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CHEMICALS DISCHARGED TO THE
COLUMBIA RIVER FROM DUN FACILITIES
FISCAL YEAR 1969

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CHEMICALS DISCHARGED TO THE
COLUMBIA RIVER FROM DUN FACILITIES
FISCAL YEAR 1969

Introduction

This report summarizes the chemical disposal data from facilities operated by Douglas United Nuclear, Inc., during fiscal year 1969.

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 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. The automatic sampler collects integrated samples of pond inlet water that are analyzed weekly. 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-C</u>	<u>100-KE</u>	<u>100-KW</u>	<u>Total</u>
<u>Water Treatment</u>				
Aluminum Sulfate ^{1,2}	144 995	1 055 839	802 525	2 003 359
Bauxite ¹	1 684 554	3 035 812	2 951 522	7 671 888
Sulfuric Acid (as 100%) ²	8 005 000	16 943 000	17 028 800	41 976 800
Chlorine ³	312 850	669 100	772 640	1 754 590
Polyacrylamide ⁴	2 350	14 250	12 550	29 150
Sodium Dichromate ⁵	150 015	340 839	604 270	1 095 124
<u>Reactor Decontamination</u>				
Turco 4306-C,D ⁶	179 200	90 000	00	269 200

Explanatory Notes

1. Total of these two quantities represents an average aluminum sulfate feed rate of 15.1 ppm. The aluminum contribution from these two sources would be about 1.38 ppm with essentially all retained at the filters and discharged to the river through process sewers during filter backwashing.
2. Sulfate (SO₄) contribution from these two chemicals represents about 23.3 ppm continual discharge to the river in the reactor effluent system.
3. Represents a continual feed of about 0.97 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 0.016 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 0.67 ppm continually discharged to the river in the reactor effluent system.
6. Material used for rear face decontamination at 105-C on 9-6-68 (138,700 lbs.) and 1-6-69 (40,500 lbs.) and at 105-KE on 3-28,29-69. No direct discharge to the 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 - Filtered¹</u>	
Aluminum Sulfate	544 734 lbs.
Polyacrylamide	1 750 lbs.
Chlorine	33 764 lbs.
<u>Water Treatment - Demineralized²</u>	
Sulfuric Acid (as 100%)	1 619 850 lbs.
Sodium Hydroxide (76% Na ₂ O basis)	492 764 lbs.
<u>Other System Additives³</u>	
Ammonium Hydroxide (25% NH ₃ by weight)	63 480 gals.
Sodium Dichromate	18 400 lbs.
Hydrazine, N ₂ H ₄ (25% solution)	9 680 lbs.
Morpholine, NH (CH ₂) ₂ O(CH ₂) ₂	3 685 lbs.

Explanatory Notes

1. Total filtered water requirements averaged 7,175 gpm. Aluminum sulfate coagulant feed rate averaged 17.3 ppm with the aluminum content being a calculated 1.6 ppm and sulfate a calculated 8.4 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 0.056 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 1.07 ppm discharged eventually to the river in the form of chlorides.
2. Sulfuric acid regenerations totaled 842 with the average pounds of acid used per regeneration being 1,924. The sulfate discharged to the river through the outfall line at each regeneration averaged a calculated 1,885 pounds. Caustic regenerations totaled 361 with the average pounds of caustic used per regeneration being 1,365. The sodium discharged to the river through the outfall line at each regeneration averaged a calculated 775 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.

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SECTION III

300 AREA FACILITIES

ESTIMATED QUANTITY (POUNDS) DISCHARGED TO 300 PONDS

<u>Chemical</u>	<u>Estimated Quantity (Lbs.)</u>	<u>Basis</u>
Aluminum Nitrate	31 200	Total store order purchases
Ammonium Bifluoride	55 500	Based on approximate usage as shown below
Deoxidizer (Oakite)	25 860	Total store order purchases
Nitric Acid	1 172 803	Total store order purchases
Sodium Hydroxide	955 138	Total store order purchases
Sodium Nitrate	18 000	Total store order purchases
Sulfuric Acid	93 296	Total store order purchases
Turco Aluminetch	9 225	Total store order purchases

Explanatory Notes

The chemicals are discharged to the process sewer in periodic batches and then flow to the 300 Area process ponds. Actual quantities and frequency of discharge are variable with the following tabulation presented to indicate the location where major quantities are routinely required and the approximate frequency of disposal to the sewer system.

<u>Chemical</u>	<u>Bldg.</u>	<u>Use Location</u>	<u>Est. Quan- tity (lbs)</u>	<u>Approx. Discharge Frequency</u>	<u>Indicated Total (lbs)</u>
Aluminum Nitrate	333	Cu & Zr-2 Cleaning	200	Weekly	10 000
	333	Preweld Etch	200	Weekly	10 000
	333	Final Etch	400	Weekly	20 000
				TOTAL	40 000
Ammonium Bifluoride	333	Cu & Zr-2 Cleaning	200	5 times monthly	12 000
	333	Prebrazing Etch	200	Weekly	10 000
	333	Prebrazing Etch	150	Weekly	7 500
	333	Preweld Etch	200	5 times monthly	12 000
	333	Final Etch	200	6 times monthly	14 000
				TOTAL	55 500
Deoxidizer Oakite (M34&LNC)	313	Cap & Can Machine	550	4 times yearly	2 000
	313	Special Products	400	Every 2 weeks	10 000
	306	N Pilot Plant	480	Every 2 weeks	12 500
				TOTAL	24 500
Nitric Acid	313	Final Etch Machine	4500	4 times yearly	18 000
	333	Cu & Zr-2 Cleaning	900	Weekly	45 000
	333	Cu Strip&Chem Mill	1600	Daily	415 000
	333	Prebrazing Etch	1500	Weekly	75 000
	333	Prebrazing Etch	700	Weekly	35 000
	333	Prebrazing Etch	1400	Monthly	17 000
	333	Preweld Etch	1300	Weekly	65 000
	333	Final Etch	600	Weekly	30 000

<u>Chemical</u>	<u>Bldg.</u>	<u>Use Location</u>	<u>Est. Quantity (lbs)</u>	<u>Approx. Discharge Frequency</u>	<u>Indicated Total (lbs)</u>
Nitric Acid (cont.)	333	Uranium Cleaning	500	Every 4 weeks	(6 500)*
	333	Uranium Cleaning	300	Every 8 weeks	(2 000)*
	333	Cu Strip&Chem Mill	1700	Every 4 weeks	(20 000)*
	306N	Chem. Mill	500	Monthly	(6 000)*
	306N	Copper Strip	4000	Monthly	48 000
	306N	Bright Etch	1000	Monthly	12 000
	306N	Billet Etch	600	8 times yearly	5 000
	313	Uranium Recovery (quantity based on store orders plus transfers*)			245 000
			TOTAL	1 010 000	
Sodium Hydroxide	313	Sleeve Machine	3000	Weekly	150 000
	313	Stripper Tank	800	11 times monthly	105 000
	313	Tool Cleaning	1000	Weekly	50 000
	313	Anodizing	650	Daily	170 000
	313	Uranium Recovery (quantity based on calculated nitric acid usage)			365 000
			TOTAL	840 000	
Sodium Nitrate	313	Special Products	42	2 times weekly	4 000
	313	Recover Operations	100	11 times monthly	13 000
				TOTAL	17 000
Sulfuric Acid	333	Cu Strip&Chem Mill	4500	Every 4 weeks	(58 500)*
	306	Chem. Mill	2000	Monthly	(24 000)*
	313	Uranium Recovery			82 500
			TOTAL	82 500	
Turco Aluminetch	313	Spire Etch	130	Monthly	1 500
	313	Cap & Can Machine	55	Every 2 days	6 500
				TOTAL	8 000

*To 313 Recovery Operations.

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SECTION IV

CHEMICAL ANALYSES OF INLET STREAM TO 300 AREA PROCESS PONDS*

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>	
Cl, ppm	7.6	0.27	2.62	29,000 lb
Cu, ppm	0.079	0.005	0.031	345 lb
Fe, ppm	0.09	0.0	0.027	300 lb
F, ppm	9.88	0.67	3.77	42,000 lb - OK
NO ₃ , ppm	297	46	142	1,600,000 lb - 3.3
SO ₄ , ppm	79	12	33	370,000 lb - 3.3
CR+ ⁶ , ppm	0.47	0.005	0.051	600 lb
U, ppm	0.44	0.005	0.15	1700 lb
pH	11.40	6.34	8.17	

*Weekly integrated samples - 44 samples included.

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