

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN **653799**

Proj. ECN

| | | | | |
|---|---|---|-------------------------------|--|
| 2. ECN Category (mark one) Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Standby <input type="checkbox"/> Supersedure <input type="checkbox"/> Cancel/Void <input type="checkbox"/> | 3. Originator's Name, Organization, MSIN, and Telephone No. Andrew M. Templeton, Data Assessment and Interpretation, R2-12, 373-5589 | 4. USQ Required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 5. Date 05/25/99 | |
| | 6. Project Title/No./Work Order No. Tank 241-AY-101 | 7. Bldg./Sys./Fac. No. 241-AY-101 | 8. Approval Designator N/A | |
| | 9. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-ER-605, Rev. 0-B | 10. Related ECN No(s). ECNs: 640356, 644492 | 11. Related PO No. N/A | |

| | | | |
|---|------------------------------|---|--|
| 12a. Modification Work <input type="checkbox"/> Yes (fill out Blk. 12b) <input checked="" type="checkbox"/> No (NA Blks. 12b, 12c, 12d) | 12b. Work Package No. N/A | 12c. Modification Work Complete N/A | 12d. Restored to Original Condition (Temp. or Standby ECN only) N/A |
| Design Authority/Cog. Engineer Signature & Date | | Design Authority/Cog. Engineer Signature & Date | |

13a. Description of Change
 This ECN has been generated in order to update the document to reflect results of recent data/information evaluation.

13b. Design Baseline Document? Yes No

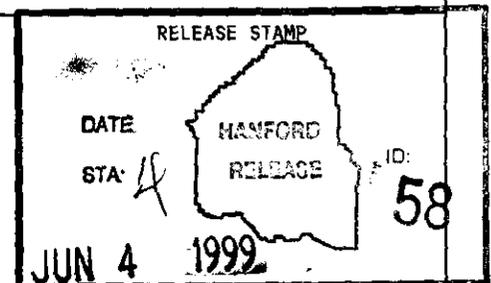
Replace pages:
 ES-9, ES-10, 6-3, 6-4, and 7-1 through 7-4

14a. Justification (mark one)

| | | | |
|---|---|--|--|
| Criteria Change <input checked="" type="checkbox"/> | Design Improvement <input type="checkbox"/> | Environmental <input type="checkbox"/> | Facility Deactivation <input type="checkbox"/> |
| As-Found <input type="checkbox"/> | Facilitate Const <input type="checkbox"/> | Const. Error/Omission <input type="checkbox"/> | Design Error/Omission <input type="checkbox"/> |

14b. Justification Details
 A tank characterization report page change revision is required to reflect the results of recent evaluation of data/information pertaining to adequacy of tank sampling for safety screening purposes (Reynolds et al. 1999. Evaluation of Tank Data for Safety Screening, HNF-4217, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington).

15. Distribution (include name, MSIN, and no. of copies)
 See attached distribution.



Tank Characterization Report for Double-Shell Tank 241-AY-101

Andrew M. Templeton

Lockheed Martin Hanford Corp., Richland, WA 99352
U.S. Department of Energy Contract 8023764-9-K001

EDT/ECN: ECN-653799 UC: 2070
Org Code: 74B20 CACN/COA: 102217/EI00
B&R Code: EW 3120074 Total Pages: 163

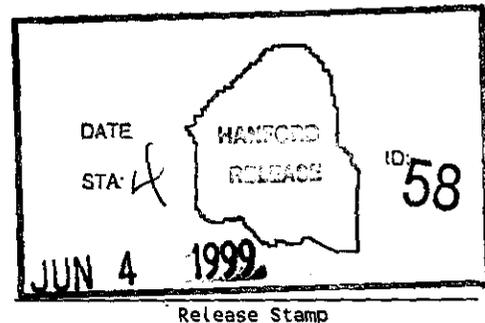
Key Words: Waste Characterization, Double-Shell Tank, DST, Tank 241-AY-101, Tank AY-101, AY-101, AY Farm, Tank Characterization Report, TCR, Waste Inventory, TPA Milestone M-44

Abstract: N/A

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: WHC/BCS Document Control Services, P.O. Box 1970, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

 6/4/99
Release Approval Date



Approved for Public Release

specification limit. The phosphate concentration at 1.2×10^{-2} M was below the 0.1-M limit for concern about mixing with wastes that would cause crystallization and plugging of equipment.

The only evaporator DQO analyses required in addition to those for other DQOs were for ammonia and acetone. The ammonia results were far below the upper limit. The acetone results are not yet available, but will be included in a revised report.

According to the criteria established by the safety screening, waste compatibility, and evaporator DQOs, all analytical results except hydroxide met the specifications for a "safe" tank. The tank was sufficiently sampled to satisfy the requirements of safety screening (Reynolds et al. 1999). The low hydroxide concentrations are an operational safety concern for corrosion of tank carbon steel components. No immediate further sampling is required for hydroxyl determination based on a review of the corrosion implications of the hydroxyl, nitrate and nitrite concentrations. Steps being considered to meet the corrosion concern include transfer of the supernatant liquid to a caustic-rich tank, caustic addition to the residue, and routine sampling.

Table ES-2 provides concentration and inventory estimates for the major analytes and analytes of concern based on the 1996 grab sample analyses.

Table ES-2. Chemical Data Summary for Tank 241-AY-101.¹ (2 sheets)

| Analyte | Sludge Data | | | Supernatant Data | | | Tank Projected Inventory |
|-----------------------|-------------------|------------|---------------------|-------------------|------------|---------------------|--------------------------|
| | Overall Mean | RSD (Mean) | Projected Inventory | Overall Mean | RSD (Mean) | Projected Inventory | |
| METALS: | $\mu\text{g/g}$ | % | kg^2 | $\mu\text{g/mL}$ | % | kg | kg^1 |
| Aluminum | 59,000 | 4.4 | 15,800 | < 12.1 | N/A | < 39.1 | 15,800 |
| Calcium | 3,290 | 7.5 | 983 | -- | -- | -- | 983 |
| Chromium | 1,780 | 4.4 | 491 | 105 | 1.6 | 339 | 830 |
| Iron | 15,700 | 1.6 | 4,210 | < 12.0 | N/A | < 38.7 | 4,250 |
| Lanthanum | 2,850 | 3.1 | 852 | -- | -- | -- | 852 |
| Manganese | 2,580 | 3.2 | 692 | < 2.39 | N/A | < 7.72 | 700 |
| Phosphorus | 5,280 | 1.6 | 1,578 | -- | -- | -- | 1,578 |
| Silicon | 1,210 | 9.7 | 362 | < 12.0 | n/a | < 38.7 | 401 |
| Sodium | 79,600 | 4.3 | 28,100 | 51,900 | 1.1 | 1.68E+05 | 1.96E+05 |
| Sulfur | 1,190 | 1.7 | 486 | -- | -- | -- | 486 |
| AMMONIA/ANIONS | $\mu\text{g/g}^6$ | % | kg | $\mu\text{g/mL}$ | % | kg | kg |
| Ammonia | --- | --- | --- | 25.2 | 9.4 | 81.4 | 81.4 |
| Nitrate | --- | --- | --- | 26,000 | 2.2 | 84,000 | 84,000 |
| Nitrite | --- | --- | --- | 35,300 | 2.6 | 1.14E+05 | 1.14E+05 |
| Phosphate | --- | --- | --- | 1,150 | 22.5 | 3,710 | 3,710 |
| Sulfate | --- | --- | --- | 5,870 | 3.3 | 19,000 | 19,000 |
| RADIONUCLIDES | $\mu\text{Ci/g}$ | % | Ci | $\mu\text{Ci/mL}$ | % | Ci | Ci |
| Total alpha | 3.12 ⁵ | 1.6 | 1,270 | 0.0441 | 4.1 | 142 | 1,410 |
| ²⁴¹ Am | --- | --- | --- | 0.00491 | 19.9 | 15.9 | 15.9 |
| ¹³⁷ Cs | 85.6 | 7.6 | 34,200 | 86.4 | 1.1 | 2.79E+05 | 3.13E+05 |
| ^{239/240} Pu | --- | --- | --- | 0.0364 | 14.4 | 118 | 118 |

According to the criteria established in the safety screening, waste compatibility, and evaporator DQOs, all analytical results met the specifications for a "safe" tank. This tank was sufficiently sampled to satisfy the requirements of safety screening (Reynolds et al. 1999). The low hydroxide concentration is an operational safety criterion; in combination with the nitrate and nitrite at the prevailing temperatures, it is an immediate corrosion concern, with steps including transfer of supernatant liquid to another caustic-rich tank, increased sampling, and caustic addition being considered.

This page intentionally left blank.

7.0 REFERENCES

- Agnew, S. F., J. Boyer, R. A. Corbin, T. B. Duran, J. R. Fitzpatrick, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1996a, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 3*, LA-UR-96-858, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.
- Agnew, S. F., P. Baca, R. A. Corbin, T. B. Duran, and K. A. Jurgensen, 1996b, *Waste Status and Transaction Record Summary for the Southeast Quadrant*, WHC-SD-WM-TI-689, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Bratzel, D. R., 1985, *Characterization of Complexant Concentrate Solids from Tanks 107-AN, 102-AN, and 101-AY*, (internal letter 65453-85-053 to J. N. Appel, March 14), Rockwell Hanford Company, Richland, Washington.
- Brevick, C. H., L. A. Gaddis, and S. D. Consort, 1995, *Supporting Document for the Historical Tank Content Estimate for AY Tank Farm*, WHC-SD-WM-ER-317, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Buckley, L. L., H. Babad, S. M. Blacker, and K. S. Redus, 1995, *Data Quality Objective to Support Resolution of the Organic Fuel Rich Tank Safety Issue*, WHC-SD-WM-DQO-006, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Campbell, T. T., 1995, *Additional Analyses for 241-AY-101 Characterization*, (internal memorandum 77310-96-000 to J. G. Kristofzski, December 4), Westinghouse Hanford Company, Richland, Washington.
- DeLorenzo, D. S., A. T. DiCenso, D. B. Hiller, K. W. Johnson, J. H. Rutherford, D. J. Smith, and B. C. Simpson, 1994, *Tank Characterization Reference Guide*, WHC-SD-WM-TI-648, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Dukelow, G. T., J. W. Hunt, H. Babad, and J. E. Meacham, 1995, *Tank Safety Screening Data Quality Objective*, WHC-SD-WM-SP-004, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Ecology, 1991, *Dangerous Waste Regulations*, Chapter 170-303, Washington State Department of Ecology, Olympia, Washington.
- Ecology, EPA, and DOE, 1996, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

- Edrington, R. S., 1988, *Report on Characterization of 101-AY Tank Samples*, (internal letter 12221-PCL888-169 to L. M. Bergmann, July 20), Westinghouse Hanford Company, Richland, Washington.
- Esch, R. A., 1996, *Final Report for Tank 241-AY-101, Grab Samples 1AY-96-1 Through 1AY-96-10 and 1AY-96-FB*, WHC-SD-WM-178, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Fowler, K. D., 1995, *Data Quality Objectives for Tank Farms Waste Compatibility Program*, WHC-SD-WM-DQO-001, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Hanlon, B. M., 1996, *Waste Tank Summary Report for Month Ending February 29, 1996*, WHC-EP-0182-95, Westinghouse Hanford Company, Richland, Washington.
- Herting, D. L., 1996, *Characterization of Sludge Sample from Tank 241-AY-101*, (internal letter 75764-PCS96-016 to J. M. Jones, February 27), Westinghouse Hanford Company, Richland, Washington.
- Kristofzski, J. G., 1995, *Directions for Opportunistic Analyses*, (letter 75310-95-103 to Distribution, September 13), Westinghouse Hanford Company, Richland, Washington.
- Leach, C. E., and S. M. Stahl, 1993, *Hanford Site Tank Farm Facilities Interim Safety Basis*, WHC-SD-WM-ISB-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Lipnicki, J., 1995, *Waste Tank Risers Available for Sampling*, WHC-SD-WM-TI-710, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- NFPA, 1995, *National Fire Codes*, Vol. 10, Section 115, "Laser Fire Protection," National Fire Prevention Association, Quincy, Massachusetts.
- Nuclear Regulatory Commission, 1988, *Statistical Methods for Nuclear Materials Management*, NUREG-CR-4604, PNL-5849, C. A. Bennett and W. M. Bowen (eds.), U. S. Government Printing Office, Washington D. C., 20013-7082.
- Reynolds, D. A., W. T. Cowley, J. A. Lechelt, B. C. Simpson, and C. DeFigh-Price, 1999, *Evaluation of Tank Data for Safety Screening*, HNF-4217, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.
- Rollison, M. D., 1995, *Results for Tank 241-AY-101, Grab Samples*, (internal memo 8E480-95-003 to J. M. Jones, February 2), Westinghouse Hanford Company, Richland, Washington.

- Salazar, B. E., 1994, *Double-Shell Underground Waste Storage Tanks Riser Survey*, WHC-SD-RE-TI-093, Rev. 4, Westinghouse Hanford Company, Richland, Washington.
- Thompson, R. R., 1996, *Tank 241-AY-101 Grab Sampling and Analysis Plan*, WHC-SD-WM-TSAP-066, Rev. 2-A, Westinghouse Hanford Company, Richland, Washington.
- Tran, T. T., 1993, *Thermocouple Status Single-Shell and Double-Shell Waste Tanks*, WHC-SD-WM-TI-553, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Turner, D. A., H. Babad, L. L. Buckley, and J. E. Meacham, 1995, *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue*, WHC-SD-WM-DQO-006, Rev. 2, Westinghouse Hanford Company, Richland, Washington.
- Vitro Hanford Engineering Services, 1971, *Dome Plan Penetration Tank-101-AY, 241-AY*, Drawing H-2-34689, Rev. 0, ICF Kaiser Hanford Company, Richland, Washington.
- Vogel, R. E., 1994, *Results for Tank 241-AY-101*, (internal memorandum 8E480-94-108 to J. M. Jones, October 19), Westinghouse Hanford Company, Richland, Washington.
- Von Barga, B. H., 1995, *242-A Evaporator/Liquid Effluent Retention Facility Data Quality Objectives*, WHC-SD-WM-DQO-014, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1996, Surveillance Analysis Computer System database, June 14, 1996, Tank Farm Surveillance Engineering, Westinghouse Hanford Company, Richland, Washington.
- Zama, R. P., December 1967, *Tank Elevation & Details, 241-AY*, Drawing H-2-64449, Rev. 6, Vitro Hanford Engineering Services, Richland, Washington.

This page intentionally left blank.

DISTRIBUTION SHEET

| To Distribution | From Data Assessment and Interpretation | Page 1 of 2 Date 05/25/99 | | | |
|--|--|---------------------------------------|-----------|------------------------|--------------|
| Project Title/Work Order Tank Characterization Report for Double-Shell Tank 241-AY-101, WHC-SD-WM-ER-605, Rev. 0-C | | EDT No. N/A ECN No. ECN-653799 | | | |
| Name | MSIN | Text With All Attach. | Text Only | Attach./ Appendix Only | EDT/ECN Only |

OFFSITE

Sandia National Laboratory
P.O. Box 5800
MS-0744, Dept. 6404
Albuquerque, NM 87815

D. Powers X

Nuclear Consulting Services Inc.
P. O. Box 29151
Columbus, OH 43229-01051

J. L. Kovach X

Chemical Reaction Sub-TAP
P.O. Box 271
Lindsborg, KS 67456

B. C. Hudson X

SAIC
555 Quince Orchard Rd., Suite 500
Gaithersburg, MD 20878-1437

H. Sutter X

Los Alamos Laboratory
CST-14 MS-J586
P. O. Box 1663
Los Alamos, NM 87545

S. F. Agnew X

Tank Advisory Panel
102 Windham Road
Oak Ridge, TN 37830

D. O. Campbell X

DISTRIBUTION SHEET

| | | |
|--|--|-----------------------------------|
| To Distribution | From Data Assessment and Interpretation | Page 2 of 2 Date 05/25/99 |
| Project Title/Work Order Tank Characterization Report for Double-Shell Tank 241-AY-101, WHC-SD-WM-ER-605, Rev. 0-C | | EDT No. N/A ECN No. ECN-653799 |

| Name | MSIN | Text With All Attach. | Text Only | Attach./Appendix Only | EDT/ECN Only |
|------|------|-----------------------|-----------|-----------------------|--------------|
|------|------|-----------------------|-----------|-----------------------|--------------|

ONSITE

Department of Energy - Richland Operations

| | | | | | |
|---------------------|-------|---|--|--|--|
| W. S. Liou | S7-54 | X | | | |
| DOE/RL Reading Room | H2-53 | X | | | |

DE&S Hanford, Inc.

| | | | | | |
|---------------|-------|---|--|--|--|
| G. D. Johnson | S7-73 | X | | | |
|---------------|-------|---|--|--|--|

Fluor Daniel Hanford Corporation

| | | | | | |
|----------------|-------|---|--|--|--|
| J. S. Hertzell | H8-67 | X | | | |
|----------------|-------|---|--|--|--|

Lockheed Martin Hanford, Corp.

| | | | | | |
|-------------------------------------|-------|---|--|--|--|
| J. W. Cammann | R2-11 | X | | | |
| L. M. Sasaki | R2-12 | X | | | |
| B. C. Simpson | R2-12 | X | | | |
| A. M. Templeton | R2-12 | X | | | |
| R. R. Thompson | R2-12 | X | | | |
| ERC (Environmental Resource Center) | R1-51 | X | | | |
| T.C.S.R.C. | R1-10 | 5 | | | |

Lockheed Martin Services, Inc.

| | | | | | |
|---------------|-------|---|--|--|--|
| B. G. Lauzon | R1-08 | X | | | |
| Central Files | B1-07 | X | | | |
| EDMC | H6-08 | X | | | |

Numatec Hanford Corporation

| | | | | | |
|----------------|-------|---|--|--|--|
| J. S. Garfield | R3-73 | X | | | |
| D. L. Herting | T6-07 | X | | | |

Pacific Northwest National Laboratory

| | | | | | |
|--------------|-------|---|--|--|--|
| A. F. Noonan | K9-91 | X | | | |
|--------------|-------|---|--|--|--|

Scientific Applications International Corporation

| | | | | | |
|---------------|-------|---|--|--|--|
| M. D. LeClair | R3-75 | X | | | |
|---------------|-------|---|--|--|--|