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QUARTERLY REPORT  
CONTAMINATION CONTROL - COLUMBIA RIVER  
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October 15, 1968

**DOUGLAS UNITED NUCLEAR, INC.**  
RICHLAND, WASHINGTON

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CHEMICALS DISCHARGED TO THE  
COLUMBIA RIVER FROM DUN FACILITIES  
FISCAL YEAR 1968

Introduction

This report summarizes the chemical disposal data from facilities operated by Douglas United Nuclear, Inc., during fiscal year 1968.

The total quantity of chemicals discharged to the Columbia River from the Single Pass Reactor facilities is detailed in Section I and from the N Reactor facilities in Section II. In addition to the gross quantities shown, supplementary information has been included to note the manner and normal rate of discharge.

Section III summarizes the disposal frequencies and estimated quantities of chemicals discharged to the 300 Area process ponds from DUN facilities. These materials are discharged to the process sewer and flow to the 300 Area process ponds. A portion, if not all, of the chemicals reach the Columbia River through underground seepage.

As the process sewer system in the 300 Area serves other companies as well, the controls established by DUN include routine composite sampling of the 300 Area process ponds. An automatic sampler which collects integrated samples of pond inlet water was placed in service in August, 1967. This analytical data is included as Section IV.

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SECTION I

SINGLE PASS REACTOR FACILITIES

<u>Chemical</u>	<u>Quantity Consumed - Pounds</u>					
	<u>100-B</u>	<u>100-C</u>	<u>100-D</u>	<u>100-KE</u>	<u>100-KW</u>	<u>Total</u>
<u>Water Treatment</u>						
Aluminum Sulfate <sup>1,2</sup>	160 019	59 561	29 054	1 000 729	1 184 660	2 434 023
Bauxite <sup>1</sup>	763 420	2 131 357	60 000	3 458 664	3 222 162	9 635 603
Sulfuric Acid (as 100%) <sup>2</sup>	4 958 226	11 739 406	136 640	21 908 971	21 776 220	60 519 463
Chlorine <sup>3</sup>	134 310	344 391	26 430	772 950	786 857	2 064 938
Polyacrylamide <sup>4</sup>	2 250	3 100	354	16 400	12 125	34 229
Sodium Dichromate <sup>5</sup>	159 996	226 020		641 042	725 354	1 752 412
Sodium Silicate <sup>6,7</sup>			208 226		127 254	335 480
Ammonium Sulfate <sup>7</sup>					10 000	
<u>Reactor Decontamination</u>						
Turco 4306 - C,D <sup>8</sup>	30 000	75 500			41 725	
Wyandotte <sup>8</sup>	40 375					

Explanatory Notes

1. Total of these two quantities represents an average aluminum sulfate feed rate of 14.8 ppm. The aluminum contribution from these two sources would be about 1.35 ppm with essentially all retained at the filters and discharged to the river through process sewers during filter backwashing.
2. Sulfate (SO<sub>4</sub>) contribution from these two chemicals represents about 26.2 ppm continual discharge to the river in the reactor effluent system.
3. Represents a continual feed of about 0.89 ppm of which essentially all discharge to the river in the form of chlorides in the reactor effluent system.
4. Represents an average feed of 0.015 ppm. This material is retained at the filters and discharged to the river through process sewers during filter backwashing.
5. Represents an average feed of 0.83 ppm continually discharged to the river in the reactor effluent system.
6. Sodium silicate at 100D was excess material that was diluted and drained to the river through the process sewer in May, 1968.
7. Sodium silicate at 100KW and ammonium sulfate were used to prepare activated silica for testing under PTA-082 during the period Oct. through March, 1968. Material was used in lieu of normal polyacrylamide material and retained at the filters and discharged to the river during filter backwashing.
8. Material used for rear face decontamination at 105 B on September 10 and 11, 1967; at 105C on January 21, 1968, and at 105KW on June 8 and 9, 1968. No direct discharge to river for in all cases, material was discharged to basins or cribs for ground disposal.

SECTION II

N Reactor Facilities

<u>Chemical</u>	<u>Quantity Consumed</u>
<u>Water Treatment - Filtered<sup>1</sup></u>	
Aluminum Sulfate	378 434 lbs.
Polyacrylamide	950 lbs.
Chlorine	28 236 lbs.
<u>Water Treatment - Demineralized<sup>2</sup></u>	
Sulfuric Acid (as 100%)	1 308 795 lbs.
Sodium Hydroxide (76% Na <sub>2</sub> O basis)	424 313 lbs.
<u>Other System Additives<sup>3</sup></u>	
Ammonium Hydroxide (25% NH <sub>3</sub> by weight)	37 197 gals.
Sodium Dichromate	15 700 lbs.
Hydrazine, N <sub>2</sub> H <sub>4</sub> (25% solution)	9 900 lbs.
Morpholine, NH (CH <sub>2</sub> ) <sub>2</sub> O(CH <sub>2</sub> ) <sub>2</sub>	3 670 lbs.

Explanatory Notes

1. Total filtered water requirements averaged 6500 gpm. Aluminum sulfate coagulant feed rate averaged 13.2 ppm with the aluminum content being a calculated 1.2 ppm and sulfate a calculated 6.2 ppm. Essentially all of the aluminum is retained at the filters and discharged to the river through the waste discharge line during filter backwashing. Polyacrylamide, filter conditioner material, represents an average feed rate of 0.033 ppm with the material retained at the filters and discharged to the river through the waste discharge line during filter backwashing. Chlorine represents a continual feed of about 1.0 ppm discharged eventually to the river in the form of chlorides.
2. Sulfuric acid regenerations totaled 793 with the average pounds of acid used per regeneration being 1650. The sulfate discharged to the river through the outfall line at each regeneration averaged a calculated 1620 pounds. Caustic regenerations totaled 295 with the average pounds of caustic used per regeneration being 1438. The sodium discharged to the river through the outfall line at each regeneration averaged a calculated 800 pounds.
3. Ammonium hydroxide is used for ph correction of primary system make-up water and sodium dichromate is added to the rod cooling water system. Both these systems discharge to the crib. Hydrazine and morpholine are both primarily additives to the secondary system. This system discharges to the river through the outfall line.

SECTION III

Chemicals Discharged to 300 Area Process Sewer, Fiscal Year 1968

<u>Chemical</u>	<u>Bldg.</u>	<u>Location</u>	<u>Approx. Quantity (LB)</u>	<u>Approx. Disch. Frequency</u>	<u>Est. 1968 Total (lbs)</u>	<u>Basis for Estimate</u>
Aluminum Sulfate		Process Ponds <sup>1</sup>		Continuous	65 000	Store order
Sodium Hydroxide	313	Sleeve Machine	2 000	Weekly	105 000	as shown
	313	Stripper Tank	500	12/mo	70 000	as shown
	313	Spire Etch	110	Weekly	6 000	as shown
	313	Tool Cleaning	500	Weekly	25 000	as shown
	306	Pilot Plant			4 000	Store order
				TOTAL	210 000	
Nitric Acid	313	Final Etch Mach.	4 500	6/year	27 000	as shown
	313	Spire Etch Tank	60	weekly	3 000	as shown
	306	Pilot Plant			18 000	Store order
		N Fuels <sup>2</sup>			475 000	Total Purchased 520 000. Less 45 000 to 313 Recovery
				TOTAL	523 000	
Aluminum Nitrate		N Fuels <sup>2</sup>			13 000	Store order
Ammonium Bifluoride		N Fuels <sup>2</sup>			22 000	Store order
Deoxidizer Oakite 34M (Discontinued use in Jan. 1968)	313	Cap & Can Mach.	1 425	Weekly	20 000	Store order
Deoxidizer Oakite LNC (Began use in Jan. 1968)	313	Cap & Can Mach.	550	3 months	1 100	as shown
Turco Aluminetch	313				3 875	Store order
Aluminux	313				7 225	Store order

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Cleaner Altrex	313		4 225	Store order
Cleaner Pennsalt A-28	313		4 225	Store order
<u>Neutralized</u> Sulfuric Acid Nitric Acid	313	Recovery		Continuous During Operation
			107 000	Store order
			333 000	Total Purchased 856 000. Less 523 000 calculated usage as previously shown..
Sodium Hydroxide			490 000	Total Purchased 700 000. Less 210 000 calculated usage as previously shown

Explanatory Notes:

1. Continuous feed to the process sewer on a test basis to improve particulate matter settling in the process ponds.
2. As N Fuels did not operate the entire year and disposal frequencies are subject to variation, usage based on store order purchases are reported for both 306 and 333 buildings. The manner of usage and discharge frequency would normally be as follows:

<u>Chemical</u>	<u>For</u>	<u>Quantity</u>	<u>Approx. Discharge Frequency</u>	<u>Estimated Yearly Total</u>
Nitric Acid	Uranium Cleaning	500 lbs.	2 weeks	13 000
	" "	300 lbs.	2 weeks	8 000
	Cu & Zr-2 Cleaning	800 lbs.	Weekly	40 000
	Cu Strip & Chem Mill	1 500 lbs.	Daily	375 000
	" "	1 700 lbs.	4 weeks	(20 000) to 313 Recovery
	Prebraze etch	1 400 lbs.	weekly	70 000
	" "	700 lbs.	3 weeks	12 000
	Preweld etch	1 200 lbs.	weekly	60 000
	Final etch	600 lbs.	weekly	30 000
	306 N Fuels			(25 000) to 313 Recovery
TOTAL				608 000

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Aluminum Nitrate	Cu & Zr-2 Cleaning	200 lbs.	2 weeks	5 000	
	Preweld Etch	200 lbs.	2 weeks	5 000	
	Final Etch	200 lbs.	weekly	10 000	
	"	200 lbs.	weekly	10 000	
			TOTAL	<u>30 000</u>	
Ammonium Bifloride	Cu & Zr-2 Cleaning	75 lbs.	weekly	4 000	
	Prebraze etch	75 lbs.	weekly	4 000	
	Preweld etch	75 lbs.	weekly	4 000	
	Final etch	75 lbs.	weekly	4 000	
	306 N Fuels			1 000	
			TOTAL	<u>17 000</u>	
Sulfuric Acid	Cu Strip & Chem Mill	4 200 lbs.	4 weeks	(55 000)	
	306 N Fuels			(17 000)	
			TOTAL	<u>(72 000)</u>	to 313 Recovery

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SECTION IV

Chemical Analyses of Inlet Stream to 300 Area Process Ponds\*

	Cl ppm	Cu ppm	Fe ppm	F ppm	NO <sub>3</sub> ppm	SO <sub>4</sub> ppm	Cr <sup>+6</sup> ppm	U ppm	pH
9-5 to 12-11-1967									
Average	1.38	.02	.02	0.89	108	25	.16	.13	7.9
Maximum	2.65	.05	.04	3.35	189	45	.64	.30	9.9
Minimum	.8	.00	.01	0.00	39	18	.05	.03	7.1
1st Quarter 1968									
Average	2.16	.016	.028	3.1	149	33	.081	.134	8.35
Maximum	3.6	.040	.048	4.10	117	56	.20	.25	9.4
Minimum	1.0	.002	.006	1.52	77	19	.012	.07	7.2
2nd Quarter 1968									
Average	1.73	.026	.019	2.8	132	30	.031	.20	8.3
Maximum	3.30	.058	.040	4.47	210	49	.073	.45	10.7
Minimum	0.6	.009	.004	0.00	82	9	.008	.01	7.1

\*Weekly integrated samples

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