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ENGINEERING DATA TRANSMITTAL

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8. Originator Remarks: For release		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: 241-S-106
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15. DATA TRANSMITTED

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1	HNF-4305	N/A	0	Organic End State Analysis of Tank 241-S-106	N/A	2	1	1

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
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		Design Authority									
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2	1	Cog.Eng. K.D. Fowler	[signature]	4/1/99	R2-11						
1	1	Cog. Mgr. N.W. Kirch	[signature]	4/1/99	R2-11						
		QA									
		Safety									
		Env.									

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
K.D. Fowler [signature] 4/1/99 Signature of EDT Originator / Date	N/A Authorized Representative for Receiving Organization / Date	N.W. Kirch [signature] 4-1-99 Design Authority/ Cognizant Manager / Date	[ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments

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Organic End State Analysis of Tank 241-S-106

S

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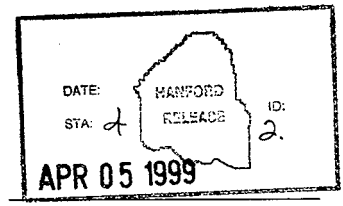


4/5/99

Release Approval Date

Release Stamp

Approved for Public Release

ORGANIC END STATE ANALYSIS OF TANK 241-S-106

1.0 PURPOSE

This document provides a record of the organic end state analysis of tank 241-S-106.

2.0 OPEN ITEMS

There are no open items.

3.0 DESCRIPTION OF TANK 241-S-106

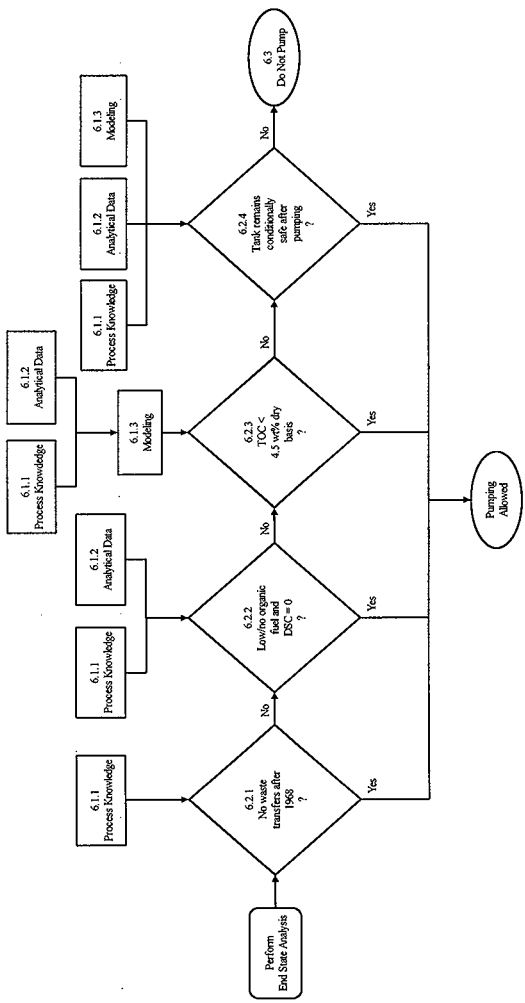
Tank 241-S-106 is one of twelve 22.9-meter (75-feet) diameter single-shell tanks in the 241-S Tank Farm in the 200 West Area of Hanford. This tank was built in 1951 and has a capacity of 2870 kiloliter (kL) (758 kilogallon [kgal]).

According to Hanlon (1999), tank 241-S-106 currently contains 1813 kL (479 kgal) of waste comprised of 1613 kL (426 kgal) saltcake, 200 kL (53 kgal) supernatant. Included in those volumes is 719 kL (190 kgal) drainable interstitial liquid. The pumpable volume is estimated at 920 kL (243 kgal). The waste is designated as non-complexed (NCPLX). Tank 241-S-106 is not a Watch List tank. Tank 241-S-106 has not been declared as a leaker.

4.0 METHOD OF ANALYSIS

Analysis of tank 241-S-106 is per the methodology in HNF-SD-WM-PROC-021, Revision 2-A, Section 20.0, "End-State Organic Analysis Methodology (Single-Shell Tanks)," (Adams, 1999). Figure 1 shows the decision logic used to determine if a tank can be pumped. Information that provides the input to a decision block (criterion) is evaluated. If the preponderance of evidence (information) supports an answer of "Yes" to the decision block, pumping is allowed. If a decision block is answered "No," the logic proceeds to the next decision block and associated inputs.

Figure 1. Logic To Determine Whether A Tank Can Be Pumped



Notes:

DSC = Differential scanning calorimetry
TOC = Total organic carbon

5.0 RESULTS OF ANALYSIS

Proceeding from left to right through the decision logic shown on Figure 1, a determination can be made as to whether saltwell pumping of tank 241-S-106 for interim stabilization will be allowed. The results of each step are presented in this section. The conclusion of this analysis is that tank 241-S-106 can be pumped because the tank will remain in the conditionally safe category after pumping. That determination is documented in this section.

5.1 Criterion 6.2.1: No Waste Transfers After 1968

Criterion 6.2.1 requires that there were no waste transfers into the tank after 1968.

Waste Transfer History

- A description of the waste transfer history is taken from Field (1998). Tank 241-S-106 was filled with waste from the reduction-oxidation (REDOX) facility from the second quarter of 1953 until the third quarter of 1953. From 1973 to 1975 tank 241-S-106 received evaporator bottoms waste from the 242-S Evaporator/Crystallizer via tank 241-S-102. Therefore, tank 241-S-106 received waste transfers after 1968. Tank 241-S-106 was removed from service in 1976 and was partially isolated in 1982.

Criterion 6.2.1 is not satisfied because waste transfers into the tank occurred after 1968. The decision logic branch requires performance of criterion 6.2.2.

5.2 Criterion 6.2.2: Low/No Organic and No Exotherms

Criterion 6.2.2 requires that the process history show the tank is expected to have no/low organic content (defined as the bulk waste possessing less than 0.53 wt% TOC) and that the differential scanning calorimetry (DSC) results show that there are no exotherms.

- The process history of tank 241-S-106 indicates that the waste is expected to meet the low/no organic fuel content criteria. Per Field (1998), the total inventory of TOC in tank 241-S-106 is estimated at 6,110 kg. This mass of TOC is distributed through 1,813,000 liters of waste with an average bulk density of about 1.6. This results in a bulk TOC concentration of about 0.21 wt%. Additionally, tank 241-S-106 samples contained a maximum total organic carbon (TOC) content of 0.655 wt% (dry basis) for the solids and 0.533 wt% (dry basis) for drainable liquid (Field, 1998). These maximum values exceed the 0.53 wt% criterion.

- Analysis showed that six samples of 241-S-106 waste exhibited DSC results in excess of the 480 joules per gram, dry weight basis, action limit.

Both conditions of criterion 6.2.2 are exceeded. The decision logic branch requires performance of criterion 6.2.3.

5.3 Criterion 6.2.3: TOC Less Tank 4.5 Weight Percent Dry Basis

Criterion 6.2.3 requires that an analysis of variance (ANOVA) analysis using analytical data be used to determine whether the TOC in a tank is less than the limit of 4.5 wt% on a dry basis at the 95 percentile with a 95 percent confidence.

- A propagation analysis for all single-shell tanks is included in Meacham, et al., (1998). Results show that propagation is not possible in tank 241-S-106 because assessment of waste transfer records and process history indicates that the tank received low complexant concentrations. In addition, sample data and ANOVA modeling show low TOC concentrations.

A tank is considered to pass the ANOVA screening if the upper 95% bound dry combustible waste fraction of the tank is below 5%. For tank 241-S-106 the upper 95% dry combustible waste fraction is 0% (Meacham, et al., 1998). Therefore, Criterion 6.2.3 is met, permitting pumping of liquid from the tank.

6.0 CONCLUSION

The organic end state analysis of tank 241-S-106 concludes that the tank can be pumped for interim stabilization. Saltwell pumping of the tank will not cause the waste in the tank to be categorized as unsafe.

7.0 REFERENCES

Adams, M. R., 1999, *Tank Waste Remediation System Process Engineering Instruction Manual*, HNF-SD-WM-PROC-021, Rev. 2-A, Lockheed Martin Hanford Corp., Richland, Washington.

Field, J. G., 1998, *Tank Characterization Report for Single-Shell Tank 241-S-106*, HNF-SD-WM-ER-714, Rev. 1, Lockheed Martin Hanford Corp., Richland, Washington.

Hanlon, B. M., 1999, *Waste Tank Summary Report for Month Ending December 31, 1998*, HNF-EP-0182-129, Lockheed Martin Hanford Corp., Richland, Washington.

Meacham, J. E., W. L. Cowley, A. B. Webb, N. W. Kirch, J. A. Lechelt, D. A. Reynolds, L. A. Stauffer, D. B. Bechtold, D. M. Camaioni, F. Gao, R. T. Hallen, and P. G. Heasler, J. L. Huckaby, R. D. Scheele, C. S. Simmons, J. J. Toth, and L. M. Stock, 1998, *Organic Complexant Topical Report: Final Draft*, HNF-SD-WM-CN-058, Rev. 2, DE&S Hanford, Inc., Richland, Washington.

CHECKLIST FOR DOCUMENT REVIEW

Document Reviewed: HNF-4305 Revision: 0

Scope of Review: Comprehensive

Yes	No	NA	
[X]	[ ]	[ ]	Problem completely defined.
[X]	[ ]	[ ]	Appropriate analytical methods used.
[X]	[ ]	[ ]	Necessary assumptions explicitly stated and supported.
[ ]	[ ]	[X]	Computer codes and data files documented.
[X]	[ ]	[ ]	Data used in calculations explicitly stated in document.
[X]	[ ]	[ ]	Data checked for consistency with original source information as applicable.
[ ]	[ ]	[X]	Mathematical derivations checked including dimensional consistency of results.
[ ]	[ ]	[X]	Models appropriate and used within range of validity or use outside range of established validity justified.
[X]	[ ]	[ ]	Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations.
[ ]	[ ]	[X]	Software input correct and consistent with document reviewed.
[ ]	[ ]	[X]	Software output consistent with input and with results reported in document reviewed.
[X]	[ ]	[ ]	Limits/criteria/guidelines applied to analysis results are appropriate and referenced. Limits/criteria/guidelines checked against references.
[X]	[ ]	[ ]	Safety margins consistent with good engineering practices.
[X]	[ ]	[ ]	Conclusions consistent with analytical results and applicable limits.
[X]	[ ]	[ ]	Results and conclusions address all points required in the problem statement.
[ ]	[X]	*	Review calculations, comments, and/or notes are attached.

[X] [ ] [ ] **Document approved.**

D.A. Reynolds D.A. Reynolds 4/1/99

Reviewer (Printed Name and Signature) Date

* Any calculations, comments, or notes generated as part of this review should be signed, dated and attached to this checklist. Such material should be labeled and recorded in such a manner as to be intelligible to a technically qualified third party.

DISTRIBUTION SHEET

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