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MASTER

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SUBJECT: Eurochemic Assistance Program: Comments by ICPP on Questions from Eurochemic

TO: E. L. Nicholson

FROM: E. M. Shank

Acknowledgment

The attached comments were made by ICPP personnel on questions from the USAEC advisor to the Eurochemic Company. Subjects commented on are the off-gas sampling system, off-gas filtration, iodine evolution during dissolution, mercury concentration, and process cell contamination. The questions are included to provide meaning to the answers.

An ORNL-CF number has been assigned to facilitate identification and distribution according to the established procedure.

DISCLAIMER

ICPP Off-Gas Sampling System

Question

In ORNL-CF-59-3-54, Rev. (Del), "Eurochemic Assistance Program: Comments by ICPP, dated Feb. 25, 1959, on Questions Listed in ORNL-CF-59-1-75," it was noted that the modified stack off-gas sampler was being designed by an architect engineer and that the design could probably be made available to Eurochemic. If the design can be made available, we would like a minimum of two copies each of all pertinent documents and design information for transmittal.

Answer

Copies of the Title I Report (IDO-24036) on the CPP Stack Gas Monitor were provided for transmittal. This document should answer the questions on the design details of the stack off-gas sampler.

Off-Gas Filtration

Question

Can drawings of the original vessel and sampler off-gas filter installations, including the filter units, be made available to Eurochemic? Are data available on the performance of these units for actual fission product removal efficiency, radiation level of the loaded filters, and radiation exposure and contamination control during filter changing?

Answer

Enclosed are two prints of 542-41-B741-A which shows the details on the vessel off-gas filter box. The sampler off-gas filter box is identical to this except the 4-inch inlet shown in view R-R is blanked off and only the 8-inch inlet is used. The filter media for the roughing unit is No. 5 Airmet Deep Bed Pocket Filter Units employing a 1/2-inch layer of No. 50 Fiber Glass. The fine filter media is again a No. 5 Airmet employing No. 100 Fiber Glass, (A.A. glass at 1.2 lbs./cu.fit.). These filters were manufactured by the American Air Filter Corporation, Louisville, Kentucky.

These units described above are the original units installed by Foster Wheeler when the plant was built and have never been changed. The filter box and frames were originally built of carbon steel and painted inside with five coats of Amercoat. There have been reports of severe corrosion on this unit and it is planned to replace the VOG-DOG system next fiscal year with a new unit. We have not definitely decided whether the new unit will be mild or stainless steel. A different filter media will probably be installed at this time although our specifications on the new unit are not complete at this time.

Iodine Evolution During Dissolution Versus Mercury Concentration

Question

Are any data available at ICPP to indicate the effect, if any, of mercury on iodine volatilization during fuel dissolution?

Answer

We have no pertinent data on the effects of mercury on iodine volatilization during fuel dissolution. Our shortest-cooled high burn-up fuels are aluminum fuels and these are dissolved by nitric acid containing a mercury catalyst so we have no comparable data on DOG iodine content when mercury is absent. The other fuels we process are usually long cooled and contain little iodine.

Our RaLa operations do give some idea of the effectiveness of mercury in decreasing iodine evolution. However, iodine is released in this process during transfer of waste solutions and not during dissolution. The RaLa process involves dissolution of a high burn-up MTR element, in caustic after a two-day cooling period. The uranium and desired fission products are separated from the basic supernate by centrifugation. The supernate (waste) is then acidified with a mixture of HNO_3, Hg^{++}, and Hg^{+} to give a final solution 5 weight per cent acid, 0.001 M Hg^{++}, and 0.001 M Hg^{+}. It is largely this waste solution that evolves the iodine during transferring and sparging operations.

In the table below some data are given on the amount of iodine that is retained in the above waste solution before and after the addition of mercury.

Per Cent of I-131 Retained

Run	Scrub	Composite Waste	Date
021	---	16.4	11-13-58
022	1.11	14.0	2-5-59
023	5.47	60.4	2-26-59
024	8.9	102	3-17-59
025	0.67	74.7	4-9-59
026	0.62	79.5	4-29-59
027	0.04	63.5	5-19-59
028	---	104	6-9-59
029	0.12	62.6	7-6-59
030	0.85	65.3	7-21-59
031	0.73	65.3	8-11-59
032	0.66	56.6	9-1-59

Runs 021 and 022 were made without mercury addition. Run 023 and all subsequent runs were made with mercury present. The iodine content of the scrub, (this is the solution recirculated in a packed-column vessel off-gas scrubber and collects the iodine from the off-gases), did not reflect the effects of mercury addition until Run 025 but showed a marked difference in iodine content thereafter. It is evident also that the waste solution retained a high proportion of the iodine after the mercury addition. A calculated iodine content based upon fuel burn-up and cooling times was used as a base for these material balances.

Process Cell Contamination

Question

Can information be transmitted on the amount and problems of contamination in the cells in which all-welded piping is used? What is the radiation level in the exit of the cell ventilation air dust serving these cells compared to other cells? Is the original plan of not installing cell ventilation air filters now thought to be adequate for a welded direct-maintenance plant? Are the Yorkmesh demisters installed on the vessel and dissolver off-gas lines still considered desirable?

Answer

We are unable to supply data comparing discharged cell ventilation air activity for welded and non-welded piping systems. Non-welded systems gave us so much trouble with leaks when the plant was first started up that practically all connections were subsequently back welded. It would be logical to assume that leaks and crystal stalactites hanging from pipes would increase the activity in the ventilation off-gas; however, we have no directly comparative data for the two systems.

During all decontamination the solutions used are deliberately run over the equipment overflows and onto the cell floors. The cell walls and floors are then washed down with water, steam, and dilute acid. Even during these periods no burst of activity from the stack has been attributed to the cell decontamination procedures employed.

Our experience has indicated that filters are not required on cell ventilation discharge streams for all welded systems.

Yorkmesh demisters were never installed on the vessel and dissolver off-gas lines. We are considering revising this system and including a demister prior to the filters on combined VOG-DOG streams. Some liquids have been found in the bottom of the present VOG filter unit in the past. While the source of the liquid has not been definitely established, the most logical origin is from entrained droplets generated during vigorous air spargingoof the vessels that are not removed in the VOG condensers. Demisters should remove this entrainment.

DISTRIBUTION

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