

[0071622H]

INTEROFFICE MEMORANDUM

7G410-MEJ-07-004

Date: January 19, 2007

To: D. J. Washenfelder

From: M. E. Johnson *Michael E. Johnson*

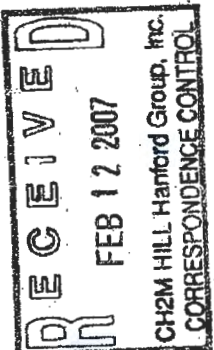
Subject: INFORMATION ON PROCESS WASTE PIPELINE FAILURES DUE TO CORROSION

- Reference
1. RPP-RPT-29191, 2006, *Supplemental Information Hanford Tank Waste Leaks*, CH2MHILL Hanford Company, Richland WA
 2. RPP-25113, 2005, *Residual Waste Inventories in the Plugged and Abandoned Pipelines at the Hanford Site*, CH2MHILL Hanford Company, Richland WA
 3. H-14-104175, 2005, revision 33, *Waste Transfer Piping Diagram 200 East Area*, U. S. Department of Energy Office of River Protection, Richland WA
 4. H-14-104176, 2005, revision 19, *Waste Transfer Piping Diagram 200 West Area*, U. S. Department of Energy Office of River Protection, Richland WA
 5. HW-35009, 1955, *An Evaluation of Buried Waste line Design Practice Interim Report No. 2 Underground Pipeline and Structure Corrosion Study Program*, General Electric Company, Richland WA
 6. HW-33504, 1954, *Cathodic Protection of Stainless Steel Waste Lines Interim Report No. 1 Underground Pipeline and Structure Corrosion Study Program*, General Electric Company, Richland WA

Over the past 60-years the Hanford site has installed in excess of 500 pipelines comprising several hundred miles for transferring radioactive waste solutions. These pipelines vary in nominal size from 1-inch to 24-inch (tank vapor header systems). Materials of construction for these pipelines include stainless steel, carbon steel, and cast iron. In some cases, carbon steel pipelines were joined to stainless steel pipelines.

From 1944 through 1947, only stainless steel pipelines were installed for the transfer of process wastes. These pipelines were directly buried in the Hanford soil either atop wooden sleepers or on concrete support structures. These pipelines initially did not have any cathodic protection system and pit corrosion failures were experienced (References 5 and 6). In circa 1947, a large percentage of the 241-U and 221-U area pipelines were exhumed and some of the stainless steel tubing was salvage after cutting out and repair of hundreds of bad spots. The new pipelines being installed as part of construction of the 241-BX Tank Farm were also removed due to pit corrosion and replaced with stainless steel pipe laid concentrically in carbon steel pipe. Some 40,000 feet of direct buried stainless steel pipelines in the 241-U Tank Farm and the 241-BX Tank Farm were replaced (Reference 6, page 10).

All stainless steel process waste pipelines at the Hanford site were protected by a cathodic protection system beginning in 1948 (Reference 6). When carbon steel pipelines began to be installed, these pipelines were also connected to the same cathodic protection system. For example of cathodic protection of a carbon steel pipeline see drawing H-2-2909, *Piping*



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Arrangement & Details First Cycle Waste Scavenging 241-C Tank Farm and H-2-41535, Electrical Conduit & Grounding Plan Cathodic Protection of Pipe Lines 241-CR Area. Several pipelines have failed in service from either corrosion or plugging with waste, since installation of the cathodic protection system.

Failed process waste pipelines were identified from review of published reports (References 1 and 2) and the Waste Transfer Piping Diagrams for the 200 East and 200 West Areas (References 3 and 4). Process waste pipelines that failed due to corrosion are identified in Table 1, along with failure mode (if known), material of construction, and service life. References 1 and 2 also identify non-process waste pipelines (e.g. vapor headers and crib lines), which are omitted from Table 1. Also listed in these references are pipelines that were cut, capped, or plugged with waste. No information was located to support that the pipelines identified as cut, capped, or plugged failed due to corrosion. Therefore, these pipelines were not included in Table 1. Hanford site drawings available in the Records Information Management System were reviewed to identify the materials of construction, sizes, and installation dates for the failed pipelines listed in Table 1 (Enclosure 2).

The cumulative number of pipelines failed versus the number of years in service is presented in Table 2 (Enclosure 1), excluding the pipelines that have unknown years in service. The failure frequency of process waste pipelines is plotted in Figure 1 (Enclosure 1).

If you have any questions on this information, please contact me at 372-3628.

MEJ:BJC

Enclosures 2

cc: H. S. Berman, R3-26
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MEJ File/LB

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Enclosure 1

Figure 1
Failure Frequency of Hanford Tank Farm Process Pipelines

Table 2
Failure Rate of Pipeline

Consisting of 2 pages, including coversheet.

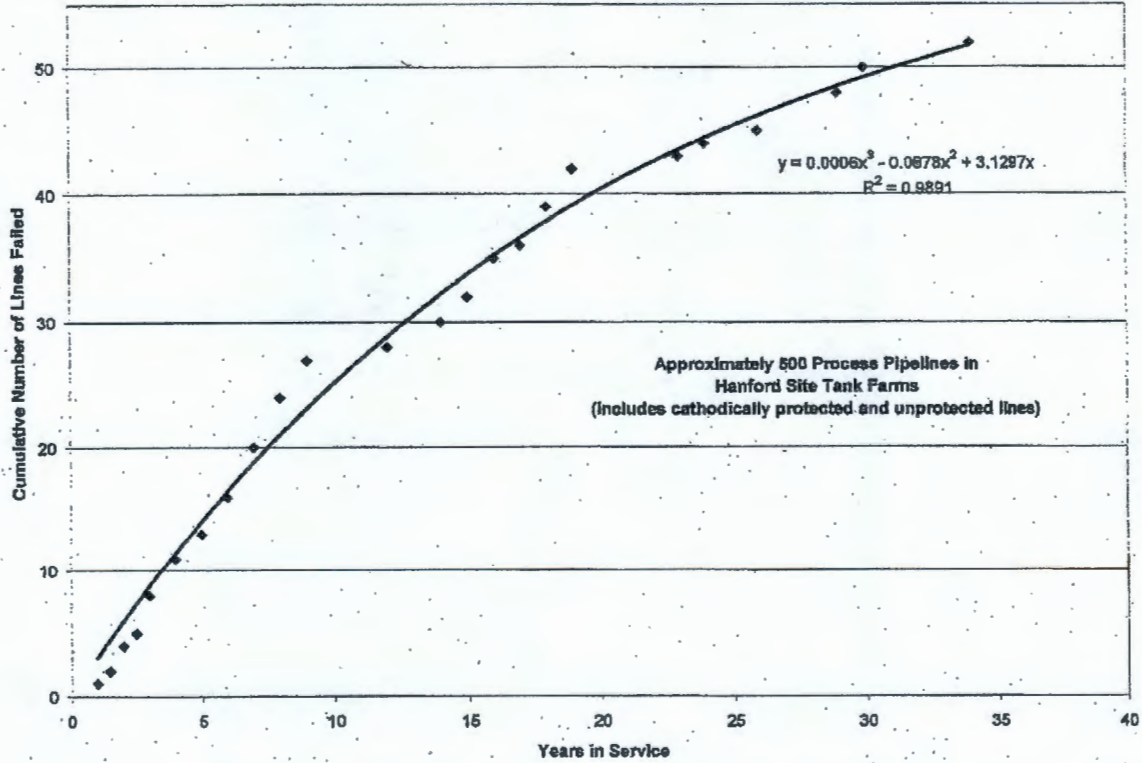


Figure 1 Failure Frequency of Hanford Tank Farm Process Pipelines

Table 2. Failure Rate of Pipelines

Estimated Years in Service	Number of Line Failures	Cumulative Line Failures
1	1	1
1.5	1	2
2	2	4
2.5	1	5
3	3	8
4	3	11
5	2	13
6	3	16
7	4	20
8	4	24
9	3	27
12	1	28
14	2	30
15	2	32
16	3	35
17	1	36
18	3	39
19	3	42
23	1	43
24	1	44
26	1	45
29	3	48
30	2	50
34	2	52

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Enclosure 2

Table 1
Failed Pipelines

Consisting of 6 pages, including coversheet

Table 1. Failed Pipelines

Line No.	Material	Approximate Year Installed	Estimated Years in Service	Status	First Connection	Second Connection	Reference
SL101	2-inch CARBON STEEL PIPE CODE M-25 4-inch CARBON STEEL PIPE CODE M-26 encasement	1973	8	Failed April 1981	241-S-152-1	241-U-D R-3	H-2-37318, CIVIL PLANS SECTIONS & DETAILS WASTE TRANSFER LINES H-2-37346, PIPING PLAN 241-U TANK FARM VALVE PITS 241-U-C & D
SL104	2-inch CARBON STEEL PIPE CODE M-25	1974	16	Failed February 12, 2000	241-U-C L-7	Tank 241-U-109-09B nozzle A	H-2-37346 H-2-37344, PIPING PLAN 241-U TANK FARM TANKS 107 & 108 & 109 & 110 & 111
SL113	2-inch CARBON STEEL PIPE CODE M-25 Polyurethane insulated	1973	6	Failed pressure test on 5/25/1979	242-S Evaporator nozzle 16	241-S-C-L3	H-2-37318 H-2-46190, VALVE PIT PIPING PLAN 241-S TANK FARM VALVE PIT 241-S-A & B
SL114	2-inch CARBON STEEL PIPE CODE M-25 Polyurethane insulated	1973	6	Failed on February 1980	242-S Evaporator nozzle 17	241-S-B-R-3. Line is capped in field.	H-2-37318, CIVIL PLANS SECTIONS & DETAILS WASTE TRANSFER LINES H-2-46190, VALVE PIT PIPING PLAN 241-S TANK FARM VALVE PIT 241-S-A & B
SL115	2-inch CARBON STEEL PIPE CODE M-25 Polyurethane insulated	1973	6	Failed pressure test on 6/10/1979	241-S-A-L10	241-S-C-L3	H-2-46188, revision 8, PIPING PLAN 241-S TANK FARM TANKS 101 102 103 105 & 106
SL116	2-inch CARBON STEEL PIPE CODE M-25 Polyurethane insulated	1973	19	Failed hydro test on 5/14/1992	241-S-D-R3, stub connected to drain	241-S-B-R10	H-2-46188
SL119	2-inch CARBON STEEL PIPE CODE M-25 Polyurethane insulated	1973	19	Failed hydro test. Line was cut and plugged on 10/23/1992	241-S-103-03A	241-S-A-L7	H-2-46188
SL126	2-inch CARBON STEEL PIPE CODE M-25	1973	7	Failed 2/21/1980 due to pinhole leaks. Waste drained.	241-S-D-R5	Capped near 241-S-107	H-2-46189, PIPING PLAN 241-S TANK FARM TANKS 107 108 109 110 111 & 112
SL133	2-inch CARBON STEEL PIPE CODE M-25	1973	15	Failed pressure test on 5/16/1988	241-SX-104-04A pump pit	241-SX-B valve pit nozzle R-7	H-2-46240, sheet 1, PIPING PLAN 241-SX TANK FARM TANKS 101 THRU 106
SL138	2-inch CARBON STEEL PIPE CODE M-25 4-inch CARBON STEEL PIPE CODE M-26 encasement	1973	7	Failed 11/1/1980	241-S-152-3	SL138 stub from 241-S-152 cut and capped in field. SL138 stub from 242-S-19 connected to SL175 stub from 241-SY-A-L3	H-2-37318
SL175	2-inch CARBON STEEL PIPE CODE M-25 4-inch CARBON STEEL PIPE CODE M-26 encasement	1976	4	Failed November 1, 1980.	241-S-152-4 capped	SL175 failed. Cut and capped close to 241-S-152. SL175 stub from 241-SY-A-L3 tied to SL138 (3/1985) and routed to 242-S-19. Line 138 stub to 241-S-152-3 failed 11/1/1980 and was capped at 241-S-152 in field close to 241-SY-B.	H-2-37780, PIPING PLAN VALVE PITS 241-SY-A & B
SL176	2-inch CARBON STEEL PIPE CODE M-25 4-inch CARBON STEEL PIPE CODE M-26 encasement	1976	4	Failed on 11/11/1980 during transfer from 242-S Evaporator to 241-SY-103	241-S-152-6	Line SL176 failed on 10/30/1980 due to stress corrosion cracking. Leak located 18-ft 2-inches from COB SY-4. Line capped at 241-S-152 and cut and capped in field close to 241-SY-B. Short stub to 241- SY-B-R3 capped.	H-2-37780
SL503	2-inch CARBON STEEL PIPE CODE M-25 4-inch CARBON STEEL PIPE CODE M-26 encasement	1980	14	Failed on 10/26/1994	204-AR Note: Although RPP-25113 claims this line connects to 204-AR, drawing H-2- 70764 shows this line connects between 241-AY-102 pump pit 02-A and sluice pit 02-D	AY-102. Tripped leak detector in sluice pit on 241-AY- 102	H-2-70764, PIPING PLAN 241-AX-B VALVE PIT TO 241-AY-TK-101 & 102

Table 1. Failed Pipelines							
Line No.	Material	Approximate Year Installed	Estimated Years in Service	Status	First Connection	Second Connection	Reference
SN215	3-inch CARBON STEEL PIPE CODE M-25 6-inch CARBON STEEL PIPE CODE M-26 encasement near 241-S-152, polyurethane insulated in 241-S Farm	1973	19	Failed pressure test on 6/12/1992	241-S-C-L1	241-S-A-L14	H-2-37318 H-2-46188
SN216	3-inch CARBON STEEL PIPE CODE M-25 6-inch CARBON STEEL PIPE CODE M-26 encasement near 241-S-152, polyurethane insulated in 241-S Farm	1973	16	Plugged. Attempts to unplug line failed 11/5 to 11/7/1999	241-S-152-nozzle 9 capped at 241-S-152 diversion box	LN216 blocked 14-ft from 241-U-D-R1 valve pit. Line failed pressure test on 9/22/1999. SN282 stub from 241-SY-B-R3 connects to SN216 and routed to 241-U-D-R1	H-2-37318 H-2-46188
SN219	3-inch CARBON STEEL PIPE CODE M-25 Polyurethane insulated	1973	17	Failed January 6, 2000	241-S-A L-15	Tank 241-S-103-03A nozzle A	H-2-46188
SN233	3-inch schedule 40 carbon steel in 6-inch pipe encasement	1976	8	Failed 11/19/1984. Leaked to encasement.	241-HR-153	244-A lift station. Leak 20-ft from 244-A lift station.	H-2-28202, CIVIL PLAN & PROFILE PROCESS LINES SN215 & SN216
SN246	3 1/2-inch Steel pipe connected to 3 1/2-inch 18-8 Cb (Stainless Steel)	1956	Unknown	Failed	244-S nozzle 17	Tank 241-S-107-07A nozzle B	H-2-36804, TK-104-S SALT WELL SYSTEM & TK-107-S H-2-3191, COATING WASTE TRANSFER LINE 241-S TO 241-U PLAN & DETAILS
SN247	2-inch CARBON STEEL PIPE CODE M-25	1979	12	Failed pressure test on 5/3/2001. Leak assumed due to failed jumpers	241-AX-B valve pit R-11, capped	241-AN-101 01E, capped.	H-2-73843, PIPING PLAN 241-AN TANK FARM FROM 241-AX TANK FARM SYS #5 H-2-73842, PIPING PLAN 241-AX TANK FARM SYSTEM NO 5
SN281	3-inch CARBON STEEL PIPE CODE M-25 6-inch CARBON STEEL PIPE CODE M-26 encasement	1976	Unknown	Failed	241-S-152-10	Line SN281 failed. Cut and capped close to 241-S-152. SN281 stub from 241-SY-A-2 also cut and capped at 241-SY-A	H-2-37780 H-2-37777, PIPING PLAN 241-SY TANK FARM 242-S BUILDING AREA
SN282	3-inch CARBON STEEL PIPE CODE M-25 6-inch CARBON STEEL PIPE CODE M-26 encasement	1976	23	Failed PRESSURE TEST September 22, 1999	241-S-152-11	Line SN282 failed. Cut and capped close to 241-S-152. Stub from 241-SY-B-R3 connected to SN216 from 241-U-D valve pit (capped), which later was blocked.	H-2-37780 and H-2-37777
SN402	3-inch CARBON STEEL PIPE CODE M-25 insulated and connected to 3 1/2-inch Stainless Steel in concrete encasement	1951 (for stainless steel) / 1981	1	Failed during saltwell pumping (before March 1982)	Line SN402 connects to an encasement adjacent to 241-TY-153 that traverse to 241-TX-155	244-TX	RHO-WM-EV-1, 1982, Jet Pumping Review, page B-2 states work was in progress in March 1982 to locate and repair the failure point in line SN-402 H-2-73903, PIPING PLAN AND DETAILS H-2-2231, DIVERSION BOX PIPING LAYOUT
V004	3 1/2-inch 304-L Stainless Steel M-21e in concrete encasement with 7-inch terra cotta sleeves	1956	16	Line failed 4/20/1972. 2,500 gallons drained from encasement. Line abandoned.	241-A-152-U2	241-A-151-L22	H-2-55952, DIVERSION BOX 241-A-152 PIPING LAYOUT H-2-53096, PIPING GENERAL ARRANGEMENT UNDERGROUND & TRENCH PIPING DIVERSION BOX STACK CATCH TANK PLAN SECTIONS
V006 ¹	3 1/2-inch 304-L Stainless Steel M-21e in concrete encasement with 7-inch terra cotta sleeves	1956	9	Line failed 3/1965	241-A-152-U4	241-A-151-L20	H-2-55952 and H-2-53096

¹ Mislabelled as V005 in RPP-25113

Table I. Failed Pipelines

Line No.	Material	Approximate Year Installed	Estimated Years in Service	Status	First Connection	Second Connection	Reference
V007	3½-inch 304-L Stainless Steel M-21e in concrete encasement with 7-inch terra cotta sleeves	1956	Unknown	Line failed	241-A-152-U6	241-A-151-L17, L-18, L-19 (Note: RFP-25113 incorrectly lists 241-A-151-L14, L-15, L-16)	H-2-55952, H-2-53096, and H-2-55976, Sheet 1, WASTE LINE ENCASEMENT PLAN & PROFILE TIE LINES BETWEEN 241-A-151 & 241-A-152
V112	3-inch 18-8 Cb (Stainless Steel)	1945	Unknown	Leaker	241-C-151 U-5		W-72183, sheet 4, DIVERSION BOXES 241-C-151 & 241-C-152 ARRGT & PIPING
V113	3-inch 18-8 Cb (Stainless Steel) (segment adjacent to 241-C-151) connected to 3-inch Schedule 40 Carbon Steel (spiral 12 and 16-gauge galvanized steel encasement over bends)	1968	7	Failed to meet pressure test requirements January 1975	Tank 241-AX-103 pump pit (PUREX sludge supernatant waste transfer line)	Diversion box 241-C-151 U-6	W-72183, sheet 4, H-2-58609, CIVIL PLAN & PROFILE LINE NUMBER V113 241-AX-101 TO 241-C-151, H-2-58610, CIVIL PARTIAL PLANS & DETAILS LINE NUMBER V113 241-AX-101 TO 241-C-151
V122	3-inch 18-8 Cb (Stainless Steel)	1945	14	On December 19, 1969, a leak was discovered near the 241-C-152 diversion box in the section of line V122 from the 105-C tank.	Tank 241-C-105 pump pit 05A	241-C-152 L-8	H-2-32484, PLAN & PROFILE CESIUM TRANSFER LINE NUMBER V122 241-CR-05A TO 241-C-152
V172	3-inch 18-8 Cb (Stainless Steel) (segment adjacent to 241-C-252) connected to 2-inch Schedule 40 Carbon Steel	1955	9	Failed June 1964	Diversion box 241-C-252 U-1	Tank 241-C-112	H-2-36835, PIPING DIV BOXES 241C-153 & 241C-252 ARRGT PLANS, H-2-2338, DIVERSION BOX 241-C-252 NOZZLE INFORMATION, H-2-2909, PIPING ARRANGEMENT & DETAILS 1ST CYCLE WASTE SCAVENGING 241-C TANK FARM
V200	3 ½-inch 18-8 Cb (Stainless Steel)	1945	2.5	Failed in service June 1947. Failed pressure test on 7/14/1974, capped at B Plant.	241-B-154 U-7	221-B Section 10, process blank installed.	H-2-432, PIPING BETWEEN 241B & 241C
V233	3 ½-inch 18-8 Cb (Stainless Steel)	1945	Unknown	Failed	241-B-151 L-4	241-B-101	W-72183, sheet 3, DIVERSION BOXES 241-B-151 & 241-B-152 ARRGT & PIPING
V329	3 ½-inch 18-8 Cb (Stainless Steel)	1945	1.5	Failed June 1946. Out of service, capped at B Plant	241-B-154 U-1	221-B Section 9, process blank	H-2-432
V330	3 ½-inch 18-8 Cb (Stainless Steel)	1945	29	Failed pressure test on 7/18/1974.	241-B-154 U-2	221-B Section 10, process blank	H-2-432
V331	3 ½-inch 18-8 Cb (Stainless Steel)	1945	29	Failed pressure test on 7/18/1974.	241-B-154 U-3	221-B Section 15, process blank	H-2-432
V333	3 ½-inch 18-8 Cb (Stainless Steel)	1945	29	Failed pressure test on 7/18/1974.	241-B-154 U-5	221-B Section 5, process blank	H-2-432
V335	3 ½-inch 18-8 Cb Grade 820-A Stainless Steel in 6-inch Carbon Steel encasement	1950	2	Apparent rupture by heavy vehicle	241-BX-154 U-1	221-B Section 11, connection 101	H-2-629, DIVERSION BOX 241-154BX PIPING CONN TO 221-B & 241-BX H-2-857, PIPING LAYOUT 154 BX, H-2-856, WASTE LINE ARRANGEMENT & DETAILS SHEET NUMBER 1, H-2-44507, sheet 3, SCHEMATIC PIPING DIAGRAM WASTE TRANSFER LINES AT 221-B
V340	3 ½-inch 18-8 Cb Grade 820-A Stainless Steel in 6-inch Carbon Steel encasement	1951	3	Failed during test	241-BX-154 U-6	221-B Section 15, connection 48	H-2-629, DIVERSION BOX 241-154BX PIPING CONN TO 221-B & 241-BX H-2-857, PIPING LAYOUT 154 BX, H-2-856, WASTE LINE ARRANGEMENT & DETAILS SHEET NUMBER 1, H-2-44507, sheet 3, SCHEMATIC PIPING DIAGRAM WASTE TRANSFER LINES AT 221-B

Table 1. Failed Pipelines

Line No.	Material	Approximate Year Installed	Estimated Years in Service	Status	First Connection	Second Connection	Reference
V342	3 1/2-inch 18-8 Cb Grade 820-A Stainless Steel in 6-inch Carbon Steel encasement	1948	24	Failed as evident by waste loss to ground and failed hydrostatic test July 1972. Line leaks at flange outside 221-B.	241-BX-154 U-8	221-B Section 12, connection 101	H-2-629, DIVERSION BOX 241-154 BX PIPING CONN TO 221-B & 241-BX H-2-857, PIPING LAYOUT 154 BX, H-2-856, WASTE LINE ARRANGEMENT & DETAILS SHEET NUMBER 1, H-2-2926, 216-B-13 FRENCH DRAIN WASTE LINES & STACK DRAIN 291-B & 221-B BLDGS
V398	3 1/2-inch 18-8 Cb (Stainless Steel)	1948	34	Failed pressure test on 5/15/1982	241-TX-155 L-5	Capped close to 241-U-151	H-2-843
V402	3 1/2-inch Stainless Steel	1952	30	Stainless steel line failed on 1/15/1982 because of chloride induced pitting	241-TX-155 L-9 open	Line cut and capped at 241-TX-155, cut and capped at 241-TY-103-12. Stub from 241-TX-155 to 241-TY-153 U-12 cut and capped in field.	H-2-843 and H-2-2231 DIVERSION BOX PIPING LAYOUT 241-TY-153
V406	3 1/2-inch Stainless Steel	1952	30	Stainless steel line failed because of chloride induced pitting. Line out.	241-TX-155 L-13 open	Line cut and capped at 241-TX-155, cut and capped at 241-TY-103-9. Stub from 241-TX-155 to 241-TY-153 U-9 cut and capped in field.	H-2-843 and H-2-2231 DIVERSION BOX PIPING LAYOUT 241-TY-153
V416	3-inch Schedule 40 Steel connected to 3-inch IPS tubing	1951 / 1946 (for 18-8 Cb)	3	Failed suddenly in service at carbon steel tie-in; November 1954	241-U-152 U-1	241-TX-153 U-10	H-2-828, DIVERSION BOX PIPING LAYOUT 241-TX-153 (stub from U-10) H-2-390, PIPING BETWEEN 241T AND 241U H-2-1204, sheet 1, FIRST CYCLE EVAPORATION 200 WEST PLOT PLAN
V426	3 1/2-inch 18-8 Cb (Stainless Steel)	1945	34	Failed 7/1979	241-U-152 L-4 capped	Line V426 failed 7/1979. Stub to 241-U-153 U-6 capped.	HW-72183, sheet 2, DIVERSION BOXES 241-U-151 & 241-U-152 ARRANGEMENT & PIPING
V601	3-inch Schedule 40 Steel connected to 3 1/2-inch 18-8 Cb (Stainless Steel)	1951 / 1946 (for 18-8 Cb)	> 15	Reported in 1966 as Leaks	241-T-152 L-10	241-TX-153 U-9	H-2-1204, sheet 1
V608	3 1/2-inch 18-8 Cb (Stainless Steel) in concrete encasement	1948	> 18	Reported in 1966 as Leaks	241-TX-153 L-2	Tank 241-TX-101	H-2-828
V624	3 1/2-inch 18-8 Cb (Stainless Steel) in concrete encasement	1948	> 18	Reported in 1966 as Leaks	242-T Evaporator condensate	241-TX-153 L-18	H-2-828
V654	3 1/2-inch 18-8 Cb (Stainless Steel)	1945	2	Failed pressure test; ground cave-in near R-19 stairwell at 221-T in July 1947	241-T-151 U-4	221-T, Section 9, nozzle 101	HW-72183, sheet 1, DIVERSION BOXES 241-T-151 & 241-T-152 ARRANGEMENT & PIPING, H-2-836, DIVERSION BOX CATCH TANK & PIPING AT 221-T, HW-72182, BUILDING 241-T PLOT PLAN
V657	3 1/2-inch 18-8 Cb (Stainless Steel)	1945	8	Failed hydrostatic test, leaks badly August 1953	241-T-151 L-1	241-T-153 U-1	HW-72183, sheet 1
V667	3 1/2-inch 18-8 Cb (Stainless Steel)	1945	8	Failed in service without warning; July 1953	241-T-152 U-4	221-T, Section 5, nozzle 11	HW-72183, sheet 1, DIVERSION BOXES 241-T-151 & 241-T-152 ARRANGEMENT & PIPING, H-2-836, DIVERSION BOX CATCH TANK & PIPING AT 221-T, HW-72182, BUILDING 241-T PLOT PLAN
V669	3 1/2-inch 18-8 Cb (Stainless Steel)	1945	9	Failed hydrostatic test; December 1954	241-T-152 U-6	221-T, Section 15, nozzle 11	HW-72183, sheet 1, DIVERSION BOXES 241-T-151 & 241-T-152 ARRANGEMENT & PIPING, H-2-836, DIVERSION BOX CATCH TANK & PIPING AT 221-T, HW-72182, BUILDING 241-T PLOT PLAN

Table 1. Failed Pipelines							
Line No.	Material	Approximate Year Installed	Estimated Years in Service	Status	First Connection	Second Connection	Reference
V671	3 1/2-inch 18-8 Cb (Stainless Steel)	1946	7	Failed hydrostatic test, appears to be corrosion failure; August 1953	241-T-152 U-9	Building 224-T Cell C connection 8	HW-7-4640, ADDITIONAL CONCENTRATION BLDG WASTE FACILITIES [361 BYPASS] [PROJECT PROPOSAL C-104]
V740	3 1/2-inch 18-8 Cb (Stainless Steel) connected to 3-inch IPS Schedule 40 18-8 Cb (Stainless Steel)	1948	> 18	Reported in 1966 as Leaks	Steam jet on 241-TX-302C catch tank	241-TX-154 U-10	H-2-839 H-2-836 H-2-832, CATCH TANK ELEVATION & PIPING ARRANGEMENT 241-TX-302 B-C & 241-UX-302
812	3-inch Schedule 40 Carbon Steel connected to Line V108 3 1/2-inch 18-8 Cb (Stainless Steel)	1945 (for 18-8 Cb) / 1968	3	Failed 3/1971	244-AR	Line 812 connected to V108 at 241-C-151 U-1	HW-72183, sheet 4
4851 / 4857	3 1/2-inch 18-8 Cb (Stainless Steel) in concrete encasement	1949	26	Failed April 28, 1975	241-TX-155 U-3	Tank 241-WR-001 connection 13	H-2-843 and H-2-983, DIVERSION BOX PIPING LAYOUT 241-UX-154
4876	3 1/2-inch 18-8 Cb (Stainless Steel) in concrete encasement	1949	5	November 1954; Sudden failure, filled catch tank, acid service	241-TX-155 U-9	Tank 241-WR-006	H-2-843 and H-2-983, DIVERSION BOX PIPING LAYOUT 241-UX-154
4877	3 1/2-inch 18-8 Cb (Stainless Steel) in concrete encasement	1949	4	Failed July 1953	241-TX-155 U-4	Tank 241-WR-006	H-2-843 and H-2-983, DIVERSION BOX PIPING LAYOUT 241-UX-154
7653	3 1/2-inch 18-8 Cb (Stainless Steel) in concrete encasement	1949	3	Failed hydrostatic test, slow leaker, acid service; December 1954	241-TX-153 L-3 (Note: Nozzle L-3 was subsequently connected to Line V609 to tank 241-TX-101)	244-TXR Tank TXR-004	H-2-40179, ENGINEERING FLOW DIAGRAM 244-TXR PROCESSING AREA WASTE METAL REMOVAL PHASE II