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EUROCHEMIC ASSISTANCE PROGRAM: COMPILATION OF ICPP-ORIGINATED INFORMATION SENT TO EUROCHEMIC VIA TRANSMITTAL LETTERS (THROUGH TRANSMITTAL LETTER 87)

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ABSTRACT

ICPP-originated information sent to Eurochemic via transmittal letters is combined in this report to facilitate general distribution. The subjects covered include waste and shielding calculations.

NOTICE

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1.0 INTRODUCTION

As part of the Eurochemic Assistance Program, information was sent and identified in transmittal letters. Specifically prepared information was generally issued with an identifying number and sent via the Division of International Affairs. Information needed quickly or small in quantity was included in the transmittal letters. The ICPP-originated information, which was not given the general distribution prescribed in the procedures for obtaining and transmitting information, is combined in this report.

2.0 DISCUSSION

2.1 Waste (via transmittal letter 31 and 71)

The ICPP has reviewed ETR 35, "Liquid Waste Management," with the following comments:

There is no specific criticism of this report. In connection with the comments on the lack of data on waste discharge volumes and activity contents of the wastes, the volumes and activity of ICPP wastes discharged to the deep well for approximately a one year period are given in Table 1, attached. This waste volume is composed of cooling water, overheads from warm waste evaporators and other utility type water that could possibly be contaminated. Laboratory and plant wastes are not segregated. The volumes and activity from the fuel element storage basin pools are given in Table 2. No analysis of this activity is made, and it is treated as if the activity were of the same distribution as that of the service wastes. The period these tables cover was one of the most active periods so should be fairly meaningful.

There is a statement made on page 13 of ETR 35 that evaporation of wastes is 30 times more expensive than coprecipitation methods, which is difficult to reconcile. Steam costs at the ICPP are about $1.35 for evaporating 1000 pounds of waste, which means that chemical costs alone for coprecipitation processes can be no more than 4.5 cents per 1000 pounds of waste. In addition, the precipitation has to be carried out in batches, necessitating large tanks and facilities to handle the precipitate; consequently, equipment costs probably favor the evaporation. Also, evaporation steam costs can be decreased by multiple effect evaporation. We would be interested in knowing how this factor of 30 was obtained.

Another factor to be weighed when comparing waste treatment processes is the capability of the system for handling large volumes of highly contaminated service wastes arising from cooling jacket or coil rupture in a dissolver, feed, or hot waste tank. In this event, evaporators can handle

the wastes much faster than coprecipitation processes. ETR 35 does not mention how this situation would be handled.

ICPP was also contacted relative to information on Yorkmesh demister experience (your letter 27, Item 1). ICPP has not performed any independent test with the Yorkmesh demister units. Their philosophy in using mesh demisters in the VOG-DOG system is based on a need for removing significant quantities of mist. This is necessary since it is undesirable to operate absolute filters wet. Because this stream fluctuates, cyclone units cannot be sized properly to cover the range. Since the efficiency and pressure drop of Yorkmesh demister are almost independent of flow rate, the Yorkmesh unit was selected. The mist that passes through the Yorkmesh unit is vaporized by heating the gas slightly (about 5°F) between the demister and the filter.

2.2 Shielding Calculation (via transmittal letter 72)

ICPP feels that satisfactory short-cut shielding calculation methods do not exist. Occasional rough estimates are made using AECD-2934, "Nomograms for the Calculation of Gamma Shielding," (being obtained). Considerable error can result, however, owing to the simplified handling of the build-up factors and absorption coefficients. Routine shielding and criticality calculations are made by one member (a chemical engineer) of the Process Engineering Section who has made a sideline of such calculations. This person relies on physicists and mathematicians in the organization for help on complex problems.

Table 1. Liquid Waste Activity Discharged from ICPP Disposal Well

Period	Vol., gal	Total Activity, Curies		Sr-89	Sr-90	Zr-95 + Nb-95	Ru-106	I-131	Cs-137	Ce-144
		α	β-α							
June '59	30,651,400	3.8×10^{-4}	1.41	0.3	0.8	12.0	13.5	24.1	4.7	44.6
May '59	28,623,000	0.0	2.14	3.1	2.0	15.1	31.2	7.2	1.7	41.8
April '59	27,308,000	0.0	2.34	0.8	1.3	52.3	4.8	17.5	6.4	16.9
March '59	30,947,300	3.55×10^{-3}	1.60	0.6	1.0	17.2	28.5	17.1	35.6	----
Feb. '59	44,969,400	0.0	7.2	1.8	6.1	5.7	3.2	27.0	1.7	54.5
Jan. '59	46,227,000	0.0	15.3	0.5	4.2	6.9	8.8	1.3	7.5	70.8
Dec. '58	47,715,000	2.57×10^{-3}	54.45	2.3	2.7	18.0	5.2	1	5.7	66.1
Nov. '58	118,012*	0.35×10^{-3}	6.24	1.76	0.04	50.7	----	32.5	---	10.0
Oct. '58	176,480	6.57×10^{-3}	10.79	2.5	0.4	20.4	----	26.4	---	20.4
Sept. '58	131,889	0.75×10^{-3}	10.14	0.2	0.01	38.2	6.3	51.0	---	4.3
Aug. '58	151,652	1.39×10^{-3}	19.2	3.4	1.1	1.0	----	51.7	---	33.2
July '58	129,141	3.16×10^{-3}	5.24	1.9	1.5	3.8	----	49.0	6.2	37.6

*Volume given in cubic meters henceforth.

Table 2. Liquid Wastes from ICPP Stainless Steel Building
(Fuel Element Storage Basin)

Period	Vol., gal	Total Activity, Curies	
		α	β-α
June '59	978,500	0.0	0.81
May '59	737,100	0.0	0.52
April '59	490,420	0.0	0.78
March '59	406,188	0.01×10^{-3}	0.4
Feb. '59	427,276	2.9×10^{-3}	0.3
Jan. '59	995,000	0.0	0.9
Dec. '58	605,900	0.54×10^{-3}	0.630

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