Sta 4. (2)

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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 624833

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Distribution	Interim Stabilzation Engineering	N/A
5. Proj./Prog./Dept./Div.:	6. Design Authority/Design Agent/Cog. Engr.:	7. Purchase Order No.:
241-S-102/ISE	GP Janicek/CB Mcvey	N/A
8. Originator Remarks:		9. Equip./Component No.:
Approval and release of Design Review Report		N/A
		10. System/Bldg./Facility:
		241-S-102
11. Receiver Remarks:	11A. Design Baseline Document? [X] Yes [ ] No	12. Major Assm. Dwg. No.:
		N/A
		13. Permit/Permit Application No.:
		N/A
		14. Required Response Date:

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Desig-nator	(G) Reason for Trans-mittal	(H) Origi-nator Dispo-sition	(I) Receiv-er Dispo-sition
1	HNF-3558	1-24	0	DESIGN REVIEW REPORT	N/A	2	1	1
				241-S-102 COVER PLATE				

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority									
		Design Agent									
2	1	Cog. Eng. CB McVey	CB McVey	10/29/98	S7-20						
2	1	Cog. Mgr. MR Koch	MR Koch	10/29/98							
		QA									
		Safety									
		Env.									

18. C.B. McVey
CB McVey 10/29/98
Signature of EDT Originator — Date

19. _____
Authorized Representative for Receiving Organization — Date

20. MR Koch 10/29/98
Design Authority/ Cognizant Manager — Date

21. DOE APPROVAL (if required)
Ctrl No. _____
[ ] Approved
[ ] Approved w/comments
[ ] Disapproved w/comments

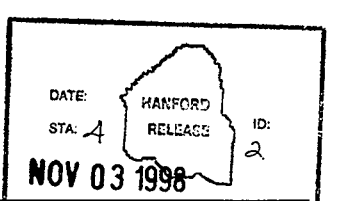
DESIGN REVIEW REPORT, 241-S-102 COVER PLATE REVIEW

C. B. MCVEY
Lockheed Martin Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 624833/638523 UC: 500
Org Code: 74920 Charge Code: 103365/BA30
B&R Code: EW3120071 Total Pages: 24

Key Words: 241-S-102, DESIGN REVIEW REPORT, COVER PLATE, BIO

Abstract: The design for the cover plate and lead plate for shielding on 241-S-102 was reviewed on 10/21/98. All Review Comment Record comments were resolved to the satisfaction of the reviewers. Additional comments were taken during the meeting and were also resolved. A design calculation for the Radiological Design Review Screening was presented as criteria for the use of 1" lead plate. The review concluded that the use of 2" steel plate and 1" lead plate provided the required safety function required by HNF-SD-WM-BIO-001, 5.3.2.20, Basis for Interim Operation. The design was approved with the incorporated comments as recorded on RCR's and meeting minutes.



11/3/98
Release Approval Date Release Stamp

Approved for Public Release

TABLE OF CONTENTS

1.0 SCOPE

A design review meeting was held to review ECN 638523. During the review meeting all RCR's were review and disposition to the satisfaction of the reviewers. The review covered the removal of the existing concrete cover block and replacement with 2" steel cover plate and 1" lead plate for additional shielding. The Basis for Interim Operation (BIO), (HNF-SD-WM-BIO-001, 5.3.2.20) identifies the cover blocks (cover plates) as safety class to knockdown spray and limit release of aerosols to the atmosphere. The requirement to provide "...for radiation protection (i.e., shielding) for facility workers." is also required by the BIO.

Documents Reviewed:

1) ECN-638523, 241-S-102 Cover Plate Installation

2) USQ TF-98-0904, IS: 241-S PUMP PIT COVER PLATES

3) Radiological Design Review Screening - 2 Inch Carbon Steel Cover Plate Installation At 241-S-102 Pump Pit, 10/20/98

The ECN provided the layout of the plate and the lead shielding plates in relation to the distributor pit 241-S-02B. It showed the recommended layout of the lead shielding plates, but did not show location of valve handle hole locations. The valve handle locations will be addressed in a separated ECN as field data was not available at the time of the ECN preparation.

The USQ (TF-98-0904, Rev. 0) provided the screening for the cover plate and was found to have all "No" or "N/A" responses which showed that a Determination was not required. A revision 1 was prepared to address the new ECN and lead shielding and again a Determination was not required.

The Radiological Design Review Screening provided documentation of the dose rate due to the removal of the concrete cover block and replacing it with a 2" steel plate. The calculation showed that additional lead shielding of 1.7 cm (0.67 inch) would be required to attain a Life Cycle Exposure Differential >1 person-REM (Appendix C).

All documents are related to the Interim Stabilization program for Saltwell Pumping of 241-S-102 tank in 241-S Tank Farm.

All objectives of the review were to establish design approval for the safety class cover plate on 241-S-02B

2.0 SUMMARY

The design review meeting was held on 10/21/98. The meeting minutes are attached in Appendix A. Comments were recorded on Review Comment Records (Appendix B) and in the meeting minutes. No further comments were made. The conclusion of the meeting was that the design of the cover plate and lead plate met the requirements of the BIO for spray knockdown and shielding for facility workers.

No outstanding action items remain on the design for the cover plates or lead plates for 241-S-02B distributor pit.

3.0 DOCUMENTATION

Design Review Committee Members:

G. P. Janicek*	Design Authority
M. R. Koch	Cognizant Manager - ISE
C. B. McVey*	Cognizant Engineer - ISE
T. J. Volkman*	Quality Assurance
O. M. Jaka*	Safety
P. C. Miller	Environmental
D. D. Wiggins*	Mechanical - ISE
J. N. Doeler	TF Cognizant Engineer - S Farm
M. R. Brown	Mechanical Engineer - S Farm

* Meeting Attendees

Documents:

Meeting Minutes, Distribution, dated 10/26/98

Radiological Design Review Screening-2 Inch Carbon Steel Cover Plate Installation At 241-S-102 Pump Pit, D. J. Foust, dated 10/20/98

APPENDIX A

MEETING MINUTES
DESIGN REVIEW MEETING ECN 638523
241-S-102 COVER PLATE

MEETING MINUTES

SUBJECT: DESIGN REVIEW MEETING ECN 638523, 241-S-102 COVER PLATE

TO:		BUILDING		
Distribution		2704-HV		
FROM:		CHAIRMAN		
Interim Stabilization Engineering		C. B. McVey		
DEPARTMENT-OPERATION-COMPONENT	AREA	SHIFT	DATE OF MEETING	NUMBER ATTENDING
ISE	200E		10/21/98	5

Design Review Committee Members:

G. P. Janicek*	Design Authority
M. R. Koch	Cognizant Manager - ISE
C. B. McVey*	Cognizant Engineer - ISE Chairman
T. J. Volkman*	Quality Assurance
O. M. Jaka*	Safety
P. C. Miller	Environmental
D. D. Wiggins*	Mechanical - ISE
J. N. Doeler	TF Cognizant Engineer - S Farm
M. R. Brown	Mechanical Engineer - S Farm

* Meeting Attendees

This design review meeting was called to determine if the replacement of the cover block on 241-S-02B by a 2" steel plate and 1" lead plate met the requirements of the Basis of Interim Operation (HNF-SD-WM-BIO-001, 5.3.2.20). The replacement steel plate and lead plate are considered safety class for the knockdown of a spray leak and radiation protection for facility workers. The design covers the fabrication of the steel plate and the placement of the steel plate and lead plates. Location for drilling of the plates for valve handles was not addressed. Field measurements of the centerline of the saltwell screen had not been completed to perform the location of the valve handle holes and will have to be handle under another Engineering Change Notice (ECN).

Comments were received by Review Comment Records (RCR) and these comments were dispositioned during the meeting to the satisfaction of the reviewers. Additional comments were taken during the meeting and are recorded as follows:

1) Change note 6 on drawing H-2-73762 to read "Cover Plates = Plate ASTM-A36 CS". This was a RCR item, but defined during the meeting.

2) Add the HNF-3558 Design Review Report to 13a Description of Change.

3) Add Chairman to the list of Approvals (Page 2 of ECN, Section 21).

4) Change Safety Representative in the Approval section of the ECN to OM Jaka.

5) Page 3, change the ECN number to 638523.

6) Page 5, show the slant on the angle iron in the view.

7) Page 6, show a section F for opposite hand.

MEETING MINUTES (Continued)

8) Page 11, remove the reference to the ECN 623920 and add a note that the details of the plates are not shown.

A discussion on the redesign of the lead plate fabrication resulted in a comment that the square tubing should be replaced with solid bar. This was due to a shielding question that approximately 2" of space when two plates are adjancet to one another. The space would not provide the shielding required as solid bar stock would. This comment was recommended to be included during the design phase for the fabrication of the plates. Cost and time were not a significant amount.

The design review will be closed by completion of the RCR's and signature of approval on the Engineering Change Notice 638523.

APPENDIX B

REVIEW COMMENT RECORDS

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
Oct. 21, 1998	998-98
3. Project No.	**4. Page**
241-S Saltwell	1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
ECN 638523/ Saltwell Pump Pit Cover Plate: 241-S-102	Saltwell Pumping	Omar Jaka	TWRS-Safety	MO-267/14/2-2322

17. Comment Submittal Approval:

Organization Manager (Optional)

10. Agreement with indicated comment disposition(s)

10/29/98
Date

M. O Jaka
Reviewer/Point of Contact

Author/Originator

11. CLOSED

10/29/98
Date

M. O Jaka
Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Statu
1.	Copy of USQ was not included with ECN for review.	OJ	Copy of USQ handed out at meeting.	O.K
2.	Structural calculations are not signed.	OJ	Calculations sheet signed prior to routing for signature.	O.K.
3.	Shielding calculations are not attached alongn with the ECN	OJ	Shielding calculations provided at meeting. They will be included in the Design Review Report and the SD document will be referenced in the ECN.	O.K

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
10/21/98	1
3. Project No.	4. Page
	1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
ECN-638523/S-102 Cover Plate	Saltwell/ISE/S-Farm/S-102	D.WIGGINS	STAB. ENGR	3-1286

17. Comment Submittal Approval

Organization Manager (optional)

10. Agreement with indicated comment disposition(s)

Dirk Wiggins — Reviewer/Point of Contact

10/21/98 — Date

Author/Originator

11. CLOSED

Dirk Wiggins — Reviewer/Point of Contact

10/21/98 — Date

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	14. Hold Point	15. Disposition (provide justification if NOT accepted).	16. Status
	VERBAL AT REVIEW MEETING DDW 10/21/98			

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
10/22/98	1
3. Project No.	4. Page
	1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
ECN-638523/S-102 COVER PLATE	SALTWELL/ISE/S-FARM/S-102	PC MILLER	ENVIRONMENTAL	2750E/A-107

17. Comment Submittal Approval

Organization Manager (optional)

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact

10/29/98
Date

C B McVey
Author/Originator

11. **CLOSED**

Reviewer/Point of Contact

10/29/98
Date

C B McVey
Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	14. Hold Point	15. Disposition (provide justification if NOT accepted).	16. Status
1	NO COMMENTS			

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
10/20/98	1
3. Project No.	4. Page
N/A	1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
ECN-638523/S-102 COVER PLATE	SALTWELL/ISE/S-FARM/S-102	MARK H BROWN	SST ENG	200W/372-1611

17. Comment Submittal Approval

Organization Manager (optional)

10. Agreement with indicated comment disposition(s)

Mark D Brown
Reviewer/Point of Contact

10-27-98
Date

Chas B McDay
Author/Originator

11. CLOSED

C. B. McDay for MARK BROWN per Telecon 10/28/98
Reviewer/Point of Contact

10-28-98
Date

Chas B. McDay
Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	14. Hold Point	15. Disposition (provide justification if NOT accepted).	16. Status
1	CHANGE NOTE 6 TO READ "PLATE ASTM A-36 CS".		ACCEPT	
2	ID PLATE AND LEAD COVER, AND REMOVE REFERENCE TO NOTE 9.		ACCEPT — NOTE 9 STILL APPLIES TO EXISTING S-01A, 03A & 07A COVER PLATES. ADDED NOTE PAGE4 THAT ID PER WORK PACKAGE INSTR.	
3	WHAT IS THE 1" DIA. DRILLED AND TAP HOLE FOR?		1" HOLE IS FOR LIFTING BAILES	
4	ON THE CALCULATION SHEET THE LEAD IS NOT NEGLIGIBLE, IT CUTS THE FACTOR OF SAFETY DOWN BY HALF. IT NEED TO INCLINED IN THE CALCULATIONS.		THE CALC. SHEETS REFLECT A SAFETY FACTOR OF 4L W/O PLATES. CALCS SHOW W/PLATES AND 3-200# OPERATORS X 1.5 A SAFETY FACTOR OF 24 — STILL NEGLIGIBLE.	
5	nEED TO ADD h-2-73763 TO THE COVER SHEET, CHANGES ARE BEING MADE TO THIS SHEET.		ACCEPT	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
10/21/98	1
3. Project No.	4. Page
	1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
ECN-638523/S-102 Cover Plate	Saltwell/ISE/S-Farm/S-102	M. R. KOCH	ISE	2704HVD117/3-2689

17. Comment Submittal Approval	10. Agreement with indicated comment disposition(s)	11. CLOSED
Organization Manager (optional)	Reviewer/Point of Contact: M R Koch Date: 10/22/98 Author/Originator: D B McKay	Reviewer/Point of Contact: M R Koch Date: 10/22/98 Author/Originator: D B McKay

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	14. Hold Point	15. Disposition (provide justification if NOT accepted).	16. Status
1	Page 4: Has ℄ been verified as located over pit riser?		1. NO. THIS IS ℄ ON DWG. FIELD TO LOCATE ℄ OF SCREEN WHEN IN PIT. THESE DWGS ARE NOT CRITICAL FOR ℄ FOR PLATE.	
2	Include USQ : WP #.		2. ACCEPT	
3	Page 5, general: are tolerances to be specified on print?		3. TOLERANCES NOT REQUIRED ON EXISTING DWG – BOT IS ON FAB. DWG (PAGE 9) WILL ADD TO DWG.	
4	Page 7 are deleted reviews relevant to any other plates common to the print?		4. NO ONLY TO S-102 COVER ONLY	
5	deflection calculation does not include lead plate, and weight of up to 3 operators. Also, no summary is included of deflection. Obviously .02 is acceptable, but this is not compared to an acceptable limit or summarized as negligible.		5. SAFETY FACTOR OF ~~10~~ 24 CWL 10/22/98 COVERS ADD 1" LEAD PLATE. WILL ADD STATEMENT THAT .02" IS NEGLIGIBLE COMPARED TO .2" FOR A SF OF 5.	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
10/22/98	1
3. Project No.	4. Page
	1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
ECN-638523/S-102 COVER PLATE	SALTWELL/ISE/S-FARM/S-102	TJ VOLKMAN	QA	2704HV/F-113

17. Comment Submittal Approval

Organization Manager (optional)

10. Agreement with indicated comment disposition(s)

TJ Volkman
Reviewer/Point of Contact

10/22/98
Date

C.B. McJoy
Author/Originator

11. **CLOSED**

TJ Volkman
Reviewer/Point of Contact

10/27/98
Date

C.B. McJoy
Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	14. Hold Point	15. Disposition (provide justification if NOT accepted).	16. Status
1	COMMENTS DISPOSITIONED AT DESIGN REVIEW MEETING		ACCEPTED	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
10/22/98	1
3. Project No.	4. Page
	1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
ECN-638523/S-102 COVER PLATE	SALTWELL/ISE/S-FARM/S-102	JN DOELER	S FARM COGNIZANT ENGINEER	MO-281/B-105

17. Comment Submittal Approval

Organization Manager (optional)

10. Agreement with indicated comment disposition(s)

J N Doeler — Reviewer/Point of Contact

10/27/98 — Date

C. B McLey — Author/Originator

11. **CLOSED**

J N Doeler — Reviewer/Point of Contact

10/27/98 — Date

C B McLey — Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	14. Hold Point	15. Disposition (provide justification if NOT accepted).	16. Status
1	NO COMMENTS			

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
3. Project No.	4. Page 1 of

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
ECN 638523, adds cover plate w/shielding plate to pit S-102 transmitted by Interoffice Memo from Charles B. McVey	Saltwell/ISE/ S-Farm/S-102	GP Janicek	Characterization Engineering/ Design Authority	2704HV/A104 376-2225

17. Comment Submittal Approval:

Organization Manager (Optional)

10. Agreement with indicated comment disposition(s)

Date 10/29/98 Reviewer/Point of Contact

Author/Originator

11. CLOSED

Date 10/29/98 Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Interoffice Memo - An EDT is the proper form for distributing formal design review materials, including: items to be reviewed, *basis of review, *design review board members (w/area of review concentration), *USQ, review instructions,...etc. Some of these things, especially the "*" items, are still needed.		The memo sent with the list of DR Board members for this review. The DRM package will reflect board members, basis of review, and USQ TF-98-0904. This information was previously reviewed as part of the S-Farm Cover Plate review. S-102 was pulled out of that package due to additional lead plates.	
2	Interoffice Memo - The memo says that this ECN is generated because of the need for shielding calculations and that "this ECN provides that design." In actuality this ECN provides neither the shield calculations (or as a separate attachment) nor a shielding design for incorporation on any drawing. The ECN only includes a recommended sketch for field usage containing another ECN reference.		The draft shielding calculations were previously part of another ECN. The final approved calculations were released on 10/20/98 and delivered that day. These calculations will be part of the DRM report and will be so indicated on the ECN.	
3	ECN, page 1 - Block 12b is incomplete.		Added Work Package WS-98-00103M	
4	ECN, page 1 - Block 4 requires a USQ. USQ needs to be part of the review materials.		Added USQ TF-98-0904	

REVIEW COMMENT RECORD (RCR)	1. Date	2. Review No.
	3. Project No.	4. Page 2 of

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
5	ECN, page 2 - Block 20 should indicate how "dome loading" (checked in block 19) will need to be addressed.		Accept, added WS-98-00103M to item 20.	
6	ECN, page 2 - Block 21: a) Type in name for Design Authority, and b) add and type in name of "Formal design review chairman". Also, make sure the manager of the individual who performed the design calculations is included as an approver.		Accept, added GP Janicek to Design Authority, will add note that CB McVey is the Chairman. MR Koch is the Cognizant Manager of the individual performing the calculations.	
7	ECN, page 4 & 5 - There is no difference between details 14 and 15. The "as shown" detail 14 is true for both corners of the plate.		Detail 14 represents the left hand view and Detail 15 (Opposite Hand) represent the right hand view.	
8	ECN, page 6 - This view "F" should show the 1" lead plate over the 2" cover plate. The views on pages 4 and 5 could say "lead shield plate not shown for clarity".		Accept	
9	ECN, page 9 - Revise "cover block" in "Note" to "2" cover plate".		Accept	
10	ECN, page 9 - What is P/N "N" (typical 4 places)? Is it the 2x2x1/4 angle iron? If so, the opposite corner shows a "T" section and offsets from plate edges are different than 5 1/2". Also, the details on page 5 would lead one to believe there are only 2 locations for these guides to be placed. Also, detail 16 would lead one to believe their location is on the topside of the plate, not the bottom side as shown on page 5 details. Revise presentation to clarify		Removed P/N "N". This was a carryover which was not removed from the previous review. Accept, revised drawings to clarify.	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
3. Project No.	4. Page 3 of

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
11	ECN, page 10 - This calculation only takes into account the weight of the steel plate itself. It is intended to be loaded with the lead plate as well. This additional loading should be included in the calculations. [Note: the calculation sheet is not signed and dated by both parties yet.]		Accept	
12	ECN, page 11 - This sketch (or other recommended arrangement) should be made part of the drawing. The use of the 2" steel plate is only an "allowable configuration" when overlaid with 1" lead plate. As a drawing addition, ECN 623920 would be an improper reference, a drawing callout is needed. Also suggest that the lead plate sizing and arrangement avoid having "seams" over, or near the edge of the 2" plate cutouts.		Accept	

APPENDIX C

RADIOLOGICAL DESIGN REVIEW SCREENING- 2 INCH CARBON STEEL COVER PLATE INSTALLATION AT 241-S-102 PUMP PIT

Radiological Design Review Screening – 2 Inch Carbon Steel Cover Plate Installation At 241-S-102 Pump Pit

Prepared by: David Foust 10/20/98

D. J. Foust – Senior Health Physicist
TWRS Radiological Engineering & Technical Support
Date

Reviewed by: K. W. Gray 10/20/98

K. W. Gray – Senior Health Physicist
TWRS Radiological Control – Characterization & Stabilization Projects
Date

Lockheed Martin Hanford Corporation

October 20, 1998

Scope

This document provides the calculated basis for the level of radiological design review required for the replacement of the 241-S-102 pump pit concrete cover block with a 5.1 cm (2 inch) carbon steel plate. The determination of the expected dose rate over the 241-S-102 pump pit after the installation of a 5.1 cm (2 inch) cover plate is described. The existing concrete cover block must be removed to provide access to the saltwell pump. The pit opening will be covered by a 5.1 cm (2 inch) carbon steel plate.

Also determined is the lifecycle dose due to this facility modification.

1. Calculations:

1.1. Baseline Dose Rate Determination

Based on current radiological survey report[1], with the saltwell screen installed, the maximum unshielded dose rate over the pump pit to be covered by the carbon steel plate is 500 mrem/hr. Installation of the saltwell pump will further reduce this dose rate. Dose rate reduction due to installation of the pump is conservatively assumed to be primarily due to shielding provided by the 2.5 cm (1 inch) steel base plate of the pump. The dose rate with the pump installed is determined as follows:

- The majority of the penetrating radiation from the pump pit is due the 0.662 Mev gamma emitted by the ^{137m}Ba daughter of ^{137}Cs. [2]
- The half-value layer for ^{137}Cs in iron is approximately 1.9 cm (0.75 inch). [3]

$$Dose\ Rate_{\max_{SteelShielded}} = Dose\ Rate_{\max_{Unshielded}} \times (.5)^n \quad \text{where n = number of half-value layers}$$

$$n = \frac{2.5\ cm}{1.9\ cm} = 1.3$$

$$Dose\ Rate_{\max_{pumpinstalled}} = \frac{500\ mrem}{hr} \times (.5)^{1.3} = \frac{200\ mrem}{hr}$$

Initiation of pumping activities will increase this dose rate. Previous experience with pumping activities indicates that dose rates may increase by as much as 300 mrem per hour[4] with the commencement of pumping. This would make the dose rate in the pump pit 500 mrem per hour during the pumping. The calculated dose rate over the steel cover plate during pumping operations is as follows:

$$Dose\ Rate_{\max_{pumpinstalled}} = \frac{500\ mrem}{hr} \times (.5)^{\frac{5.1}{1.9}} = \frac{77\ mrem}{hr}$$

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[1] IS000056, page 3, Item No. 23
[2] WHC-SD-WM-ER-611
[3] Shleien, page192
[4] Craft, September 1998

1.2. Life Cycle Exposure Differential

- Maximum personnel occupancy over the carbon steel cover plate is expected to be 30 minutes (0.5 hr) per week.
- S-102 pumping schedule is 1 yr. 9 mo. (91 weeks)
- Half-value layer for ^{137}Cs of concrete cover block to be replace by the carbon steel plates is 5 cm (2 inches) [5].
- Thickness of concrete cover block replaced by carbon steel plate is 56 cm (22 inches).

$$n = \frac{56\ cm}{5\ cm} = 11$$

$$Dose\ Rate_{ConcreteShielded} = \frac{500\ mrem}{hr} \times (.5)^{11} = \frac{0.2\ mrem}{hr}$$

$$\frac{77\ mrem}{hr} - \frac{0.2\ mrem}{hr} = \frac{77\ mrem}{hr}$$

$$\frac{77\ mrem}{hr} \times \frac{0.5\ hr}{week} \times 91\ weeks = 3500\ person - mrem$$

In addition, experience indicates that a maximum exposure of 100 person-mrem[6] is incurred during each pit cover removal and replacement operation. This adds 200 person-mrem to the lifecycle dose to account for installation of the steel cover, and its removal at the end of pumping operations, for a total of 3700 person-mrem.

Additional shielding would be necessary to reduce the lifecycle dose differential to less than 1000 person-mrem. The amount of additional lead (Pb) shielding necessary is as follows:

- The half value layer for ^{137}Cs in lead is 0.8 mm (0.31 inch) [7]
- Target screening dose for occupancy over plate is:

$$1000\ person - mrem - 200\ person - mrem = 800\ person - mrem$$

- Required half-value layers of additional Pb shielding to achieve target dose is:

$$800\ person - mrem = 3500\ person - mrem \times (.5)^n$$

[5] Shleien, page 192
[6] McVey, September 1998
[7] Shleien, page 192

$$\frac{800\ person-mrem}{3500\ person-mrem} = (.5)^n$$

$$\log\left(\frac{800}{3500}\right) = n \log(.5)$$

$$n = \frac{\log\left(\frac{800}{3500}\right)}{\log(.5)} = \frac{-.641}{-.301} = 2.1$$

- Thickness of Pb necessary to achieve target dose is:

$$2.1 \times 0.8\ cm = 1.7\ cm_{Pb}$$

2. Conclusion

The calculated exposure increase due to the proposed installation of the carbon steel cover plate is 3700 person-mrem for the life cycle of the project. The addition of 1.7 cm (0.67 inch) lead shielding to the steel cover plate would reduce this dose to 1000 person-mrem. This calculated exposure is based on several conservative assumptions. Actual dose rates should be verified by field measurements after installation of the cover plate. Exposure may be further reduced by administratively limiting personnel occupancy over the cover plate.

3. References

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