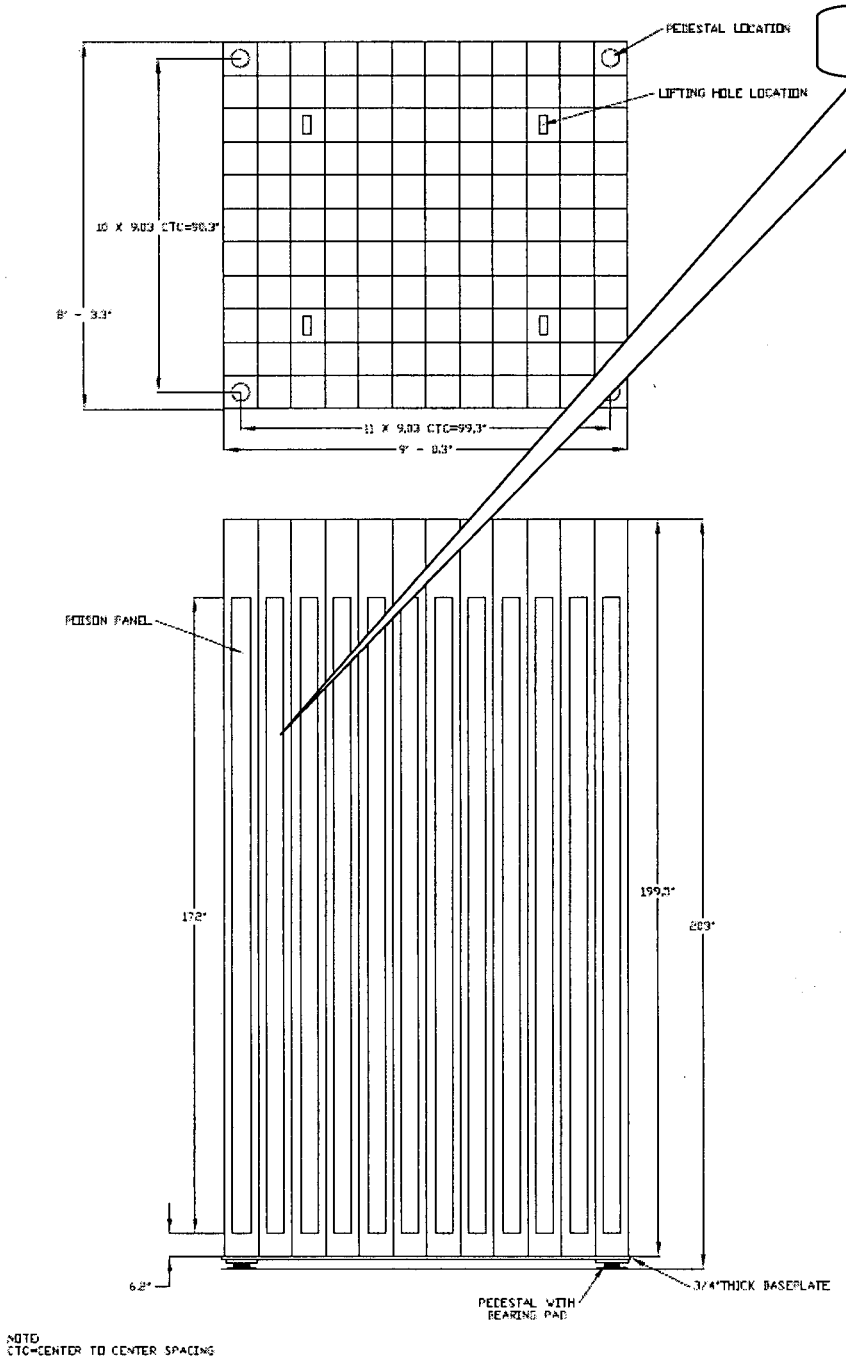


~~Figure 2-2 Configuration of a Region 1 Storage Cell (Sheet 2 of 2)~~



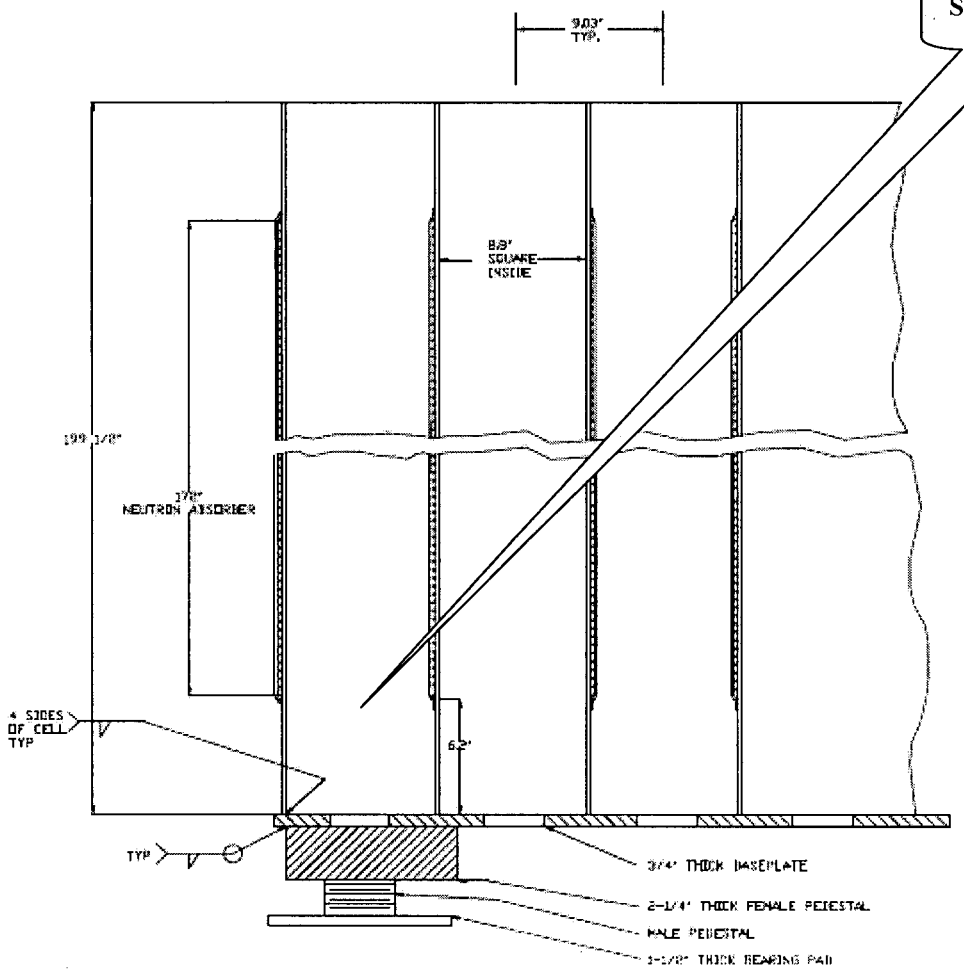
~~Figure 2-3 Configuration of a Region 2 Storage Cell (Sheet 1 of 2)~~

SUPERSEDED



~~Figure 2-3 Configuration of a Region 2 Storage Cell (Sheet 2 of 2)~~

SUPERSEDED



Technical Report Revision from RAI-TR54-15 Rev 2 response:
(Superseded by Revision 3)

~~Figure 2-1 has been changed to reflect the requested added note All gaps are nominal and measured at the top of the rack from the exterior cell wall and the change in size of the tool storage area to accommodate rack movement during an earthquake.~~

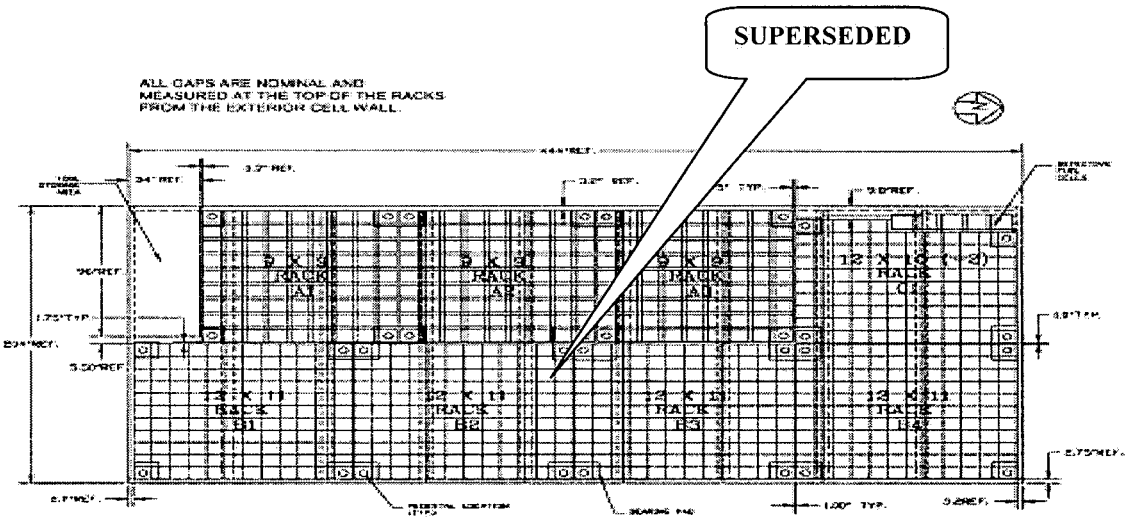
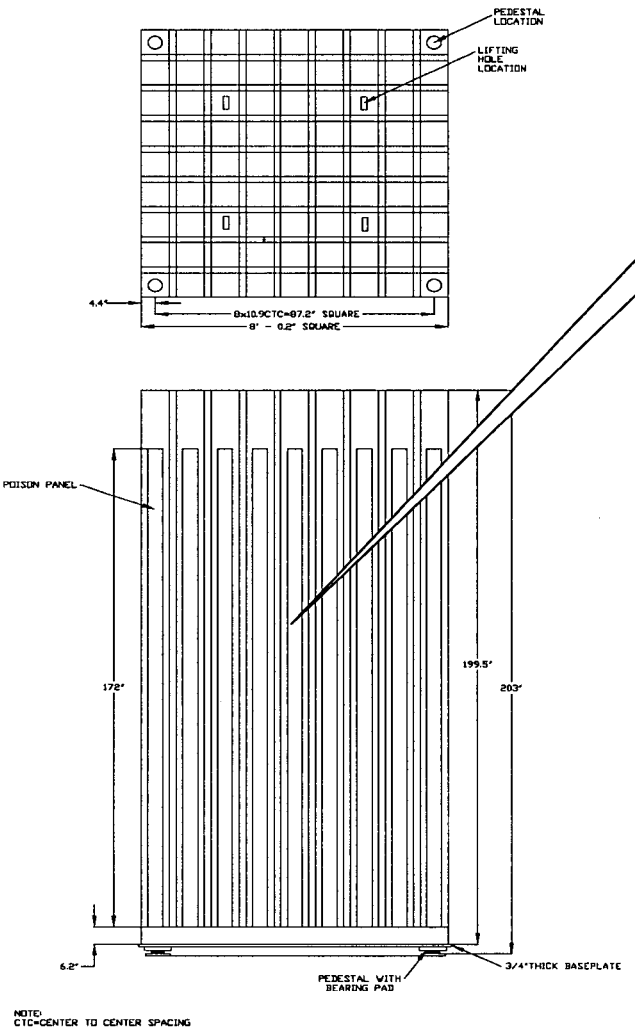


Figure 2-1 Spent Fuel Pool Storage Layout (889 Total Storage Locations) – Leak Chases Show in Phantom

~~Figure 2-3 (Sheet 1 of 2) has been changed to reflect the correct distance from the TOP of the bearing pad to the top of the rack~~

SUPERSEDED



~~Figure 2-3 Configuration of a Region 2 Storage Cell (Sheet 1 of 2)~~

TR Changes: (Revision 3)

None.