

Inter-Organization Correspondence

To	W. C. Holbrook	Date	January 12, 1972
Location	Cleveland	From	Q. M. Adams-C. J. Orsborn
Subject	Environmental Control Activities at the Calvert City Plant - December, 1971		

SUMMARY

Cyanide in the plant effluent exceeded the 7.3 pounds per day permit limit for a ten-day period - December 2 through December 12. Bypassing the waste water stripper bottoms from the incinerator to caustic digestion was the major cause of the high cyanide.

The mercury in the plant effluent was just over an ounce per day, 0.067 pound per day. Operation of the sulfide treatment has improved so that the mercury in the treated stream is less than half of the total mercury in the plant effluent.

Mr. Ellison of Engineering-Science was in the plant during the week of December 6. He conducted studies to define the design criteria for the sludge handling facilities of secondary treatment.

The proposed feasibility study by Catalytic, Inc., for a community waste treatment plant is now dead due to the decision by Airco Carbide not to participate.

The three biological treatment units were operated until the middle of the month, when they were shut down. The biological sludge from the No. 1 unit is being batch fed to use for additional treatability studies to begin in January, 1972.

The fourth quarter status report on the Calvert City 1971 environmental control program was issued.

Installation of a cooling water return line has resulted in increased cooling tower cycles for the Chlorine Plant cooling tower. The mercury content of the cooling water has been significantly reduced due to a reduction of atmospheric mercury losses.

Dave McClure, a Co-op student working on environmental projects (mainly off-shoot evaluations of secondary treatment), returned to school.

DISCUSSIONWaste Disposal

A total of 1.7 million pounds of chlorinated byproducts was burned in the Byproduct Disposal Plant. The byproduct inventory decreased by 664,400 pounds including losses due to No. 6 tank repairs. The burning rates were limited due to the repairs of the primary absorber, which failed in November.

BFG46282

10089092

DISCUSSION (continued)

Water Quality Control

The cyanide concentration in the plant effluent exceeded the 7.3 pounds per day permit level for a ten-day period from December 2 through December 12. Bypassing the waste water stripper bottoms to the caustic digestion treatment system was the major cause for high cyanide. The alkaline chlorination treatment system cannot effectively handle the waste water when the quench water is diverted to the caustic digestion system rather than being incinerated. Although the plant effluent did exceed 1.0 ppm cyanide for a short time, no notice of toxic problems was cited.

	Plant Effluent HCN >7.3 Lbs/Day			No. 2 Pond Outlet HCN >1.0 PPM		
			No. of			No. of
	Hours	% Time		Hours	% Time	
August	0	0	0	0	0	0
September	0	0	0	0	0	0
October	0	0	0	0	0	0
November	160	21.5	9	48	6.5	6
December	240	32.3	13	5	0.6	1

The average mercury level in the plant effluent was 0.067 pound per day and 0.060 pound per day from No. 4 pond. It should be pointed out that an upset in the treatment system on December 2 resulted in 0.96 pound per day leaving the No. 4 pond, which significantly increased the average. Excluding this one day would reduce the average mercury from No. 4 pond to 0.03 pound per day. Now that the No. 4 pond is impounded and the operation of the filter system has been improved, the mercury present in the treated stream from the Chlorine Plant accounts for less than 50% of the total mercury in the plant effluent. The other mercury sources are:

1. Chlorine Plant hypo tower blowdown (to 3B pond).
2. Mercury from other plants (mainly caustic and chlorine usage).
3. Mercury redissolved in the main pond system.

	No. 2 Pond Outlet			Additional Mercury Removal Due to #2 Pond	No. 4 Pond Outlet		
	<u>Hg >0.25 Lb/Day</u>				<u>Hg >0.25 Lb/Day</u>		
	%				%		
	<u>Days</u>	<u>Time</u>	<u>Average</u>		<u>Days</u>	<u>Time</u>	<u>Average</u>
July	0	0	0.067	77	7	22	0.295
August	0	0	0.056	83	19	61	0.327
September	0	0	0.0497	56	4	13	0.112
October	0	0	0.074	32	3	9.7	0.109
November	0	0	0.063	48	1	3.3	0.118
December	0	0	0.067	-12	1	3.2	0.060

BFG46283

DISCUSSION

Water Quality Control (continued)

The vacuum tank truck moved the following amounts of material during December.

Waste fuel oil	2,100 gallons
Ethylene waste oil	14,000 gallons (60% oil)
EDC (sump)	19,600 gallons
Pond skimming oil	14,000 gallons (10% oil)
Acrylic Acid	22,400 gallons (acrylic acid & water)
Acrylo	8,400 gallons (cyanide waste)
EDC sludge - #6 tank	<u>14,000</u> gallons
	94,500 gallons

Air Quality Control

The Kentucky implementation plan for attainment of national ambient air quality standards was reviewed. A small discussion meeting, held by Peabody Coal, concerning this plan was attended. The effect of the plan and its new regulations on existing facilities is not greater than the existing regulation. However, it is very restrictive on new facilities.

Environmental Control Program

1. Acrylonitrile Plant

A report was issued in conjunction with the acrylo department water conservation program. Liquid carryover from the quench column was shown to be the source of most of the solids in the recovery system. An entrainment separator was recommended to obtain the potential savings in excess of \$20,000 per year in addition to reducing the magnitude of future secondary treatment facilities.

2. Ethylene Plant

The Ethylene Plant's API effluent is not suitable for use as cooling tower makeup without additional treatment for organic removal - especially in chromate cooling water - per evaluation by Betz and Calgon.

The satisfactory operation of the Ethylene Plant's oil recovery facilities does not produce a suitable effluent quality with regard to oil. Additional oil removal facilities are needed to have an effluent suitable for secondary treatment.

26066003

BFG46284

DISCUSSION

Environmental Control Program

2. Ethylene Plant (continued)

Several tests of a Fram coalescer installed in a slipstream taken from the discharge of one of the API separator lift pumps were again made to determine the feasibility of this method for final oil removal from the effluent, with no success. John Lank will contact Fram to determine if they have any other coalescing cartridges that could be of possible use on this stream.

Three plant site evaluations of equipment are being considered for this spring: "Cat-Sep" process, inclined plate separator and chemical additions to the present air flotation unit. The design job for chemical additions to the present air flotation unit has been written.

3. EDC-VC1 Plants

A test run was made on the North waste water stripper to determine the feasibility of externally neutralizing the hot quench bottoms feed stream. Also evaluated was the necessity of the stripper decomposer bowl for chloral destruction. A report dated December 21 was written by D. M. Gentner discussing the results of the test run. It was found that the residence time provided by the bowl is not required for chloral destruction and that in-line HCl neutralization is possible upstream of the waste water stripper. It was recommended that the decomposer bowl be eliminated and that a suitable external neutralization system be installed. The Engineering Department is presently working on this design.

A program was set up to sample and analyze each of the EDC-VC1 sumps and Z4. The samples are being tested for BOD, COD, TOC, TIC² and chlorinated organics. This study should be complete by Friday, January 7, 1972.

An interim report was issued on December 21 covering the work completed to date on this project. Working with a lab steam stripper it was determined that significant reductions (approximately 97%) of both TOC and TOD can be made by steam stripping the Z3 sump effluent. Some additional lab testing will be done to determine the effect of steam stripping on other parameters.

4. Waste Treatment Studies

The three biological treatment units were operated until December 16 without serious problems. In some cases the results were encouraging but in other cases disappointing.

BFG46285

26000004

DISCUSSION

Environmental Control Program

4. Waste Treatment Studies (continued)

The No. 1 unit was operated on a feed of the No. 2 pond effluent. The retention time was maintained at about three hours. In November the BOD reduction ranged from 85-89%. On November 29 a "sour cabbage" odor was noted in the aeration tank and lasted for several days with a resulting decrease in BOD reduction to 65-75%. During this period of time the BOD reduction decreased about 20%. The cause of this problem could not be determined. On December 16 continuous feeding was changed to batch feeding to try to hold the biological sludge until January.

The No. 2 unit was operated on a mixed feed from 3A pond and the waste water stripper bottoms of the EDC Plant with a retention time of nine to ten hours. In November the BOD reduction decreased to 65-75% with the introduction of the waste water stripper bottoms. In December the BOD reduction increased to 81-89% but with no significant change in the TOC reduction. The COD reductions were too erratic to draw any conclusions. On December 16 this unit was converted to an aerobic digestion unit.

The No. 3 biological system was operated on a feed from the Acrylonitrile Plant (before alkaline chlorination), the Acrylic Acid Plant and the Ethylene Plant at a retention time of 14-16 hours. Cyanide destruction was erratic, varying from 16% to 70%. BOD reductions were low, varying from 33% to 66%. Late in November corn steep liquor was added in the hope that enzymatic action would increase the degree of destruction. In December activated carbon and copper were also added in hopes of improved destruction. None of these changes resulted in the anticipated improved operation. The only change noted was a decrease in the solids in the biological sludge. On December 16 this unit was shut down and the sludge discarded.

An engineer from Engineering-Science worked here for one week to run a series of tests to provide the remainder of the design data required. This work included:

- a. Sludge settling rates.
- b. Sludge filtration rates.
- c. Oxygen transfer rates.
- d. Sludge centrifuge tests.

Two aerobic digestion units were run during the month to evaluate this method of sludge destruction. These tests were discarded and two more tests were started.

26066005

BFG46286

DISCUSSION

Environmental Control Program

4. Waste Treatment Studies (continued)

Two carbon isotherm tests were run in the lab on the clarifier effluent from both the No. 1 and No. 2 BOD units. All of the analytical tests are not complete, but the preliminary TOC analyses show reductions of 90-98%, depending upon the carbon dosage. The purpose of these tests was to quickly evaluate the feasibility of using activated carbon for tertiary treatment in the future, should it be required.

A laboratory study was run in which the EDC hot quench bottoms and the manufacturing wash train effluent (caustic and acid washes) were mixed. This resulted in a significant reduction in the TOC, free chlorine and BOD in the mixture as compared to the individual streams before mixing. The results of this work indicate that these streams could be mixed and fed to the waste water stripper with minimal corrosion problems, removal of the chlorinated organics, concentration of the sludge in 3B pond, and improved waste treatment. A report was issued by Dave McClure on this work.

Jar clarification tests were run on mixtures of plant effluents combined in proportion to their flow rates to evaluate various coagulants. A significant clarification was obtained, but little or no TOC reduction was obtained.

Test correlation studies on data from the BOD evaluation units have been completed. Significant correlations were found between TOD, TOC, COD and BOD results. However, the correlations found were poor and would not allow prediction of individual results by the correlation equations.

Curves were drawn up for the correlation between BOD results and COD results, which allow the prediction of the average BOD level from the average COD level with reasonable accuracy.

5. Status of Program

The fourth detailed quarterly status report on the Calvert City environmental control program for 1971 was issued. The 1972 program is in Cleveland awaiting comments.

BFG46287

J. M. Adams
Q. M. Adams

C. J. Orsborn
C. J. Orsborn

ru

cc: CLWoods / EWHarrington / DBSchrock / JKKoster / FRCarvell / NSGrove /
GFLeFebvre / MCJohnson / JRRender / HWCCompton / EEAtkins / JRGough /
DRHise / DKPruitt / JJSchonaerts / TMSpencer / RLThomas / RVRommelma /
FHSollman / JRHarper / DDHenneke

26066006

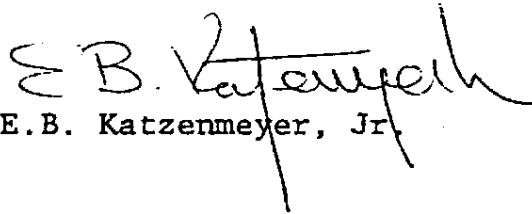
June 20, 1978

C. L. Woods
E. W. Harrington

INDUSTRIAL HYGIENE SURVEY - CALVERT CITY

During May 1978, Mr. Thomas Bialke conducted an industrial hygiene survey of manufacturing operations at Calvert City. A copy of his report is attached.

Please note that he has made several recommendations. In order to maintain a working relationship, I would appreciate being advised of the status of these recommendations within 60 days.


E.B. Katzenmeyer, Jr.

v

cc: R. Edwards
J. Bloodworth
H. Waltemate
K.J. Kaminski
R.W. Strassburg
R.A. Guyton
H.W. Dietz
R.A. Kelley

26067001

BFG46288