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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT № 612795

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Distribution	Interim Stabilization Engineering	612794, 612796, 617982, 617983, 622129, 622130, 623332
5. Proj./Prog./Dept./Div.: S-Farm Overground Transfer (OGT) Line/Interim Stabilization Project	6. Design Authority/ Design Agent/Cog. Engr.: WF Zuroff/FDNW/JN Doeler	7. Purchase Order No.: N/A

8. Originator Remarks:
For the S-Farm Overground Transfer (OGT) line between valve pits 241-S-B and 241-S-D, the attached Design Comparison and BIO Evaluation addresses pipeline design with respect to the BIO articles concerning surface leak resulting in a pool, spray leak, high wind and seismic events.

9. Equip./Component No.: N/A

10. System/Bldg./Facility: TWRS/241-S (OGT)

11. Receiver Remarks: 11A. Design Baseline Document? [x] Yes [] No

Approval of the S-Farm Overground Transfer Line Design Comparison and BIO Evaluation document is indicated by signature on this EDT.

11.A. Refer to Design Verification for S-Farm Overground Transfer Line, HNF-3381, Rev. 0, dated September 1998.

12. Major Assm. Dwg. No.: N/A

13. Permit/Permit Application No.: N/A

14. Required Response Date: March 17, 1998

15. DATA TRANSMITTED

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16. KEY

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(Ref: HNF-PRO-233)	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
2	1	DF Hicks	DF Hicks	3/18/99	S7-24	1	1	LA Gaddis	LA Gaddis	3/18/99	H5-57
2	1	QA/~~MJ Bailey~~	Michael C. Imes for MJ Bailey	6/9/99	T4-07	1	1	CH Brevick	CH Brevick	3/18/99	B4-57
2	1	Safety/OM Jakam	OM Jakam	3/23/99	S7-34	2	1	JN Doeler	JN Doeler	6/8/99	T4-07
2	1	DesAuth/WF Zuroff	WF Zuroff	3/24/99	S7-24						

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No. (N/A)
DF Hicks 6/10/99	N/A	MR Koch 6-10-99	[] Approved N/A
Signature of EDT Originator / Date	Authorized Representative for Receiving Organization / Date	Design Authority/ Cognizant Manager / Date	[] Approved w/comments
			[] Disapproved w/comments

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LETTER REPORT

(ETN-98-0005)

S-Farm Overground Transfer (OGT) Line Design Comparison and BIO Evaluation

Dale F. Hicks
Numatec Hanford Corporation, POB 1300, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

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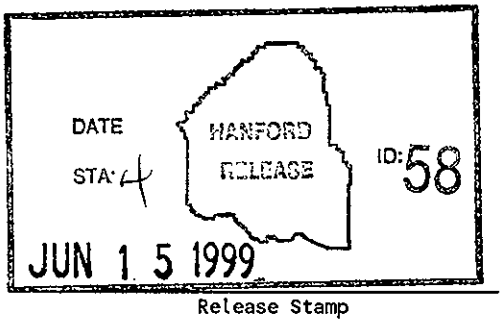
Key Words: OGT, Overground Transfer, Interim Stabilization, 241-S, 241-S-B, 241-S-D, saltwell pumping, BIO, Basis for Interim Operation.

Abstract: This document provides an evaluation of the detailed design for the 241-S Overground Transfer (OGT) line between S-Farm valve pits 241-S-B and 241-S-D. The evaluation compares the design calculations to the design features, the important assumptions, and the required controls for TWRS BIO representative accident scenarios.



Release Approval — Date — Release Stamp

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HNF-3478
Revision 0

LETTER REPORT

S-FARM OVERGROUND TRANSFER LINE

DESIGN COMPARISON AND BIO EVALUATION

September 1998

LETTER REPORT

S-FARM OVERGROUND TRANSFER LINE

DESIGN COMPARISON AND BIO EVALUATION

September 1998

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LETTER REPORT

S-FARM OVERGROUND TRANSFER LINE DESIGN COMPARISION AND BIO EVALUATION

1.0 INTRODUCTION

This report evaluates the detailed design of the S-Farm overground transfer line (OGT) line between transfer system pits 241-S-B and 241-S-D. The evaluation compares the design features, important assumptions, and required controls of the OGT line design analyzed in the TWRS BIO to the design of the S-Farm OGT line. In addition to the S-Farm OGT line evaluation, information is presented to confirm that the S-Farm OGT line will withstand the BIO Evaluation Basis high wind and the BIO evaluation basis earthquake.

2.0 SUMMARY

The design of the S-Farm OGT was compared to the OGT design analyzed for the Tank Waste Remediation System Basis for Interim Operation (TWRS BIO) accident analysis. The OGT design was found to have the same general configuration as the TWRS BIO design. The OGT design incorporates the physical features and attributes necessary to implement the controls dictated by the technical safety requirements and fulfills the TWRS BIO requirements. The functional requirements and performance criteria have been incorporated into the design.

3.0 APPROACH/ EVALUATION

A. Scope

This evaluation compares the S-Farm OGT line design attributes with those required for the OGT line design analyzed in the TWRS BIO with respect to BIO sections 5.3.2.18, *Surface Leak Resulting in Pool*, and 5.3.2.20, *Spray Leak in Structure or From Overground Waste Transfer Line*. Information on the analysis and evaluation of the design with respect to the BIO evaluation basis high wind and seismic events is also presented.

B. Design Configuration Comparison Basis

The OGT line analyzed for the TWRS BIO used the drawings and related engineering change notices (ECNs) shown in Table 1 as the basis for the hazards analysis.

Table 1

Drawing Number	ECN Number
H-2-818280	618349
H-2-818279	622123
H-2-818281	622514
H-2-818283	623918
H-14-100414	624949
	626427
	626429
	626431
	627903

The drawings listed in Table 1, and others, are the basis for the S-Farm OGT line design. The S-Farm OGT line design, with minor changes, is the design that was analyzed in the TWRS BIO.

The following drawings, incorporating those features analyzed for the BIO OGT, describe the S-Farm OGT line arrangement:

- H-2-829564, Rev. 0, Sh 1, *Civil/Piping 241-S OGT Pipeline Plan and Profile*
- H-2-829564, Rev. 0, Sh 2, *Civil/Piping 241-S OGT Pipeline Details*
- H-2-829565, Rev. 0, Sh 1, *Civil/Piping 241-S OGT Shielding Plan and Profile*
- H-2-829565, Rev. 0, Sh 2, *Civil/Piping 241-S OGT Shielding Details*
- H-2-829566, Rev. 0, Sh 1, *Electrical/Instm S-Farm OGT Pipeline Plan*
- H-2-829566, Rev. 0, Sh 2, *Electrical/Instm S-Farm OGT Pipeline Details & Elementary*

C. Design Configuration Comparison

1. Surface Leak Resulting in Pool Accident Comparison

Section 6.0 of BIO Table 5.3.2.18-3, *Safety Structures, Systems, and Components for Surface Leak Resulting in Pool*, is shown in Table 2. The table shows the structure, systems, or components (SCC); the safety classification; and the safety function that were identified in the hazard analysis and required for the BX-Farm OGT line design.

Table 2

Section 6.0, Surface Pools Due to Leaks From Temporary SST OGT Lines

Structures, Systems, or Components	Safety Classification		Safety Function	Comments
	SC	SS		
6.1 OGT encasements and connections	x	--	Provide secondary confinement for leaks from primary line; route leak from primary line back to process pit.	
6.2 OGT concrete shielding system	x	--	Protect OGT from vehicle impacts (if vehicle controls not implemented).	Shield blocks will be needed for shielding purposes during some transfers.
6.3 Leak detectors in interfacing pits and their interlocks with the waste transfer pump(s) or alarm	x	--	Detect leak, shutdown transfer before interfacing pit(s) overflow.	

The S-Farm OGT line design incorporates an encasement line, and a concrete shielding system required to mitigate or prevent the *Surface Leak Resulting in Pool* accident. The scope of this evaluation does not extend to the evaluation of leak detectors in the interfacing pits. The encasement and connections system and the concrete shielding system have been designed and constructed as Safety Class SSCs.

2. Spray Leak in Structure or From Overground Waste Transfer Line Accident

Section 4.0 of BIO Table 5.3.2.20-3, *Safety Structures, Systems, and Components for Spray Leaks* is shown in Table 3. The table shows the structure, systems, or components; the safety classification; and the safety function that were identified in the hazard analysis and required for the BX-Farm OGT line design.

Table 3

Section 4.0 Spray Leaks From Single-Shell Tank Overground Transfer Lines

Structures, Systems, or Components	Safety Classification		Safety Function	Comments
	SC	SS		
4.1 OGT encasements and connections	x	--	Confine leak from the primary piping and ensure that a leak is directed to the encasement leak detection system.	The OGT pipe encasement shall be design to withstand the design basis earthquake and high wind.
4.2 OGT concrete shielding system	x	--	Prevent vehicle collisions with the OGT system that could result in a loss of integrity of the primary and encasement pipe.	

The S-Farm OGT line design incorporates both an encasement and connections system and the concrete shielding system. The encasement and shielding systems have been designed and constructed as Safety Class SSCs.

D. Key Assumptions

1. Surface Leak Resulting in Pool Accident

There are no key assumptions related to the accident frequency estimate. The following assumptions are important to the accident consequence estimate.

- The controls selected to prevent misroutes through open nozzles into the pits and to prevent jumpers from disconnecting are assumed to preclude high flowrate leaks into the pit.
- The maximum leak rate into the pit, given the preventative controls, is assumed to be 1.3 L/s (20 gpm) from a degraded gasket.
- The leak is assumed to occur in the A-A valve pit, the smallest valve pit in the 200-East Area.
- The pit leak detector alarm is assumed to annunciate after 51 mm (2 in.) of waste have built up in the pit.
- The operator is assumed to shut down the appropriate transfer pump 30 minutes after the leak detector alarm goes off.
- The cover blocks provide tortuous leak paths.

None of these assumptions are affected by the OGT design.

2. Spray Leak in Structure or From Overground Waste Transfer Line Accident

There are no key assumptions related to the accident frequency estimate. The following are assumptions important to the accident consequences.

- For the scenario without controls, the spray is assumed to occur at maximum transfer pump pressure of 2.17×10^6 Pa (300 psig).
- The cover blocks provide tortuous leak paths.
- Maximum waste temperature during transfers is assumed to be 49 °C (120 °F).
- For the scenario assuming controls, the pit drain is assumed to be closed to maximize the quantity of air expelled because of liquid displacement.

None of these assumptions are affected by the OGT design.

E. Confirmation of Natural Phenomena Design Margins

The OGT line piping system was stress analyzed using the software program AutoPipe Version 4.6. The program used the encasement pipe configuration shown on drawing H-2-829564, Rev. 0. The analysis considered sustained, thermal, and seismic loads. The seismic load was that required by the TWRS BIO (0.19g peak horizontal acceleration). Wind loads were not considered in the analysis for the following reasons:

- Since the pipe is approximately 3 feet above ground, the wind loads are insignificant.

- The seismic loads are more critical when compared to wind loads. Wind loads and seismic loads need to be treated separately in accordance with the requirements of ASME Code B31.3. Also, the OGT system design calls for concrete shielding blocks to be placed around the piping system, which will minimize the wind effects. The analysis results indicate that pipe stresses in sustained, thermal, and seismic categories meet ASME Code B31.3 requirements. The analysis is documented in Calculation 41-26-2*P-1 (Ref. 1), which is part of the project file.

A stability analysis was also performed on the concrete shielding for seismic, wind, and impact loads. The analysis results indicate that the stability of the concrete shielding blocks is adequate for the specified loads. The pipe supports were also analyzed for the required seismic loading and found to be adequate. The analysis is documented in Calculation 41-26-2-*C-1 (Ref. 2), which is part of the project file.

4.0 CONCLUSIONS

The S-Farm OGT line design is the same basic configuration as the OGT line (BX-Farm) that was analyzed for the TWRS BIO hazards analysis. The same design features required for TWRS BIO controls associated with BIO sections 5.3.2.18, *Surface Leak Resulting in Pool,* and 5.3.2.20, *Spray Leak in Structure or From Overground Waste Transfer Line,* have been duplicated in the S-Farm OGT line design.

Engineering analysis confirms the design adequacy with respect to natural phenomena occurences of seismic events and high winds.

5.0 REFERENCES

1. Design Analysis Calculation 41-26-2*P-1, *Overground Transfer Encasement Pipe Stress Analysis.*
2. Design Analysis Calculation 41-26-2-*C-1, *Concrete Shielding Stability and Pipe Supports.*

DISTRIBUTION SHEET

To	From	Page	1 of 1
Distribution	Interim Stabilization Engineering	Date	03/18/99
Project Title/Work Order		EDT No.	612795
S-Farm Overground Transfer (OGT) Line/103360/EF00-588/50		ECN No.	N/A

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