UNION CARBIDE

AGRICULTURAL PRODUCTS COMPANY, INC.
P. O. BOX 2831, CHARLESTON, W. VA. 25330
Institute Plant

February 2, 1982

I.D. No. 039-00007 Reg. 13-641
Company Quentis
Facility Institute Region 4
Initials RLJ

NON-CONFIDENTIAL

Mr. Carl G. Beard, II
West Virginia Air Pollution Control Commission
1558 Washington Street, East
Charleston, West Virginia 25311

Re Permit Application for construction of LARVIN[R] Thiodicarb Insecticide Production Facility

Dear Mr. Beard:

Attached hereto is the corrected VOC Fugitive Emission Control Program and the Sulfur Dioxide Emission Control Program that were agreed to in your meeting with Messrs. Heinecke, Jensen, Martin and McNeer of UCC on February 1, 1982.

Very truly yours,

H. J. Karawan
Plant Manager

HJK/sg
1010A/0056A

PESTICIDE B PROJECT

VOC FUGITIVE EMISSION CONTROL PROGRAM

The control of VOC fugitive emissions from the Pesticide B Project is composed of two parts (1) Design philosophy, and (2) the VOC Fugitive Emission Monitoring, Detection, and Repair Program.

I. General Design Philosophy

The project has specified the use of special low-emission specifications for piping, valves, pumps, flanges, etc. normally used for highly toxic or corrosive service. In doing so, leaks resulting in VOC emissions will be minimized. The specific features of the low-emission design concept are attached for reference purposes.

II. VOC Fugitive Emission Monitoring, Detection, and Repair Program

1. After mechanical completion, the unit will be checked for leaks by using a combination of hydrostatic testing and pneumatic (bubble check) testing.

2. Prior to process operation, a complete master list of potential VOC fugitive emission sources (valves, pumps, flanges, and compressors) will be developed. Each potential leak source will be identified in such a manner as to be reasonably easy to locate. The Institute Environmental Protection Department will supply the WVAPCC with a copy of the complete master list.

3. Due to the odoriferous nature and low odor threshold (less than 1 ppm) of several of the chemicals in the process, a detailed survey will be made between two (2) and four (4) months of operation after start-up of all potential VOC fugitive leak sources, previously identified on the master list, using appropriate portable leak detection equipment and visual checks. A member of the Institute Environmental

Protection Department will accompany unit personnel during the inspection to monitor and evaluate the procedures and results. Any suspected problems with the procedures or results will be referred to the appropriate UCC experts for resolution. Corrective action to stop leaks will be taken on each leaking source within five (5) days of detection. A written record will be kept of actions taken to correct any leaks.

4. A listing of all identified leaks found in the survey outlined in (3), together with the magnitude of each leak and the corrective action taken, will be developed and sent to the WVAPCC by the Institute EP Department within five (5) months after the start of unit operation.

5. After eight (8) months of unit operation, a second comprehensive survey will be conducted by unit personnel of all potential VOC fugitive leak sources on the master list using portable monitoring equipment and visual checks. Corrective action to stop leaks will be taken on each leaking source within five (5) days of detection. The results of this survey and actions taken will be reviewed and sent to the WVAPCC by the Institute EP Department by the completion of ten (10) months of operation. Special notation will be made of those sources which were found leaking in <u>both surveys</u>.

6. After ten (10) months of operation, those sources found leaking in either the first or the second survey will be monitored again using portable leak detection equipment and visual checks. A member of the Institute EP Department will again accompany unit personnel during this inspection to monitor and evaluate the procedures and results. Corrective action to stop leaks will be taken within five (5) days of the detection of the leak. The results and actions will be furnished to WVAPCC before the completion of twleve (12) months of operation by the Institute EP Department.

7. The unit's standard operating procedure will require walk-through checks of most potential sources of VOC emissions on a shift-to-shift basis. Any leaking source of toxic or odoriferous material that is detected will be repaired as quickly as possible, but no later than five (5) working days. A record of these leaking sources and the corrective action taken will be recorded.

8. Computer monitoring of the accumulated data from the surveys and walk-through inspections will highlight trouble spots and confirm design criteria.

9. Upon the completion of twelve (12) months of operation, an on-going program will be formulated by unit personnel and the Institute EP Department based on the results of the three surveys and will be submitted to the WVAPCC for their review and approval.

10. It is understood that any program developed in (9) will be an on-going committment by Union Carbide. It is further understood that it is Union Carbide's intent to comply with the repair schedules to the fullest extent feasible, but that there will be situations where strict adherence to these repair schedules will not be practical or possible. Any exceptions will be explained in the written reports to the WVAPCC. It should be further understood that any leak detected outside of the formal checks and surveys will receive the appropriate attention depending on whether it is an odoriferous, or toxic, or non-odoriferous and non-toxic emission.

11. Notwithstanding the foregoing, prompt action will be taken to correct leaks of pesticides or toxic chemicals as quickly as possible.

It should be noted that Step 1 and Step 2 of the process are scheduled to start up and operate approximately one (1) year before the start-up and operation of Step 3. Therefore, the definition of "unit" in

the VOC Fugitive Emission Monitoring, Detection, and Repair Program is Step 1 and Step 2 of the process or Step 3 of the process, whichever the case may be. For clarification purposes, a tentative operating-shutdown schedule for the unit is attached. It should be understood that this operating schedule is tentative and subject to change depending on the business climate.

R.L.McNeer:bg
1/22/82

PESTICIDE B PROJECT

SULFUR DIOXIDE EMISSION CONTROL PROGRAM

The SO_2 emissions from the No. 1 Steam Plant boiler stacks are determined by calculation based on the sulfur content of the fuels burned in the boilers to insure compliance with Regulation X at the Institute Plant. These fuels include liquid and gaseous process waste by-products (residues) as well as coal, fuel oil, and hydrogen. Of all the fuels used, only coal (which consistently contains 0.95-1.0% sulfur) and Pesticide B wastes contain significant amounts of sulfur. Since the sulfur content of coal is essentially a constant, only Pesticide B wastes need be considered in the following sampling program. The SO_2 emission calculation procedure is shown in Attachment-I.

The following is a description of the procedure for determining the sulfur content of the liquid and gaseous residues leaving the Pesticide B Unit and being fed to the boilers. The recordkeeping procedure is also described below.

I. Liquid Residues

The following procedure for sampling and analyzing the sulfur content in the liquid residues from the Pesticide B Unit and the liquid residues being fed the boilers at the No. 1 Steam Plant will be initiated immediately on start-up of Steps-I and II of the Pesticide B Unit.

1. The contents of the unit residue storage tanks, T-43 and/or T-55, will be sampled approximately two (2) hours prior to being pumped to Tank 1021 at the No. 1 Steam Plant. The sample will be transported to the Plant Laboratory where it will be analyzed for sulfur concentration.

2. The quantity of residue pumped to Tank 1021 will be determined by difference in tank (T-43 and/or T-55) inventory and corrected for the rate in which residue is added to the tank (T-43 and/or T-55) while it is being pumped out.

3. The amount of sulfur pumped to Tank 1021 will be determined by multiplying the quantity of residue pumped times the sulfur concentration.

4. The quantity of sulfur transferred to Tank 1021 is then used to calculate the sulfur concentration in Tank 1021. The Tank 1021 sulfur concentration will be recalculated as sulfur-free residues are pumped into the tank. The contents of Tank 1021 will be sampled daily and analyzed as described above to check the actual sulfur concentration against the calculated sulfur value.

5. The amount of sulfur in the residue feed to the boilers will then be determined by multiplying the flow rate to each boiler by the sulfur concentration of Tank 1021.

6. Daily logs of the amount of sulfur transferred from the Unit tanks (T-43 and/or T-55) to Tank 1021, the calculated and sampled sulfur content in Tank 1021, and the amount of sulfur transferred from Tank 1021 to each individual boiler will be maintained by Union Carbide in a format similar to that found in Attachments-II, III, and IV. The daily logs will be reviewed by the Institute Environmental Protection Department and submitted to the WVAPCC at the end of each calendar month.

7. The total amount of all fuels fed to the boilers along with the average sulfur concentration and fuel value will continue to be reported to the WVAPCC in the Monthly Fuel Report.

II. Gaseous Residue

The following procedure for determining the amount of sulfur being fed to the boilers at the No. 1 Steam Plant from the gaseous residue stream from the Pesticide B Unit will be initated at the start-up of Steps-I and II.

II. Gaseous Residues - continued

1. The combined quantity of vent gas from Steps-I and II of the Pesticide B Unit burned in the No. 1 Steam Plant boilers will be metered continuously and totalized on a twenty-four (24) hour basis.

2. During the first two (2) months of operation, after start-up of Steps I and II, the vent gas from the Pesticide B Unit will be sampled weekly while the unit is operating and analyzed in the same manner as the liquid residues.

3. The amount of sulfur fed to the boilers with the vent gas will be determined by multiplying the totalized flow rate from No. 1 times the sulfur concentration from No. 2. Daily logs of the sulfur fed to the boilers from the vent gas will be maintained by Union Carbide in a format similar to that found in Attachment V. The logs will be reviewed by the Institute Environmental Protection Department and submitted to the WVAPCC at the end of each calendar month.

4. Between two (2) and four (4) months of operation after start-up Steps I and II, Union Carbide will conduct a vent gas sampling program to correlate the variability in the vent gas sulfur concentration with operating rate and other appropriate parameters. This sampling program will include daily vent gas sampling and sulfur analysis for two (2) consecutive weeks, Monday through Friday inclusive while the unit is operating. On three (3) of the above days, two (2) samples per shift (a total of six (6) samples per day) will be taken and analyzed for sulfur.

5. Results of the sample program will be reviewed with the WVAPCC within five (5) months after the start of unit operation to determine the vent gas sampling frequency required to insure compliance with Regulation X. Until this time, normal vent gas sampling will continue to be done weekly.

6. Between eight (8) and ten (10) months of unit operation, the above sample program will be repeated to include the vent gas from Step III. The results of this second sampling program will be reviewed jointly by UCC and the WVAPCC within eleven (11) months of unit operation. An on-going Sulfur Dioxide Emission Control Program will be agreed upon at that time.

III. Modification of Program

It is understood that at any time during the program, the sampling requirements and/or the recordkeeping and reporting requirements may be modified by mutual consent of the WVAPCC and Union Carbide if the existing data so warrents.

R.L.McNeer:bg
2/2/82

PESTICIDE B PROJECT

SULFUR DIOXIDE EMISSION CALCULATIONS

Sulfur Balance - No. 1 Steam Plant Boilers

(Fuel Sulfur In) $\frac{MW_{SO_2}}{MW_S}$ = Sulfur Dioxide Out

MW_{SO_2} = 64
MW_S = 32
Sulfur Dioxide Out = 430 lbs/hr
Fuel Sulfur In = $S_c + S_1 + S_G$

S_c (Sulfur in Coal)

$$S_c = (\text{Wt. Fraction S in Coal})(\text{Capacity Coal Usage})\left(\frac{W - X}{\text{Capacity Steam Production}}\right)_b$$

Where:

W = Steam Required (lbs/hr)
X = Steam Equivalent from Hydrogen (lbs/hr) [See Note 1]
b = BTU Fraction of coal in total nongaseous fuel.

$$S_c = (0.01)(18070)\left(\frac{W - X}{150{,}000}\right)_b$$

S_1 (Sulfur in Liquids)

$S_1 = y\ Z$

Where:

y = Sulfur Wt. Fraction in liquid fuels
Z = Liquid Fuel Flow rate

S_G(Sulfur in Gases)

S_G = 0 For Boilers No 1, 2, 5, and 6

S_G = 48 lb/hr on Boilers No. 3 or 4

S_G = 24 lb/hr when both Boilers No. 3 and 4 are in operation

By Substitution In Sulfur Balance Equation:

$$[(0.01)(18070) \quad \frac{(W - X)_b}{(150{,}000)} + yZ + S_G] \frac{64}{32} \quad 430$$

$$0.0024 \quad (W - X)b + 2yZ + 2S_G \quad 430$$

Solving for Z:

$$Z \quad \frac{430 - 2S_G - 0.0024 \ (W - X)b}{2y}$$

Dividing by 2:

$$Z \quad \frac{215 - S_G - 0.0012 \ (W - X)b}{y}$$

By Internal Restriction:

$$Z \quad (18070) \left(\frac{W - X}{150{,}000}\right) (1 - b) \ \frac{HV_c}{HV_1}$$

Where:

HV_c = Heating value of coal = 11900 BTU/lb
HV_1 = Heating value of liquid

Note 1: Hydrogen steam equivalent

$$X = \frac{(\text{SCFH hydrogen})(HV_H)}{1430 \text{ BTU/lb steam}}$$

Hydrogen can be used only on boilers 3, 4 and 5

Note 2: BTU Fraction of Coal in Total Nongaseous Fuel

$$b = \frac{\text{Steam From Coal}}{\text{Total Steam Production}}$$

Steam from Coal = Total Steam Production - Hydrogen Steam Equivalent - Residue Steam Equivalent

Where:

Total Steam Production is measured
Hydrogen Steam Equivalent = X (See Note 1)

$$\text{Residue Steam Equivalent} = \frac{(\text{lbs/hr Residue Fed}) \ (HVr)}{1430 \text{ BTU/lb Steam}}$$

ATTACHMENT II

PESTICIDE B LIQUID RESIDUE SUMMARY

Month _____

NON-CONFIDENTIAL

	Tank T-43			Tank T-55			Total of all Residues to Tank 1021		
Date	Quantity Lbs/day	Sulfur Concentration %	Sulfur Content Lbs/day	Quantity Lbs/day	Sulfur Concentration %	Sulfur Content Lbs/day	Quantity Transferred	Sulfur Content	BTU Value
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
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26									
27									
28									
29									
30									
31									

Comparison of Calculated and Sampled Sulfur Content in Tank 1021

ate	Time sample taken from Tank 1021	Calculated Sulfur Content At Time Sample Taken (% of Weight)	Sulfur Content of Sample (% by Weight)	Calculated Maximum Sulfur Content in Tank 1021 (% by Weight)
1				
2				
3				
4				
5				
6				
7				
8				
9				
.0				
1				
.2				
.3				
.4				
.5				
.6				
.7				
.8				
.9				
20				
1				
2				
23				
24				
25				
26				
27				
28				
29				
30				
31				

ATTACHMENT IV

NO. 1 STEAM PLANT

SULFUR BALANCE, LBS/HR

Month _____

BOILER NO. _____

Date	Tank 1021		Fuel:		Fuel:		Fuel:		Fuel:		Fuel:		Total
	Feed lbs/hr	Sulfur lbs/hr	Feed lbs/hr	Sulfur lbs/hr	Feed lbs/hr	Sulfur lbs/hr	Feed lbs/hr	Sulfur lbs/hr	Feed lbs/hr	Sulfur lbs/hr	Feed lbs/hr	Sulfur lbs/hr	lbs/hr Sulf.
1													
2													
3													
4													
5													
6													
7													
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31													

ATTACHMENT V

PESTICIDE B GAS RESIDUES

Month _____

NON-CONFIDENTIAL

Date	Totalized Vent Gas Flow Lbs/day	Sulfur Concentration (% by Weight)	Sulfur Content Lbs/day	Vent Gas Flared Lbs/day	No. Hrs. Flared	Reason for Gas Flaring
1						
2						
3						
4						
5						
6						
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12						
13						
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