OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

Complete Only Applicable Items

1. QA: QA

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2. ☒ Analysis — Check all that apply

Type of Analysis	☒ Engineering ☐ Performance Assessment ☐ Scientific
Intended Use of Analysis	☐ Input to Calculation ☒ Input to another Analysis or Model ☐ Input to Technical Document ☐ Input to other Technical Products
Describe use:	Input to Emplacement System for Site Recommendation

3. ☐ Model — Check all that apply

Type of Model	☐ Conceptual Model ☐ Abstraction Model ☐ Mathematical Model ☐ System Model ☐ Process Model
Intended Use of Model	☐ Input to Calculation ☐ Input to another Model or Analysis ☐ Input to Technical Document ☐ Input to other Technical Products
Describe use:	

4. Title:

BOTTOM/SIDE LIFT GANTRY CONCEPTUAL DESIGN

5. Document Identifier (including Rev. No. and Change No., if applicable):

ANL-WES-ME-000003 REV 01

6. Total Attachments:	7. Attachment Numbers - No. of Pages in Each:
None	None

	Printed Name	Signature	Date
8. Originator	P. S. Bair	for R. J. Bierich, FOR	04-11-00
9. Checker	J. T. Pullen	R. A. D'Agostino, for	April 11, 2000
10. Lead/Supervisor	F. J. Bierich	for R. J. Bierich	04-11-00
11. Responsible Manager	D. G. McKenzie III		4/11/00

12. Remarks:

1. The following TBD/TBV are contained in this document:

TBV	TBD
245	405
246	3764
252	3936
253	
254	
273	
274	
289	
291	
294	
295	
308	
460	

- $S_v = 184.6$ in^3
- $f_{bv} = 1{,}172.5$ kip-in/184.6 in^3 = 6.4 ksi
- f_{bh} = maximum bending stress due to the horizontal moment
- $f_{bh} = M_h \div S_h$
- $M_h = 2{,}217.7$ kip-in
- $S = 161.1$ in^3
- $f_{bh} = 2{,}217.1$ kip-in/161.1 in^3 = 13.8 ksi

- The combination bending stress ratio for a lift beam is equal to the vertical bending stress ratio plus the horizontal bending stress ratio (AISC 1997, p. 5-54). With combined seismic loads, the combination stress ratio should be less than 1.33, which is the allowable stress plus a stress increase of one-third (AISC 1997, p. 5-30).

  - $f_a \div F_a + f_{bv} \div F_{bv} + f_{bh} \div F_{bh} \leq 1.33$ (AISC 1997, Section H1, p. 5-54, except 1.33 from Section A5.2, p. 5-30)
  - f_a = stress due to axial force = 0
  - $f_{bv} = 6.4$ ksi
  - $f_{bh} = 13.8$ ksi
  - $F_a = F_{bv} = F_{bh} = 18.0$ ksi (Section 5.6)
  - $0 \div 18 + 6.4 \div 18 + 13.8 \div 18 = 1.12$

- The calculated bending capacity ratio of 1.12 is less than the maximum ratio of 1.33, therefore, the horizontal beam concept is acceptable for the bounded bending stress.

6.3.4 Gantry Weight

The bottom/side lift gantry is shorter than the end-lift gantry with lift-over capability developed in a previous design analysis (CRWMS M&O 1997c, Figure II-3, p. II-19 and Figure II-6, p. II-22). The self-weight of the bottom/side lift gantry is estimated from the weight of the previous gantry:

- Characteristics of the bottom/side lift gantry that are used for this analysis

  - Length of bottom/side lift gantry (end frame-to-end frame) = L_{lc}
  - L_{lc} = 5.500 m (Figure 9) × 39.37 in/m = 216.5 in
  - Weight of load lifted by bottom/side lift gantry = P_{bc}
  - P_{bc} = 88 MT (Section 6.3.1)

- Key characteristics of the previous emplacement gantry that are used to estimate the weight of the bottom/side lift gantry are as follows:

  - Length of base case gantry (center end frame to end frame) = L_{bc}
  - L_{bc} = 8.619 m (CRWMS M&O 1997c, Figure II-3, p. II-19) × 39.37 in/m = 339.3 in
  - Weight of load lifted by base case gantry = P_{bc}
  - P_{bc} = 69 MT (CRWMS M&O 1997c, p. II-3)