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Finfish Samples of Study Species From Lavaca Bay

Classified by mg/kg Hg

Total Samples Collected Since 1-1-'77	42	
Samples from 0 - .5 mg/kg Hg	9	21.43%
Samples from .5 - 1 mg/kg Hg	12	28.57%
Samples from 1 - 2 mg/kg Hg	9	21.43%
Samples from 2 - 3 mg/kg Hg	4	9.53%
Samples from 3 - 4 mg/kg Hg	2	4.76%
Samples from 4 - 5 mg/kg Hg	3	7.14%
Samples from 5 - 6 mg/kg Hg	2	4.76%
Samples over 6 mg/kg Hg	1	2.38%
Samples exceeding .5 mg/kg Hg	33	78.57%

(Received from
Health Dept., Austin
1978-01-20
C Stem)

CP 034849

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FROM: F. D. CARTER
POINT COMFORT OPERATIONS

TO: MR. K. W. PERRY
PITTSBURGH OFFICE

1977 October 31

RE: CHLOR-ALKALI MERCURY CONSUMPTION

Summary

From discussions with Monsanto, PPG, Stauffer, and Olin, a desirable target for mercury loss from our plant is 100 grams/tonne. From original plant startup in 1966 until the first major modification to our mercury handling system (brine on inlet endbox) in September 1972, our average loss was 200 grams/tonne. With installation of brine on the inlet endboxes and pump tanks in 1972 until March, 1977, our average loss increased to 400 grams/tonne. In March 1977, the brine circulating from the pump tanks was removed because of severe corrosion and this increased our mercury loss to 500 grams/tonne. Because our mercury losses have been impounded in our waste water evaporation lake and our other plant processes which directly affected production needed major engineering attention, the problem of controlling mercury consumption was not given major attention until January 1977. Since January, the major sources of mercury loss have been isolated and to date several tests to determine how to best control these sources have begun. Once equipment to control all these sources has been installed, $200,000/year in mercury will be saved and we will no longer be vulnerable to government controls on the amount of mercury we can purchase. Our intentions in engineering the controls of these mercury losses are to leave all the mercury possible in the cell to which it was added and to recycle all the mercury which leaves the cell to the mercury system. Also, it is intended to approach as closely as possible a system which is common within the Chlor-Alkali industry.

Details

Shown in Figure 1 is the mercury/mercury fume handling system in the plant as originally installed. As you can see, soft water flowing at 2-4 gpm was circulated from the inlet endbox to the mercury pump tank and finally to the waste water trench. The parts of this system which were environmentally unacceptable were the low soft water flow which caused steaming and excessive fumes in the cellroom and the soft water dump to the waste water trenches which contributed to a water balance problem as well as hot mercury fumes to the cellroom. At that time, waste water discharged from an outfall to the bay.

Shown in Figure 2 is the solution to the water balance and mercury fume problems described above. In this system, dechlorinated brine was added in the inlet endbox at a rate of 15-20 gpm and this brine was overflowed to the mercury pump tank. Brine overflow from the pump tank was remixed with the circulating cell brine stream in the treatment area for removal of any impurities picked up in the endbox or pump tank.

EXHIBIT P-37 Carter 1/6/95

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Laboratory tests showed brine to be ten (10) times better at a given temperature for suppressing mercury fumes. The increased flow allowed the temperatures of the system to drop significantly and there were no further problems with steaming or excessive mercury fumes in the cellroom. A side benefit gained from circulating the brine was salt crystallized at all the system leaks so the leaks were more noticeable and quickly repaired. There were two problems generated by this brine system. Firstly, the higher flow through the pump tank made impossible an adequate electrical current break as the brine flowed from cell line potential in the pump tank to ground potential in the brine header to the treatment area. This lack of electrical current break caused severe corrosion in the mercury pumps and pump tanks and maintenance was intolerable. Secondly, the high brine flow through the pump tank caused mercury to become entrained in the brine and flushed to the brine treatment area. After brine treatment, the brine filters removed most of the mercury from the brine and the mercury was flushed to the waste water evaporation lake. This system more or less doubled our mercury losses but because we were impounding our waste water and not violating any environmental regulations, and because mercury costs were low, our major engineering efforts were confined to process areas causing major production losses. As this system became three years old, the maintenance costs had risen to approximately $500,000/year and in 1975, a system to remove the brine flow from the pump tanks was designed.

Shown in Figure 3 is the present system used to control cell mercury fume emissions. In this system brine is added in the inlet endbox but this brine is not overflowed to the pump tank. Instead, the brine is collected in a common header with the mercury fumes and the brine is returned to the treatment area. Installation of this system did not affect the environmentally excellent performance of the mercury fume control system but did increase our mercury loss problem. Because there was no brine flow (cooling) in the pump tank, the brine had to be mixed with the mercury in the piping ahead of the endbox to prevent temperature damage to the rubber lining. This mixing increased the mercury entrainment in the brine and the mercury losses again increased. This increase in mercury loss and the threat of government control of purchased quantity of mercury caused the start in January 1977 of an extensive engineering effort to control our mercury losses. Government restrictions also caused mercury supply to lessen and price to rise which compounded the need to address this problem.

Shown in Figure 4 is the system now being tested in the plant. This configuration is as close as our equipment design will allow to a common industry system and was chosen as a result of considerable testing performed this year. The tests showed each cell was losing an average of 46 kilograms of mercury per day to the brine stream. The system of Figure 4 circulates 1000 gpm of soft water in a closed loop through all the endboxes and pump tanks for proper cooling and purges 120 gpm to the decomposers to make caustic. With this system, all the water which could sweep mercury from the cells is returned to the cell mercury cycle. It is planned to test this system for four to six months and at the same time prepare an RFA to make permanent revisions to the temporary connections now installed.

The inlet endboxes previously discussed are the major source of mercury loss; however, there are two other revisions which will be a part of the above mentioned RFA. The first of these involves the hydrogen handling system. Presently 14 Kg/day of mercury leaves each cell and is recovered from the composite hydrogen stream by cooling. As is common to most industry plants, an individual heat exchanger will be installed on each

cell so the mercury in the hydrogen will be returned directly to the cell from which it came. This eliminates 18,000 kilograms per month of mercury handling and should make the heat exchangers on the composite stream more efficient. This improved heat exchanger efficiency should improve the $65,000/year maintenance on the hydrogen compressors by at least 50%. The second revision involves the handling of the waste water from the cell outlet endbox. Tests showed an average of 1500 Kg/month of mercury is lost from the outlet endboxes, but this loss is intermittent. A settling tank will be installed to catch the mercury and the water and brine will be returned to the brine stream.

All the modifications mentioned above should be installed within a year. Following the installation, a couple of personnel should have a reasonable chance at closing a mercury balance on our plant.

F. D. CARTER

FDC/gac
Attachments
cc: Mr. F. J. Mabry
Mr. J. I. Badgett
Dr. L. F. Brennecke/Mr. J. McCall

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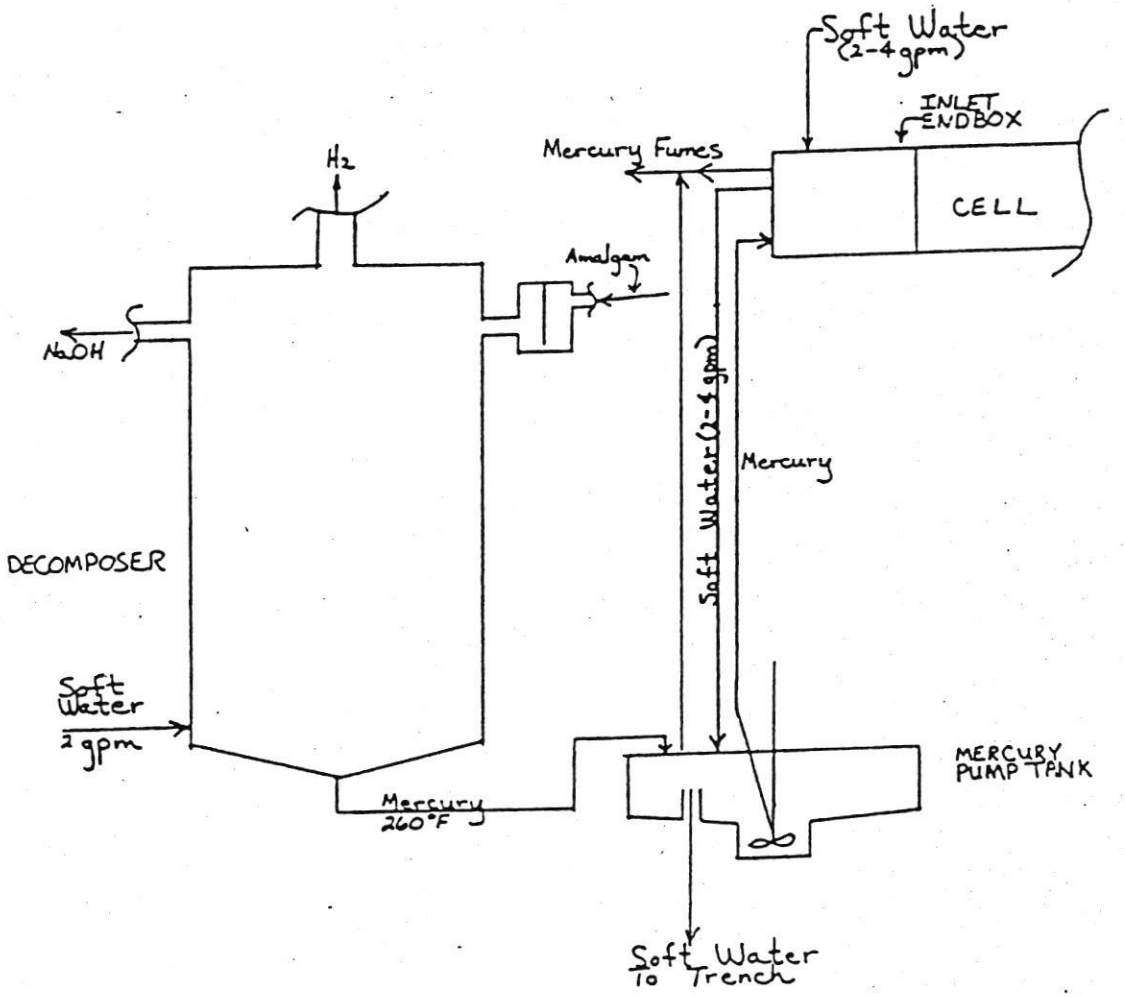
Figure 1



DATE 10/27/77

ALUMINUM COMPANY OF AMERICA
ENGINEERING DEPARTMENT
Cell Mercury System 1966-1972

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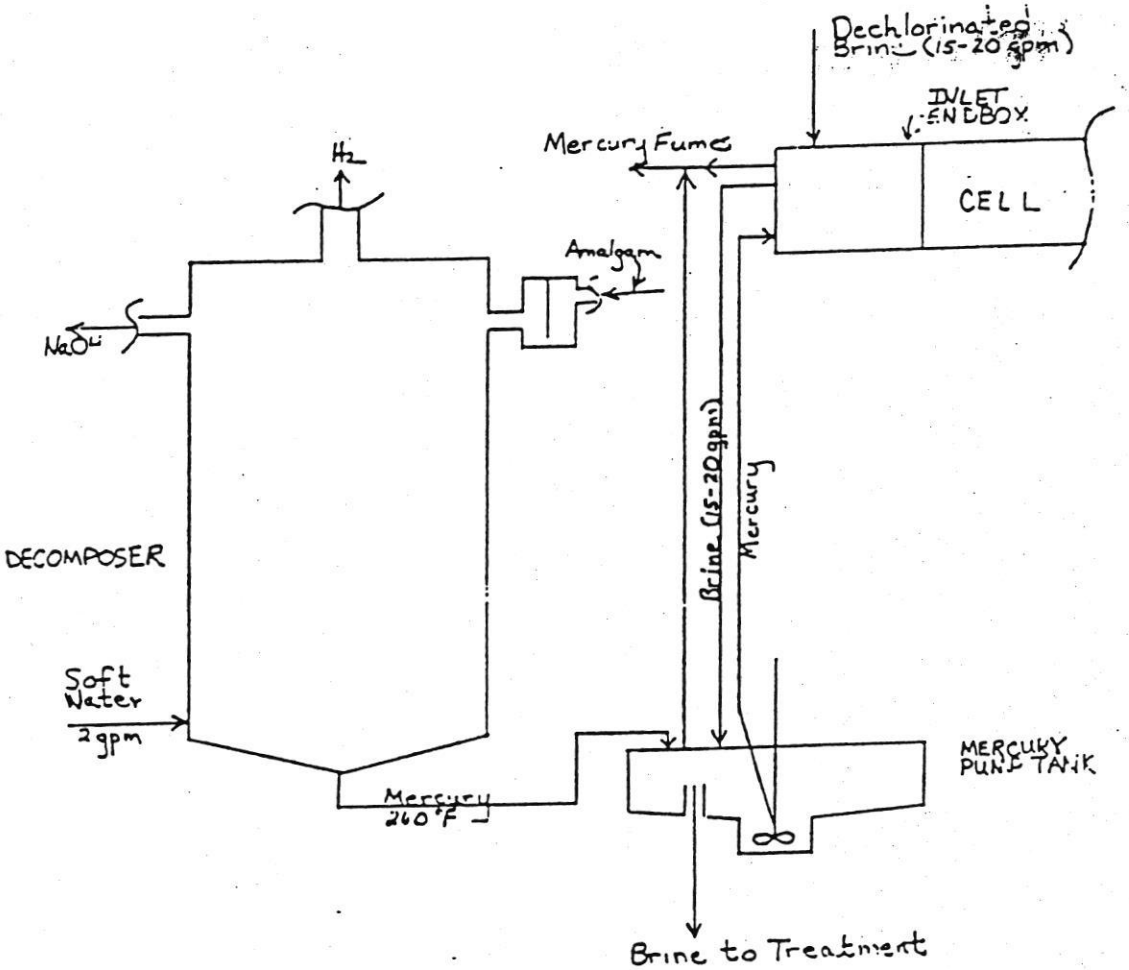
Figure 2



DATE 10/27/77

ALUMINUM COMPANY OF AMERICA
ENGINEERING DEPARTMENT
Cell Mercury System 1972-1976

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Defendants Exhibit 25061

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ALCOA, ET ANO.
vs.
ADMIRAL INSURANCE, ET AL