DUQUESNE LIGHT COMPANY

SHIPPINGPORT ATOMIC POWER STATION

TEST EVALUATION

DLCS 2390101
T-641317

PERIODIC WASTE DISPOSAL SYSTEM
MATERIAL BALANCE TEST

Section 1 of 4 Sections

First Issue, June 30, 1961

DISCLAIMER

TEST EVALUATION

DLCS 2390101
T-641317

PERIODIC WASTE DISPOSAL SYSTEM MATERIAL BALANCE TEST

CORE I SEED 2

Purpose

To determine the adequacy of storage capacity and operating procedures of the Radioactive Waste Disposal System during a normal reactor plant warmup.

Conclusions

The storage capacity and operating procedures of the Radioactive Waste Disposal System are adequate to cope with wastes accumulated during a normal reactor plant warmup.

It is impossible to perform a complete material balance (waste received by Radioactive Waste Disposal versus waste discharged from the station) based upon existing level instrumentation and using the data required by the test procedure.

During the performance of the test, approximately 21,290 gallons of waste (all classes) were received by Radioactive Waste Disposal and 13,210 gallons (all classes) were discharged to the river with a total activity of 1200 micro-curies. A quantity of 6670 gallons of reactor coolant effluent was processed. These figures are based on level instrumentation. Approximately 634 pounds of combustible waste were incinerated.

There were no difficulties in the operation of the Radioactive Waste Disposal System other than a malfunction of the effluent flow recorder at 2220 on April 5. This discrepancy was corrected by 0410 on May 6.

Description of Test Equipment and Test Procedure

This test was performed in accordance with the approved Test Procedure DLCS 23901, Periodic Waste Disposal System Material Balance Test, Core 1, Seed 2, dated September 30, 1959.

Existing level and flow instrumentation used in Waste Disposal System operation was utilized to determine changes in quantities of waste in the system.

Data concerning level instrumentation of various tanks in the Radioactive Waste Disposal System, reactor coolant temperature and pressure, the pressure of tanks in the gaseous waste system, and pertinent chemical samples were taken. This data was taken at an estimated twenty-four hours prior to a normal reactor plant warmup, every twelve hours thereafter and continued for twenty-four hours after operating temperature and pressure were attained.

Results

DLCS 2390101, Periodic Waste Disposal System Material Balance Test was performed from April 5 through April 8, 1961.

TEST EVALUATION DLCS 2390101
T-641317
PERIODIC WASTE DISPOSAL SYSTEM MATERIAL BALANCE TEST

At the beginning of the test, the reactor coolant system was at approximately 200 F T_{avg} and 500 psig, all reactor coolant loops were in service with the 1B Reactor Coolant Pump on slow speed. During the first 48 hours the temperature and pressure remained relatively constant except for a simulated rupture test (pressure increased to 1800 psig and lowered rapidly) at 1700 hours on April 5, 1961 and venting of reactor coolant pumps (pressure lowered to head tank pressure) at 1700 on April 6, 1961. Thereafter a gradual increase of reactor coolant temperature was affected until 1300 on April 7 at which time the pressurizer steam bubble was drawn. Normal operating temperature and pressure were reached at approximately 2100 hours on that date. The reactor plant remained at normal operating temperature and pressure throughout the remainder of the test except for two occasions when the system pressure was lowered to approximately 1200 psig for installation and removal of fission counters for DLCS 14902, Control Rod Positions for Criticality.

The fluctuations mentioned above contributed additional quantities of reactor coolant to Waste Disposal which may not have been contributed during a plant warmup where no testing was in progress. Figure 1 shows the status of all tanks and the plant temperature and pressure during the test. A log of events is included and indicates pertinent operations which may have influenced this test.

In order to perform a material balance on the Radioactive Waste Disposal System, the quantity of water received by the system was compared to a calculated quantity discharged from the Reactor Plant.

It was first necessary to consider the reactor coolant effluent as compared with wastes received from other sources by the Radioactive Waste Disposal System. Other classes of waste (Non-Active, Special, and Chemical) originated throughout the station and no attempt was made to determine individual sources and the quantity discharged by each. Based upon level instrumentation, 10,420 gallons of reactor coolant were received by the Radioactive Waste Disposal System. In contrast, only 7,490 gallons were accounted for as leaving the reactor plant. A material balance on this system is found in Table I.

The difficulty in resolving the difference as seen in Table I is that there is no way to determine the quantity of reactor coolant effluent received by the flash tank due to the automatic operation of the flash tank pumps. The reliability of the level instrumentation is also questionable. The Spray Recycle Tank fluctuated 7% while isolated indicating a volume change of 2000 gallons.

Sources of reactor coolant not accounted for in Table I include the venting of the reactor coolant pumps and the FEDAL pump. Also charging and draining operations occurred where the pressure and temperature of the reactor coolant were not significantly altered to show system volume changes. Sample calculations include the method of determining volume changes and thus reactor coolant drained to the flash tank.

Table II is a summary of the tank levels and volumes taken throughout the test as well as pressure readings of certain tanks and the reactor coolant temperature and

pressure. The flow path for processing during the test was from the 1C Surge and Decay Tank through the 1C, 1B, 1A and 1D ion exchanger (in that order), the gas stripper and to a test tank receiving at that particular time. Figure 1 depicts the status of all tanks during the test and also shows the temperature and pressure of the reactor coolant.

During the test, processing was interrupted by a loss of A-C power drill (one and one-half hours) on April 5 and by lack of steam (thirteen hours) on April 6 due to shutdown of the station service boiler for maintenance.

Table III contains a summary of all classes of liquid waste received by Radioactive Waste Disposal except reactor coolant effluent, and lists the permits issued authorizing the discharge of waste to the river.

It should be noted that 500 of the 2010 gallons of chemical waste which were received came from the Reactor Plant Gravity Drain Tank. This waste was diverted to the Chemical Waste System due to a CrO_4 concentration of greater than 0.05 ppm.

There was no discharge of resin during the test. The Blow-Off Tank was vented twice during the test for short periods, once at 1400 on April 6 and again at 1230 on April 8.

The incinerator was loaded twice on April 6 to incinerate a total of 617 pounds of combustible waste and once on April 7 with 117 pounds. The activity of the waste was less than 15 mr on contact prior to burning.

Table IV is a compilation of radio-chemical data obtained during the test. The quantity of waste discharged to the river, as determined by level instrumentation and flow recorder charts, is shown. The activities of the discharged waste was determined by chemical sampling. In all cases, the flow meter values were used, except the 1A Test Tank discharge when the flow meter was erratic at the beginning of the discharge.

Samples were taken from the tanks as shown in Table IV at the beginning of the test and near the end of the test.

The 1B Surge and Decay Tank which was not sampled until April 8 shows the greatest activity as would be expected since it received the bulk of reactor coolant during the test. Since the level in the 1C Surge and Decay Tank decreased from 23% when first sampled to 1% at the time of the second sample, the increase in activity is not considered significant. The activity increase in the Spray Recycle Tank is the result of that tank receiving water from the 1B Surge and Decay Tank.

The activity of waste being processed, also shown in Table IV, indicates the activity at the outlet of the components in the process flow path.

SAMPLE CALCULATIONS

1. Volume Changes Due to Temperature-Pressure Changes

$$\text{Plant Volume Change} = \left(\frac{2500}{V_1} - \frac{2500}{V_2}\right) \times \frac{1}{8.355}$$

Plant Volume Change = gallons
2500 Cubic Feet = Plant Volume (Including Pressurizer)
V_1 = Specific Volume Before Temp-Press Increase
V_2 = Specific Volume After Temp-Press Increase
8.355 lbs/gallon = Weight of Water at STP

SAMPLE:		
Date	4-5-61	4-5-61
Time	0700	0800
Temp	180 F	187 F
Press	515 PSIA	490 PSIA
Spec Vol	.016505 FT^3/lb	.016541 FT^3/lb

$$\left(\frac{2500}{.016505} - \frac{2500}{.016541}\right) \times \frac{1}{8.355} =$$

$$\frac{151469 - 151140}{8.355} = \frac{329}{8.355} = \underline{39.4 \text{ gallons}}$$

NOTE: Summary of Calculations follow sample calculations.

2. Pressurizer Volume Change Forming Steam Bubble:

Total Pressurizer Volume	261.0 FT^3
Water Volume (At 97")	115.5 FT^3
Steam Volume (At 97")	145.5 FT^3

Date 4-7-61 at 1300 hrs From 450 F and 755 psia (water) to 440 F and 380 psia (steam)

$$\text{Volume Change} = \left(\frac{145.5}{V_1} - \frac{145.5}{V_2}\right) \times \frac{1}{8.355} = \left(\frac{145.5}{.019497} - \frac{145.5}{1.2222}\right) \times \frac{1}{8.355} = \frac{7463-119}{8.355} =$$

$$\frac{7344}{8.355} = 879 \text{ gallons}$$

3. Sample Trains:

2 Trains on for 46 Hours at 40 lbs/hr.

$$\frac{2 \text{ trains} \times 46 \text{ hours} \times 40 \text{ pounds/hour}}{8.355 \text{ pounds/gallon}} = 440 \text{ gallons}$$

SAMPLE CALCULATIONS (Cont'd)

4. Calculated Drainage of Reactor Coolant:

Date	Temp. °F	Press PSIA	Weight Lbs.	Volume Gals.	
4-5					
0700	180	515	329	39.4	
0800	187	490			
4-5					
1300	180	465	467	55.9	
1500	191	515			
4-5					
1700	183	515	420	50.2	
2000	192	515			
4-5					
2300	187	505	255	30.5	
4-6					
0100	192	440			
4-6					
0200	190	490	101	12.1	
0900	192	465			
4-6					
1000	186	465	274	32.8	
1200	192	465			
4-6					
1300	185	465	2315	277.1	
4-7					
0300	223	540			
4-7					
0700	210	465	33192	3972.7	
4-8					
2400	500	1815			
			37353	4471	
4-7					
1300	450	740			
	440	380	7344	879	Pressurizer Bubble Formed
4-7					
0200	---	---	3680	440	2 Sample Trains 40 lbs/hr
4-8					
2400					

LOG OF EVENTS

Date	Time	Event
4-5-61	1005	Raising System Pressure to 1800 psig. Processing 1C Surge and Decay Tank through ion exchangers (C, B, A, D) through stripper to 1A test tank.
	1015	Started recirculating 1D Surge and Decay Tank using 1D-1 and 1D-2 transfer pumps.
	1310	1B Special Waste Tank full (78%) and isolated.
	1315	Gas stripper off due to pending loss of AC power drill.
	1330	1D-1 and 1D-2 transfer pumps off due to loss of AC power. All valves left on "RECIRCULATE".
	1350	Loss of all AC power drill.
	1411	Return of all AC power.
	1455	Gas stripper returned to service. Processing 1C Surge and Decay Tank through ion exchangers to test tank. (Same ion exchanger flow path).
	1500	Chemistry sample taken of 1D Surge and Decay Tank. Recirculating 1D Surge and Decay Tank using 1D-1 and 1D-2 transfer pumps.
	1713	1B Reactor Coolant Pump off.
	1853	Simulated Rupture.
	1900	Initiate Safety Injection Test
	2110	1A Test Tank full and isolated. 1B Test Tank now receiving. Sample taken of 1A Test Tank.
	2125	Started discharging 1B Special Waste Tank to river at rate of 20 gpm. Permit #1471.
	2133	Stopped discharging 1B Special Waste Tank to river.
	2222	Started discharging 1B Special Waste Tank to river at rate of 20 gpm. Permit #1471.
	2226	Stopped discharging 1B Special Waste Tank to river. Flow meter out of service.

LOG OF EVENTS (Cont'd)

Date	Time	Event
4-5-61 (Cont'd)	2232	Loss of Component Cooling Water Drill.
4-6-61	0000	1A and 1B Reactor Coolant Pumps on "SLOW" speed. Pre-critical check in progress for DLCS 14901.
	0410	Effluent Flow Meter repaired.
	0415	Started discharging 1A Test Tank to river at rate of 12 gpm. Permit #1472.
	0433	Reactor critical with all rods banked at 19 inches. DLCS 14901 in progress.
	0645	Gas stripper out of service due to lack of steam. 1C Surge and Decay Tank isolated.
	1005	Stopped recirculating 1D Surge and Decay Tank.
	1008	DLCS 14901 completed.
	1100	Stopped discharging 1A Test Tank to river. 1A Test Tank now empty.
	1115	Started discharging 1B Special Waste Tank to river at the rate of 20 gpm. Permit #1471.
	1200	Reactor shutdown with all control rods inserted. All loops open to reactor with 1B Reactor Coolant Pump on slow speed. Core removal cooling system in service.
	1245	Service steam supply returned.
	1330	Incinerator loaded and ignited.
	1400	Venting Blow-Off Tank so chemists can get sample. (Pressure dropped from 5.85 to 1.30 psig, purged for 45 seconds at 37.5 psia nitrogen pressure. 2.3% H_2 content at inlet to burner.)
	1420	Stopped discharging 1B Special Waste Tank to river.
	1430	Began drumming operations.
	1706	System pressure lowered to 150 psig in order to vent reactor coolant pumps.

LOG OF EVENTS (Cont'd)

Date	Time	Event
4-6-61 Cont'd	1715	Incinerator loaded and ignited.
	1945	Gas stripper in service. Processing 1C Surge and Decay Tank through four ion exchangers to 1B Surge and Decay Tank.
	2104	Reactor critical. DLCS 15101 in progress.
	2146	Safety shutdown. Intermediate range high flux (5×10^{-7} micro-amps indicated)
	2240	Gas stripper in service. Processing 1C Surge and Decay Tank through four ion exchangers to 1B Test Tank.
4-7-61	0000	Reactor shutdown with all control rods inserted. All loops open to reactor with 1B reactor coolant pump on slow speed.
	0445	Wet gas scrubber flushed and refilled.
	0748	Reactor critical. DLCS 15101 in progress.
	0800	Flow rates on all tanks adjusted.
	0845	Incinerator loaded and ignited. Wet gas scrubber on.
	1210	DLCS 15101 completed.
	1251	Reactor shutdown with all control rods inserted CB-14 open. Pre-critical check started.
	1330	1A Special Waste Tank isolated. 1B Special Waste Tank now receiving.
	1335	Discharging Spray Recycle Tank through Flash Tank to 1B Surge and Decay Tank at 250 gpm.
	1339	Stopped discharging Spray Recycle Tank.
	1340	1A Vent gas compressor out of service for repairs. Clearance # 165072.
	1400	Sample taken of 1C Surge and Decay Tank and four ion exchangers. 1C ion exchanger isolated. Spray Recycle Tank inlet valve opened to receive from 1C Surge and Decay Tank.

LOG OF EVENTS (Cont'd)

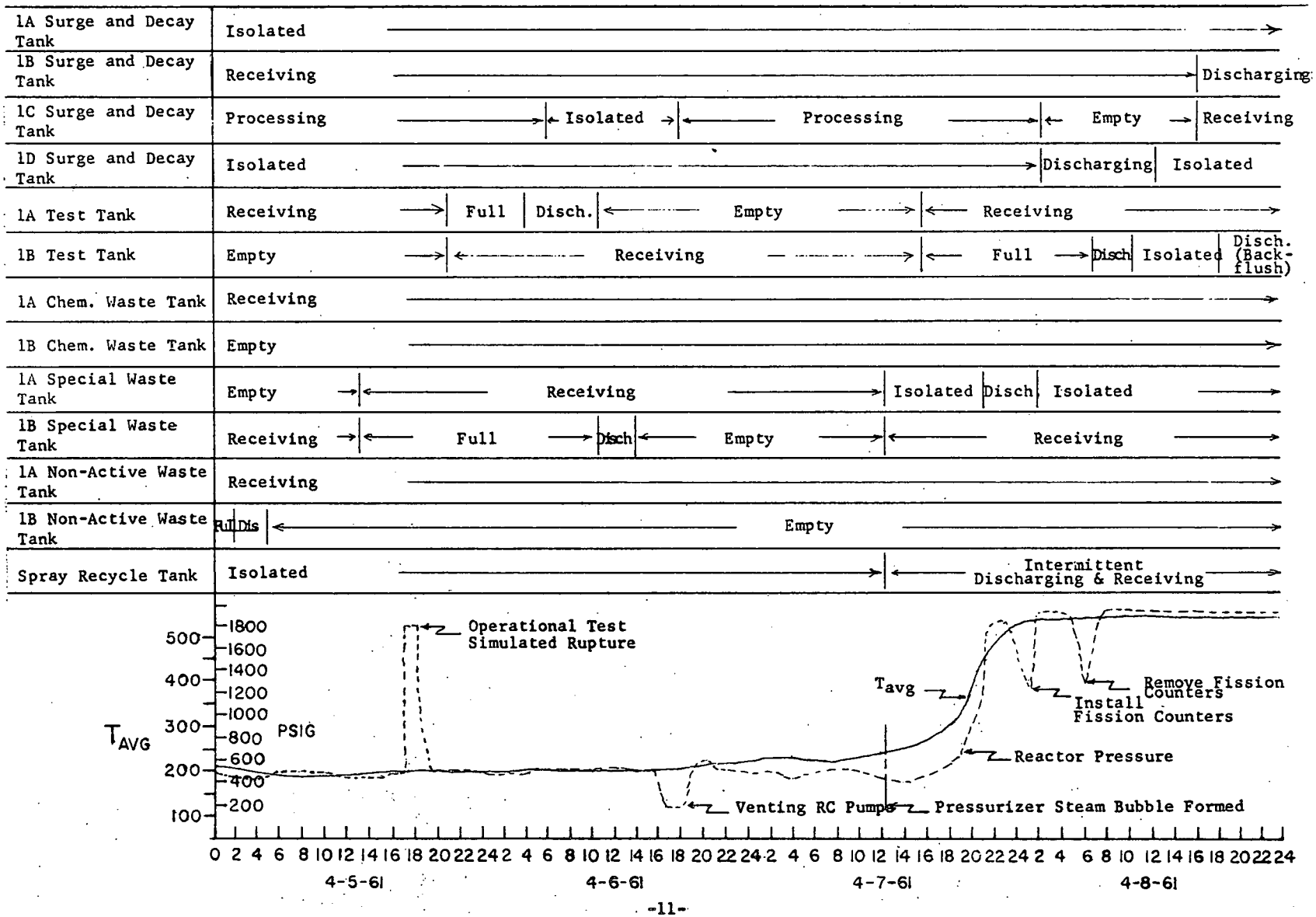
Date	Time	Event
4-7-61 Cont'd	1630	1B Test Tank 90% full and isolated. 1A Test Tank now receiving from 1C Surge and Decay Tank.
	1721	Reactor critical Reactor Coolant System temperature at 257 F.
	1840	Reactor sub-critical for maintenance radiation clearance.
	2142	Reactor shutdown for removal of fission counters.
	2205	Started discharging 1A Special Waste Tank to river at rate of 20 gpm. Permit #1473.
	2300	Ion exchangers needed flushing. By-passing them to increase level in Spray Recycle Tank.
4-8-61	0000	Reactor shutdown.
	0205	Stopped discharging 1A Special Waste Tank to river. 1A Special Waste Tank now empty.
	0300	DLCS 14902 in progress.
	0310	1C Surge and Decay Tank empty. 1D Surge and Decay Tank pumping to Spray Recycle Tank.
	0500	Cooling down Blow-Off Tank.
	0700	Completed cooling down Blow-Off Tank. Fission counters removed.
	0800	Started discharging 1B Test Tank to river at rate of 20 gpm. Permit #1474.
	1115	Stopped discharging 1B Test Tank to river at 20% level. Water left for backflushing ion exchangers.
	1130	Started draining Reactor Plant Container Gravity to 1B Surge and Decay Tank.
	1230	Blow-Off Tank vent valve opened.
	1235	Blow-Off Tank vent valve closed.

LOG OF EVENTS (Cont'd)

Date	Time	Event
4-8-61 Cont'd.	1315	Stopped filling Spray Recycle Tank. Sample of Gravity Drain Tank indicated $CrO_4 > 0.05$ PPM
	1330	Stopped draining Reactor Plant Gravity Drain Tank.
	1400	Started pumping Reactor Plant Gravity Drain Tank to 1A Chemical Tank due to CrO_4 concentration.
	1420	Stopped pumping Reactor Plant Gravity Drain Tank to 1A Chemical Tank.
	1430	Ashes emptied from incinerator into two drums.
	1705	1B Surge and Decay Tank isolated. 1D Surge and Decay Tank receiving.
	1815	Pumping 1B Surge and Decay Tank through 1B ion exchanger to Spray Recycle Tank.
	1900	Stopped pumping 1B Surge and Decay Tank to Spray Recycle Tank.
	1920	Backflushed 1A, 1B, and 1D ion exchangers using water in 1B Test Tank.
	1950	Started pumping 1B Surge and Decay Tank through 1B ion exchanger to Spray Recycle Tank.
	2040	Started to recirculate 1B Surge and Decay Tank.
	2045	Stopped pumping 1B Surge and Decay Tank to Spray Recycle Tank.
	2050	Started pumping 1B Surge and Decay through 1A ion exchanger to Spray Recycle Tank because of better flow.

FIGURE 1

STATUS OF TANKS IN WASTE DISPOSAL DURING DLCS 2390101



DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC WASTE DISPOSAL SYSTEM
MATERIAL BALANCE TEST
DLCS 2390101 (T-641317)

TABLE I

From the Reactor Plant:

	Gallons
*Volume Drained From Loops	4470
*Volume Drained Due to Pressurizer Bubble	880
*Volume From Sample Trains	440
‡Volume From RPGD Tank	1700
	7490

Received By Waste Disposal:

**Surge Tanks, Test Tanks, and Spray Recycle Tank Volume Change	3570
**Discharged to River From Test Tanks	6850
	10420
	- 7490
Difference	= 2930

*Calculated Values (See Sample Calculations)
**Based on Level Instrumentation
‡Estimated

TABLE II

CHANGE IN LEVEL AND PRESSURE OF TANKS AND DRUMS

Date		4-5-61			4-6-61			4-7-61			4-8-61			Remarks
Time		1005	1500	2125	0300	1000	1500	0300	1000	1500	0300	1500	2300	
1A Surge & Decay Tank Level	%	5.5	6.0	6.0	6.0	6.0	6.0	1.5	1.0	6.0	-3.0	-3.0	-3.0	Isolated throughout test.
	gals	1800	1900	1900	1900	1900	1900	1400	1400	1900	1000	1000	1000	
1B Surge & Decay Tank Level	%	9.0	14.0	16.0	17.0	18.0	19.5	22.0	23.0	36.0	79.0	87.5	82.3	Received 26750 gals change = +24,900 gals
	gals	2350	3300	3700	3950	4200	4600	5350	5750	10450	26100	29100	27250	Discharged 1850 gals
1C Surge & Decay Tank Level	%	36.0	23.5	30.5	28.0	26.0	26.0	18.5	21.0	17.0	1.0	1.5	26.5	Discharged 9050 gals change = -3350 gals
	gals	10450	5950	9200	7600	6850	6850	4350	5000	3900	1400	1400	7100	Received 5700 gals
1D Surge & Decay Tank Level	%	81.5	81.5	81.0	80.0	80.0	80.0	80.5	80.5	81.0	81.5	52.5	51.8	Discharged 10150 change = -10150 gals
	gals	26950	26950	26750	26400	26400	26400	26550	26550	26750	26950	16450	16300	
1A Test Tank Level	%	49.0	59.0	80.5	81.0	9.0	0	-1.0	2.0	0	20.5	20.5	17.8	Received 1550 + 970 gals change = -1490 gals.
	gals	2680	3170	4200	4230	750	350	280	420	350	1320	1320	1190	Discharged 3880 + 130 gals
1B Test Tank Level	%	-5.0	-5.0	-5.0	6.5	25.0	25.0	41.5	64.0	81.0	84.0	22.0	9.8	Received 4280 gals change = +710
	gals	80	80	80	650	1540	1540	2330	3410	4230	4360	1390	790	Discharged 3570 gals
1A Chemical Waste Tank Level	%	8.0	15.0	15.5	17.5	19.0	23.0	27.5	31.5	36.5	37.5	49.0	48.8	Received 2010 gals change = +2010
	gals	1040	1330	1360	1500	1540	1740	1970	2160	2420	2470	3060	3050	
1B Chemical Waste Tank Level	%	0	0	0	0	0	0	0	0	0	0	0	0	No change
	gals	600	600	600	600	600	600	600	600	600	600	600	600	
1A Special Waste Tank Level	%	0	8.0	15.0	17.5	22.5	42.0	61.5	66.0	80.0	-1.0	0	0	Received 3180 gals No change
	gals	250	530	820	920	1120	1900	2680	2870	3430	250	250	250	Discharged 3180 gals
1B Special Waste Tank Level	%	65.0	80.0	78.0	76.5	37.5	0	-5.0	1.5	7.0	11.5	31.0	35.2	Received 600 + 1380 change = -1200 gals
	gals	2830	3430	3350	3280	1710	250	250	280	500	680	1470	1630	Discharged 3180
1A Non-Active Waste Tank Level	%	7.5	15.0	27.0	28.5	26.5	23.5	26.0	31.0	36.0	60.0	60.5	63.8	Received 3700 gals change = +3700 gals
	gals	650	1200	1900	1950	1850	1700	1800	2150	2400	4100	4125	4350	
1B Non-Active Waste Tank Level	%	3.5	3.5	3.5	3.0	5.0	2.5	2.5	5.0	4.0	2.5	2.5	3.2	No change
	gals	350	350	350	300	450	300	300	450	425	300	300	330	
Spray Recycle Tank Level	%	92.0	88.0	92.0	92.0	85.0	92.0	92.0	84.0	79.0	45.0	92.0	61.4	Discharged 9300 + 6050 change = -6050 gals.
	gals	18400	17750	18400	18400	17150	18400	18400	16950	15900	9100	18400	12350	Received 9300
Reactor Plant Gravity Drain Tank Level	in.	17.5	18.5	19.5	20.2	21.2	22.0	22.9	50.0	50.0	54.0	0	1.5	Discharged 2200 gals
	gals	580	630	680	710	750	800	840	2070	2070	2200	0	40	Received 40 gals
Flash Tank Level	in.	38.9	38.9	36.3	36.4	36.5	36.5	37.0	37.0	35.0	36.2	36.0	35.1	Unable to calculate change due to
	gals	1930	1930	1770	1770	1770	1770	1800	1800	1670	1770	1770	1670	automatic pump operation.
Blow-Off Tank Level	in.	63.6	63.2	65.0	64.0	65.0	64.0	62.6	62.5	62.5	61.6	63.5	61.5	No change
	gals	4500	4500	4630	4580	4630	4580	4430	4430	4430	4370	4500	4370	
Blow-Off Tank Press.	psig	6.20	4.85	6.45	5.78	5.85	1.30	4.40	4.38	4.27	8.30	9.35	3.67	
1B Mueller Tc	°F	186*	186.6	187.3	187.3	178.8	183.4	220.3	226.1	247.1	500.2	503.6	497*	
Average Reactor Pressure	psig	450*	420	500	580	460	450	480	440	420	1800	1800	1790*	

*These values were not original data; they were taken from the daily log and are T_{avg} and Reactor Press.

NOTE: Quantities taken from DLCS 285 Plant Tank Level-Capacity Curves dated January 13, 1959 and Chapter 24, Volume II, Radioactive Waste Disposal System of the System Description.

TABLE II (Cont'd)

Date 1961	Time	Vent Gas		Gas Decay Drum Press			
		Compressor Suction Press in H_2O	Surge Drum Press PSIG	1A PSIG	1B PSIG	1C PSIG	1D PSIG
4-5	1005	7.5	29.0	0	0	10.0	8.5
	1500	7.5	29.0	0	0	10.0	8.5
	2125	7.0	29.0	0	0	9.0	8.5
4-6	0300	6.0	29.0	0	0	9.0	8.5
	1000	6.0	29.0	0	0	9.0	8.5
	1500	6.5	29.0	0	0	9.0	8.5
4-7	0300	5.8	29.0	0	0	9.0	8.5
	1000	6.0	29.0	0	0	9.0	8.5
	1500	9.0	25.0	0	0	9.0	8.5
4-8	0300	5.8	25.0	0	0	9.0	8.5
	1500	7.0	27.0	0	0	9.0	8.5
	2300	6.8	28.0	0	0	9.0	8.0

Combustible Waste

4-6-61 617 lbs (2 loads) < 15 mr on contact
4-7-61 117 lbs < 15 mr on contact

TABLE III

WASTE RECEIVED BY THE RADIOACTIVE WASTE DISPOSAL SYSTEM

Type	Level Change Gallons	Discharged To River Gallons
Non-Active Wastes	+3700	----
Special Wastes	-1200	6360 (1A Spec - 3180[1] 1B Spec - 3180[2])
Chemical Wastes	+2010	----
	4510	6360

DISCHARGE PERMITS

Number	Discharge Source	Quantity Gallons	Rate GPM	Activity Gross $X10^{-2}$ μc/gal	Date of Permit
[1] 1473	1A Spec	3400	20	7.95	4-7-61
[2] 1471	1B Spec	3500	20	4.92	4-5-61
OTHER DISCHARGES					
1472	1A Test	4600	12	15.48	4-5-61
1471	1B Test	4700	20	9.92	4-7-61

NOTE: The above flow rates are the maximum allowable based on activity and quantity.

TABLE IV

QUANTITIES AND ACTIVITIES DISCHARGED TO RIVER

Tank	Permit No.	Activity ($X10^{-2}\mu c/gal$)	Quantity (Level Inst) gallons	Quantity (Flow Recorder) gallons	Est. Discharge μc
1A Test	1472	15.48	3880	3328*	534.1
1B Test	1474	9.92	2970	2970	294.6
1A Special	1473	7.95	3180	2685	213.5
1B Special	1471	4.92	3180	3150	155.0
				TOTAL	1198.7 μc

NOTE: Estimated Discharge calculated using underlined values for quantity discharged.

*The flow recorder was not operating properly during discharge on 4-5-61. Quantity estimated at 3450 gallons.

TABLE IV (Cont'd)

RADIO-CHEMICAL DATA

Gross Beta-Gamma Activity

Tank	Date	Gross Activity DPM/ML (β-γ)	Remarks
1A Surge and Decay	4-5-61	----	Tank Empty
1A Surge and Decay	4-8-61	----	Tank Empty
1B Surge and Decay	4-5-61	----	Tank Receiving
1B Surge and Decay	4-8-61	8040 $\pm$ 17	
1C Surge and Decay	4-5-61	417 $\pm$ 3	
1C Surge and Decay	4-8-61	1590 $\pm$ 11	
1D Surge and Decay	4-5-61	356 $\pm$ 3	
1D Surge and Decay	4-8-61	626 $\pm$ 10	
1A Test	4-5-61	90 $\pm$ 3	
1A Test	4-8-61	45 $\pm$ 3	
1B Test	4-5-61	----	Tank Empty
1B Test	4-8-61	45 $\pm$ 3	
Spray Recycle	4-5-61	138 $\pm$ 4	
Spray Recycle	4-8-61	550 $\pm$ 10	
Vent Gas Surge Drum	4-5-61	$2.89 \times 10^{3} \frac{DPM}{cc}$	Only Gaseous Activity
Vent Gas Surge Drum	4-8-61	$2.26 \times 10^{3} \frac{DPM}{cc}$	Identified as Xe^{133}

SAMPLING TIMES: 1430 on 4-5-61 and 0900 on 4-8-61

TABLE IV (Cont'd)

FLOW PATH AND ACTIVITY OF
RADIOACTIVE WASTE BEING PROCESSED

Date	Time	Gross Beta Activity Given as DPM/ml					
			Ion Exchangers				
		1C Surge & Decay	C	B	A	D	Gas Stripper
4-5-61	1900	302 ± 6.0	787 ± 9.3	93 ± 3.6	620 ± 8.3	22.4 ± 2.3	36.2 ± 2.7
4-7-61	1320	4333 ± 238	564 ± 7.9	327 ± 6.3	215 ± 5.1	41 ± 2.9	120 ± 4.0

NOTE: The activities shown were obtained at the outlets of the various equipment.

TEST EVALUATION DLCS 2390101
T-641317
PERIODIC WASTE DISPOSAL SYSTEM MATERIAL BALANCE TEST

Prepared By W. E. Graber - RWR

Reviewed By R W Noble

Approved (Duquesne Light Co.) George A Santel Date 6/30/61