UNION CARBIDE INTERNAL CORRESPONDENCE

P. O. BOX 471, TEXAS CITY, TEXAS 77590

TO: C. V. Taormina
USV Shift Prod. Supervs.
USV Staff

Date: August 26, 1985

cc: N. J. Alford
M. E. Eisenhour
R. A. Mendez

Subject: Safety Training

The following safety topics and assignments have been made:

1. General Safety/Startup Safety

   M. L. White - Chairman
   M. G. Sellen
   R. A. Mendez
   T. T. Do

2. Unit Hazards Review (including Evacuation Training, Vapor Cloud Releases, Hazardous Chemicals, VCM Training):

   D. R. Hall - Chairman
   S. M. Norwood
   J. R. Rex
   R. J. Bocek

3. Reaction/Processing Technology:

   R. M. Arnold - Chairman
   M. E. Eisenhour
   J. A. Gordy

4. Eye, Hearing and Hand Protection:

   R. W. Brandt - Chairman
   E. D. Sheely
   J. D. Washington

5. Vessel and Confined Space Entry, Elevated Work Procedure and Master Card/Hazardous Work Permits:

   K. R. Behnke - Chairman
   D. B. Rygaard
   C. V. Taormina

Each of the five general safety topics should be presented to all USV Personnel in training sessions of 1-1/2 - 2 hours maximum. It is anticipated that each topic will be presented in two sessions, i.e., Startup Safety on Monday, Unit Hazard Review on Tuesday, etc. Each group should be prepared to present their training by October 1. The training sessions and time have not been established but most likely will occur during the weeks of October 14 and 21. Vinyls Application Training is scheduled for October 10.

Each group will also have an SPS assigned in the next few days. Please feel free to use any resources, material, film, etc. Consideration should be given to involving as many people as possible in these sessions - perhaps designating a specific topic to a select group of Operators (such as Hazardous Chemicals). Input from all Operations and Maintenance Personnel is encouraged.

Let me know if you have any questions.

R. M. Arnold

RMA/st

ID#: RMA8853

To: L. K. Berringer
W. W. Crosby
W. W. Johnson
J. C. Zirl
C. P. Milligan
C. E. Simpson

Date: Nov 20, 1961

1 Copy: E. T. Boyd
F. A. Bracciano
D. G. Reese
A. O. Ross
N. J. Augustin

Subj: Vinyl Chloride
Training for Operators
& Maintenance

OSHA Regulation 1910.1017(j) requires that "each employee engaged in vinyl chloride or polyvinyl chloride operations shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use". It further requires that this training be done annually.

If your personnel have not received this training in the last ~~twelve mo~~ year, you should arrange to do so.

The Safety Dept (EXT 5153) has the Vinyl Chloride Training film in both video tape and 35 mm slide module.

J. L. Johnson

UCC 093682

Atmospheric concentration of vinyl chloride	Required apparatus
(i) Unknown, or above 50,000 ppm	Open-circuit, self-contained breathing apparatus, pressure demand type, with full facepiece.
(ii) Not over 50,000 ppm	(A) Combination type C supplied air respirator, pressure demand type, with full or half facepiece, and auxiliary self-contained air supply; or (B) Combination Type C, supplied air respirator continuous flow type, full or half facepiece, and auxiliary self-contained air supply.
(iii) Not over 1,000 ppm.	Type C, supplied air respirator, continuous flow type, with full or half facepiece, helmet or hood.
(iv) Not over 100 ppm	(A) Combination type C supplied air respirator demand type, with full facepiece, and auxiliary self-contained air supply; or (B) Open-circuit self-contained breathing apparatus with full facepiece, in demand mode; or (C) Type C supplied air respirator, demand type, with full facepiece.
(v) Not over 25 ppm	(A) A powered air-purifying respirator with hood, helmet, full or half facepiece, and a canister which provides a service life of at least 4 hours for concentrations of vinyl chloride up to 25 ppm, or (B) Gas mask, front- or back-mounted canister which provides a service life of at least 4 hours for concentrations of vinyl chloride up to 25 ppm.
(vi) Not over 10 ppm	(A) Combination type C supplied-air respirator, demand type, with half facepiece, and auxiliary self-contained air supply; or (B) Type C supplied-air respirator, demand type, with half facepiece; or (C) Any chemical cartridge respirator with an organic vapor cartridge which provides a service life of at least 1 hour for concentrations of vinyl chloride up to 10 ppm.

[Section 1910.93q (4) amended at 39 FR 41848, December 3, 1974 and redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(5) (i) Entry into unkown concentrations or concentrations greater than 36,000 ppm (lower explosive limit) may be made only for purposes of life rescue; and

(ii) Entry into concentrations of less than 36,000 ppm, but greater than 3,600 ppm may be made only for purposes of life rescue, firefighting, or securing equipment so as to prevent a greater hazard from release of vinyl chloride.

(6) Where air-purifying respirators are used:

(i) Air-purifying canmisters or cartridges shall be replaced prior to the expiration of their service life or the end of the shift in which they are first used, whichever occurs first, and

(ii) A continuous monitoring and alarm system shall be provided where concentrations of vinyl chloride could reasonably exceed the allowable concentrations for the devices in use. Such system shall be used to alert employees when vinyl chloride concentrations exceed the allowable concentrations for the devices in use.

(7) Apparatus prescribed for higher concentrations may be used for any lower concentration.

(h) *Hazardous operations.* (1) Employees engaged in hazardous operations, including entry of vessels to clean polyvinyl chloride residue from vessel walls, shall be provided and required to wear and use:

(i) Respiratory protection in accordance with paragraphs (c) and (g) of this section; and

(ii) Protective garments to prevent skin contact with liquid vinyl chloride or with polyvinyl chloride residue from vessel walls. The protective garments shall be selected for the operation and its possible exposure conditions.

(2) Protective garments shall be provided clean and dry for each use.

(i) *Emergency situations.* A written operational plan for emergency situations shall be developed for each facility storing, handling, or otherwise using vinyl chloride as a liquid or compressed gas. Appropriate portions of the plan shall be implemented in the event of an emergency. The plan shall specifically provide that:

(1) Employees engaged in hazardous operations or correcting situations of existing hazardous releases shall be equipped as required in paragraph (h) of this section;

(2) Other employees not so equipped shall evacuate the area and not return until conditions are controlled by the methods required in paragraph (f) of this section and the emergency is abated.

(j) *Training.* Each employee engaged in vinyl chloride or polyvinyl chloride operations shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use.

(1) The program shall include:

(i) The nature of the health hazard from chronic exposure to vinyl chloride including specifically the carcinogenic hazard;

(ii) The specific nature of operations which could result in exposure to vinyl chloride in excess of the permissible limit and necessary protective steps;

(iii) The purpose for, proper use, and limitations of respiratory protective devices;

[Section 1910.93q(j)(1)(iii) amended at 39 FR 41848, December 3, 1974, and redesignated as 1910.1017 at 40 FR 23072, May 28, 1975]

(iv) The fire hazard and acute toxicity of vinyl chloride, and the necessary protective steps;

(v) The purpose for and a description of the monitoring program;

(vi) The purpose for, and a description of, the medical surveillance program;

(vii) Emergency procedures;

(viii) Specific information to aid the employee in recognition of conditions which may result in the release of vinyl chloride; and

(ix) A review of this standard at the employee's first training and indoctrination program, and annually thereafter.

(2) All materials relating to the program shall be provided upon request to the Assistant Secretary and the Director.

(k) *Medical surveillance.* A program of medical surveillance shall be instituted for each employee exposed, without regard to the use of respirators, to vinyl chloride in excess of the action level. The program shall provide each such employee with an opportunity for examinations and tests in accordance with this paragraph. All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, and shall be provided without cost to the employee.

(1) At the time of initial assignment, or upon institution of medical surveillance:

(i) A general physical examination shall be performed, with specific attention to detecting enlargement of liver, spleen or kidneys, or dysfunction in these organs, and for abnormalities in skin, connective tissues and the pulmonary system (See Appendix A).

(ii) A medical history shall be taken, including the following topics:

(A) Alcohol intake;

(B) Past history of hepatitis;

(C) Work history and past exposure to potential hepatotoxic agents, including drugs and chemicals;

(D) Past history of blood transfusions; and

(E) Past history of hospitalizations.

(iii) A serum specimen shall be obtained and determinations made of:

(A) Total bilirubin;

(B) Alkaline phosphatase;

(C) Serum glutamic oxalacetic transaminase (SGOT);

(D) Serum glutamic pyruvic transaminase (SGPT); and

(E) Gamma glutamyl transpeptidase.

(2) Examinations provided in accordance with this paragraph shall be performed at least:

(i) Every 6 months for each employee who has been employed in vinyl chloride or polyvinyl chloride manufacturing for 10 years or longer; and

(ii) Annually for all other employees.

(3) Each employee exposed to an emergency shall be afforded appropriate medical surveillance.

TEXAS CITY PLANT

UCAR SOLUTION VINYLS COMPLEX

VINYLS AREA S.O.P.	TOTAL AREA NO. 2 (Revised) PAGE: Cover Sheet EFFECTIVE: May 15, 1981

SUBJECT: Vinyl Chloride Exposure Protection

This S.O.P. is a Revision of two S.O.P.'s combined: S.O.P. No. 2 three pages issued August 23, 1976 and S.O.P. No. 26 issued January 16, 1979, eight pages for Bldgs. 115 and 117. Please take those two S.O.P.'s from your Manual and insert this new Revised S.O.P. No. 2 for TOTAL AREA, effective May 15, 1981.

It contains the following:

A. POLICY

B. MONITORING EQUIPMENT

C. LEAK DETECTION

D. RESPIRATORY EQUIPMENT

E. EMERGENCY

TEXAS CITY PLANT

UCAR SOLUTION VINYLS COMPLEX

VINYLS AREA S.O.P.	TOTAL AREA NO. 2 (Revised) PAGE: 1 of 14 EFFECTIVE: May 15, 1981

SUBJECT: Vinyl Chloride Exposure Protection

A. POLICY

1. UCC Policy is to fully comply with the OSHA Regulation for Exposure to VCl (1910.1017) reference letter by D.L. Engle dated 3/1/76 to all employees, Texas City Plant.

2. The OSHA standard for VCl requires that no employee may be exposed to VCl in concentrations greater than 1) 1 ppm averaged over any 8-hr period, 2) 5 ppm averaged over any period exceeding 15 minutes, & 3) may not be exposed by direct contact with liquid VCl (1910.1017c).

3. At any time the allowable levels are exceeded in an area, personnel working in the area must wear respiratory protection and rain suits if required.

4. All Visitors to the Regulated Area will register at Bldg. 114 or Bldg. 119 Control Room. The Regulated Area is shown on an attached plot.

5. All Operations & Maintenance personnel regularly assigned to the Regulated Area will be registered on Rosters kept by the Chief Operators & Leadmen. The Contract Division will keep Rosters n contract personnel entering the area. The UCAR Vinyls Staff Roster will be maintained by the Vinyls Secretary. These Rosters (Logsheets) must be forwarded to Bldg. 197 on a regular basis for filing.

6. The Regulated Area will be monitored by three continuous vapor fraction analyzers (VFA's) with sample points scattered throughout the area.

B. MONITORING EQUIPMENT

1. Continuous Vapor Fraction Analyzer (VFA)

Two continuous vapor fraction analyzers are currently in service in the Unit and located in Bldg. 115. A third unit will be added during 1981. Each analyzer consecutively analyzes sample points requiring 40 minutes to complete a scan (2 minutes/point). The analyzer is designed to analyze for VCl only. Results are

SUBJECT: Vinyl Chloride Exposure Protection

C. LEAK DETECTION

1. Vinyl Chloride Leak (Defined)

A leak, other than one that can be detected by sight, sound, or smell, is defined as a single reading of 10 ppm or greater, or two consecutive readings of 5 ppm or greater on the VFA.

2. Leak Detection Procedure (North Area)

a. The Bldg. 115 Operator is responsible for monitoring the continuous analyzer (VFA) printouts and determine if ther is a leak as previously defined.

b. The North Area Chief Operator must be notified immediately when a leak is indicated. Other personnel in the affected area must also be notified immediately over the public address (PA) system. The Chief Operator will notify the Shift Production Supervisor.

c. The Chief Operator, or the Operator if delegated, will determine the source of the leak using the portable organic analyzer (OVA) or the Drager Detector. The Operator searching for the leak must wear respiratory protection (MSA Pack). It must be assumed that he will be exposed to levels higher than the permissible exposure limits when the source of th leak is discovered.

d. When the source has been determine, corrective action must begin immediately to stop the leak. If Maintenance is required to repair the leak, the request should have a high priority, normally 2A unless the leak is very large or a vapor cloud release, then 1A. See Emergency Section. Maintenance personnel repairing the leak must also wear respiratory protection and rain suits if danger of exposure to liquid.

e. Non-essential personnel shall be withdrawn from the area of the leak. Personnel required to remain in an affected area are required to wear respiratory protection when spending 15+ minutes in an area where the latest reading is 5 ppm, or anytime the individuals 8-hr TWA is forecast to be over 1 ppm.

f. If, for any reason, repairs cannot be made immediately, the area must be isolated until the leak is fixed and VFA monitor indicates a return to normal conditions ($<$ 1 ppm).

g. The Chief Operator will notify personnel in the area ov r the PA system when the VCl level is back to normal.

h. All leaks, as defined, must be recorded on the forms provided (copy attached) with a description of the action taken to eliminate the leak. The completed form should be routed to the SPS, DPS, and Vinyls Dept. Head.

3. Leak Investigation Procedure (Bldg. 113 Area)

a. The Bldg. 113 Operator is responsible for monitoring the VFA printouts and determine if there is a leak as previously defined.

b. The Bldg. 113 Chief Operator must be notified immediately, as well as any other personnel in the affected area, when a leak is indicated.

d. Other steps of procedure same as procedure for North Area and as listed above.

4. Procedure For High Levels At Bldg. 121

a. The Bldg. 115 Operator is responsible for monitoring the VFA for the Bldg. 121 area. When a high level (10 ppm or greater for a single point, or two consecutive readings of 5 ppm or greater) is detected in Bldg. 121, he will notify the North Chief Operator.

SUBJECT: Vinyl Chloride Exposure Protection

b. The North Chief Operator will notify the South Chief Operator and the Shift Prod. Supervisor.

c. If the Control Room (Point 5) is indicated by the VFA to be high, the South Chief Operator will use the Drager Detector to confirm the level in the Control Room and make the decision on proper respiratory protection (canister respirators or MSA Air Packs) for the Operators.

d. The South Chief Operator, or the Operator if delegated, will use the Drager to determine the source of the VCl. He must wear respiratory protection while searching for the source. The most likely source is the varnish and a check of each impregnator must be made to determine the specific varnish involved.

e. The South Chief Operator will communicate the results of his search to the North Chief Operator who will take corrective action in the Stripping Area, if required.

f. The Bldg. 115 Operator will continue to monitor the VFA and report areas of Bldg. 121 affected.

g. The North Chief Operator will communicate areas affected to the South Chief Operator who will decide on areas to be cleared of personnel and notify Staff.

h. The North Chief Operator will notify personnel in the area over the PA system when the VCl level is back to normal.

i. The North Chief Operator will fill out the Leak Detection Log Report.

SUBJECT: Vinyl Chloride Exposure Protection

5. Routine Check For Leaks

A weekly check will be conducted to find small leaks in the area. The Bldg. 116 Operator and the Bldg. 113 Chief Operator will be responsible for conducting the checks for their areas each Saturday on Day Shift. Areas to be checked using the OVA include:

North Area (Bldg. 116 Operator)

a. Autoclave steam pumps
b. Autoclave safety relief devices and manual vents
c. Centrifugal pumps in the Stripping Unit
d. Reciprocating (steam) pumps in the Stripping Unit
e. The second and third levels of the Stripping Unit
f. Safety relief devices in the Stripping Unit
g. The compressors (unloaders and packing)
h. Centrifugal pumps in Tank Area 1
i. Reciprocating pumps in Tank Area 1
j. The second level of Tank Area 1
k. Safety relief devices in Tank Area 1
l. Scrubber vent to atmosphere in Stripping Unit.

VCl Tank Car Rack (Bldg. 113 Chief Operator

a. First level - transfer pump
b. Second level - four hookup spots.

Building 119 (Bldg. 113 Chief Operator)

a. First level - compressor, reflux pump, cycle tank, knockout pot
b. Second level - condenser
c. Third level - stripper feed motor valve

recorded on a strip chart and stored in a Micro-Computer f r further processing. After each 20-point cycle, the stored information is printed out showing VCl concentrations for each f 19 sample points. The 20th point is a 10 ppm calibration point. The first analyzer covers Tank Area 1, Bldgs. 115 & 117. The second analyzer covers Bldgs. 121, 122, & 114. The location f the sample points are shown in the attached lists. The third analyzer will be located at Bldg. 113 and cover Bldg. 119 and the VCl Tank Car Unloading Rack.

Calibration samples are taken every 40 minutes. Whenever the calibration samples read out of the specified range (10 ppm ± 1 ppm), the analyzer must be reported to Maintenance for repair.

The Bldg. 115 Operator & Bldg. 113 Operator when VPA is installed, are responsible for monitoring the VPA, requesting Maintenance for repairs if required, ordering & replacing the printout sheets, and removal of completed sheets each Monday Day Shift. The completed sheets should be placed in the DPS's box with other charts. A file is maintained at Bldg. 115 for filing the VPA printout sheets.

2. Portable Organic Vapor Analyzer (OVA)

Portable OVA Units (Century) are currently available at Bldg. 115 for pin-pointing leaks in the unit. One unit will also be located at Bldg. 113. The analyzers can be used to measure total organic vapors, or specifically for VCl. The analyzer is accurate to 1 ppm.

3. Drager Gas Detector

The Drager Unit consists of a hand operated bellows pump and a detector tube. The tubes come in three detection sizes: 0.5 - 3ppm, 1 - 50 ppm, 100 - 300 ppm. The tubes are specific for vinyl chloride.

Three units will be available - one each at Bldgs. 115, 121 & 197.

SUBJECT: Vinyl Chloride Exposure Protection

Tank Area 4 (Bldg. 113 Chief Operator)

a. Transfer pump

b. Acetone purge pump

All leaks discovered should be recorded on the forms provided at the Chief Operator's desk at Bldg. 115 and Bldg. 113. Action should be taken to eliminate any leaks as soon as possible.

D. RESPIRATORY EQUIPMENT

1. The approved respiratory equipment in the Unit for protection from exposure to VCl are (1) the MSA self-contained 30-minute Air Pack, (2) the Breathing Air Systems and (3) Canister Masks.

2. One or more MSA Air Packs are located at each building in the Vinyls Area. A list is attached showing the number and location. Each Operator should know the location of the respiratory equipment in his/her working area. The MSA Air Pack contains a clean MSA Mask and a full air bottle. Anytime an Air Pack is used, it must be reported to the Safety Dept. Ext. 6027 or 5199, for refilling the bottle and cleaning the Mask.

3. The Breathing Air System consists of a Mask and Hose connected t a cylinder of "breathing" air. Some buildings have cylinders connected to a manifold with several take-off points for hose use. Clean Masks should be stored conveniently located to each Breathing Air Station or in the Control Rooms.

When a Mask has been used, it should be cleaned or the Safety Dept. should be called (Ext. 6827 or 5199) and they will pick up the Mask for cleaning.

Breathing Air Systems are located at Bldgs. 113, 115, 116, 117, 122 and the VCl Tank Car Rack.

4. Canister type respirators are available from a storage container located on the west side of Fifth Street about midway between Bldgs. 115 and 121. The container is painted green and marked "Vinyl Chloride Canister Respirators" These respirators can be worn only in areas where the VCl level is less than 25 ppm. The canister is good for four hours use.

E. EMERGENCY

A vinyl chloride emergency occurs when there is a massive VCl release threatening a vapor cloud hazard. In this case, the Flammable Vapor Cloud Release S.O.P. (Vinyls Area S.O.P. No. 1) should be followed.

The main steps of that procedure are as follows:

1. Actuate the deluge system for the affected area.
2. Evacuate the endangered area (upwind or crosswind of the leak).
3. Activate the Plant Fire Alarm and/or the Toxic Gas Alarm.

Locations of Toxic Gas Alarm boxes:

Box 612 - Pipe rack east of Bldg. 117
Box 623 - Pipe rack east of Bldg. 113
Box 632 - Pipe rack northeast of Bldg. 120

4. Isolate the affected area, roping it off if possible. Do not allow ignition source near area.
5. Do not re-enter the area. Only Fire and Rescue Squad wearing proper protective equipment are allowed in the area.
6. Isolate the leak by remote valve or pumping arrangements, if possible.
7. All available water should be used to disperse the cloud and

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VINYLS AREA S.O.P.	TOTAL AREA NO. 2 (Revised) PAGE: 14 of 14 EFFECTIVE: May 15, 1981

SUBJECT: Vinyl Chloride Exposure Protection

LOCATION OF RESPIRATORY EQUIPMENT

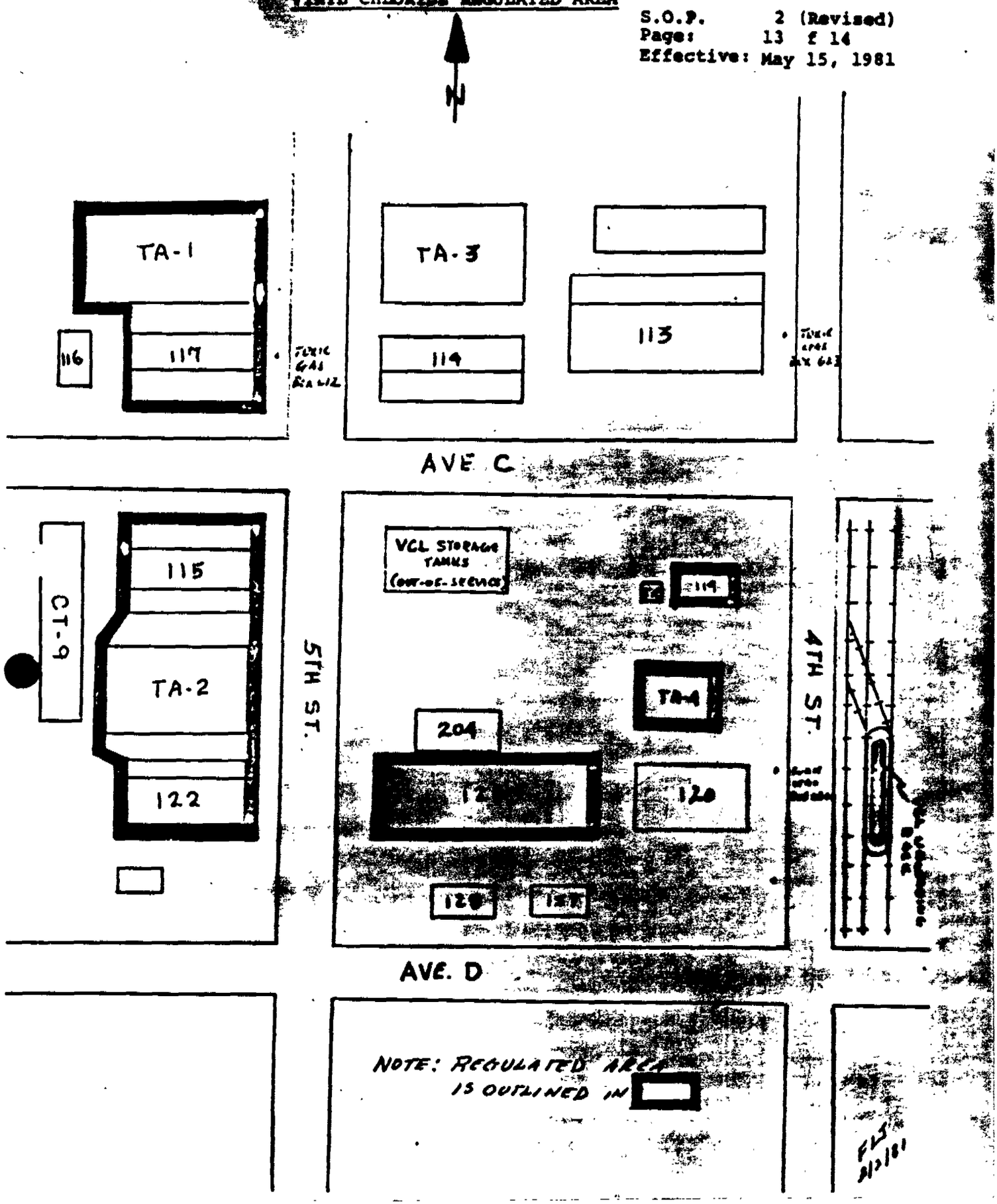
Bldg. No.	MSA Air Packs (30 Minute)	Breathing Air Systems	Canister Type Respirators
Tank Car Rack	2	Yes	1
Bldg. 113	4	Yes	
Bldg. 114	2		1
Bldg. 115	2	Yes	2
Bldg. 116	1	Yes	
Bldg. 117	2		2
Bldg. 119	1		1
Bldg. 121	4		
Bldg. 122		Yes	
5th Street Storage Box			20

UCC 093693

form a water curtain to prevent vapors from reaching an ignition source. Deluge, spray systems, monitor nozzles, and fire hoses should be used.

8. As a last resort, entry to the area shall be made from upwind by Fire/Rescue Squad especially trained to cope with vapor releases, wearing protective clothing and respiratory protecti n and under a protective water spray. An ignition should be anticipated at any time.

9. If a fire occurs, do not extinguish until the source of the fuel is shut off. A re-ignition could be more hazardous than the fire.


VINYL CHLORIDE REGULATED AREA
TOTAL AREA
N
TA-1
116
117
TOXIC GAS BA WIZ
TA-3
114
113
AVE C
CT-9
115
TA-2
122
5TH ST.
VCL STORAGE TANKS (OUT-OF-SERVICE)
119
TA-4
204
120
4TH ST.
AVE. D
NOTE: REGULATED AREA IS OUTLINED IN

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VINYLS AREA S.O.P.	TOTAL AREA NO. 2 (Revised) PAGE: 12 of 14 EFFECTIVE: May 15, 1981

SUBJECT: Vinyl Chloride Exposure Protection

VINYL CHLORIDE LEAK DETECTION LOG

Date: _____

Time: _____

Operator: _____

Please list below the sources or leaks of VCl found in the Solutions Unit. Please list how the source was discovered and the action taken to eliminate the leak.

Source

How Discovered

Action Taken

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VINYLS AREA S.O.P.	TOTAL AREA NO. 2 (Revised) PAGE: 10 of 14 EFFECTIVE: May 15, 1981

SUBJECT: Vinyl Chloride Exposure Protection

LOCATION OF VINYL CHLORIDE
CONTINUOUS SAMPLE POINTS - NORTH END

Point No.	Building	Level	Location
1	Tank Area 1	1	North of 602 & 612 tanks
2	Tank Area 1	1	North of 676 tank
3	Tank Area 1	1	South of 615 tank
4	Tank Area 1	1	South of 675 tank
5	Bldg. 117	1	Middle of compressor room
6	Bldg. 117	1	Control Room
7	Bldg. 117	2	Middle of deck
8	Bldg. 117	3	Middle of deck
9	Bldg. 117	1	North of #2 Dilution tank
10	Bldg. 115	1	North of B-8, 9 autoclaves
11	Bldg. 115	1	South of B-7, 8 autoclaves
12	Bldg. 115	1	South of B-9, 10 autoclaves
13	Bldg. 115	1	Office
14	Bldg. 115	1	Control Room
15	Bldg. 115	1	Lab
16	Bldg. 115	1	North of B-4, 5 autoclaves
17	Bldg. 115	1	North of B-2, 3 autoclaves
18	Bldg. 115	3	North of B-3, 4 autoclaves
19	Bldg. 115	3	B-6 autoclave pump
20	Calibration Point	1	Calibration point

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UCAR SOLUTION VINYLS COMPLEX

VINYLS AREA S.O.P.	TOTAL AREA NO. 2 (Revised) PAGE: 11 of 14 EFFECTIVE: May 15, 1981

SUBJECT: Vinyl Chloride Exposure Protection

LOCATION OF VINYL CHLORIDE
CONTINUOUS SAMPLE POINTS - SOUTH END

Point No.	Building	Level	Location
1	121	1	Office - Bldg. 121
2	121	1	West end of building
3	121	1	East end of building
4	121	2	West end of No. 3 Bird chute
5	121	2	Control Room
6	121	2	East end by No. 4 wash tank
7	121	3	Middle of atomizer room
8	121	3	Center north wall of Bird room
9	121	3	Middle of cyclone room
10	Tank Area 2	1	Northeast of 13004 tank
11	122	1	North of structure
12	122	2	Between 013 and 031
13	122	1	North wall of gel tank room
14	122	1	North wall of ionexer room
15	122	2	Middle of floor
16	122	3	Middle of floor
17	121	2	Outside northeast corner of bldg.
18	114	1	Office
19	114	1	Control Room
20	115	1	Calibration point - 10 ppm

JOB [illegible] TRAIN
RETURN FORM TO: ________
BLDG. 197

EMPLOYEE TRAINING ATTENDANCE RECORD

TRAINER F. L. Johnson
PAYROLL # 31857
SUPERVISOR [illegible]

TRAINING COURSE #	TRAINING COURSE DESCRIPTION	DATE MO. YR	DELETE CODE
079906	VINYL CHLORIDE SAFETY TRAINING	01/82	

PAYROLL NUMBER	LAST NAMES	INITIALS	
70307	CARBIDE	J	[illegible] (SAMPLE 1)
0597	JONES	[illegible]	(SAMPLE 2)
02240	COOK	MK	
8117	WERNER	SN	
4496	Fairchild	JJ	
07077	CANO	RR	
071J1	HARMS	TF	
06960	BEDARD	TD	
02189	LANE	GP	
01642	REMMERS	GH	
00024	ALFORD	WE	
06548	NEWSOM	[illegible]	
85655	MILLIGAN	CP	
37148	WHITE	MW	
6279	HERNANDEZ	R-	
2306	MARTINEZ	H-	
219	WINDHAM	AL	
[illegible]	[illegible]	[illegible]	
4550	BLAZEK	JF	
0953	Hollingsworth	CJ	
	[illegible]	[illegible]	
[illegible]	[illegible]	WM	
62578	CRODY	GW	

1-20-82

UCC 093699

JOB AX TRAIN

RETURN FORM TO: _____

BLDG. 197

EMPLOYEE TRAINING ATTENDANCE RECORD

LAST NAME, F.I., M.I.

TRAINER F C Johnson

PAYROLL # 35657

SUPERVISOR S M Jones

TRAINING COURSE #	TRAINING COURSE DESCRIPTION	DATE MO	DATE YR	DELETE CODE
070906	ULWF CHLORIDE SAFETY TRAINING	01	82	

PAYROLL NUMBER	LAST NAMES	INITIALS	
70307	CARBIDE	J	Q
05976	JONES	K	
06479	MOREWO	M	F
00700	MARTIN	J	
42652	RISSY	M	T
85799	DO	T	T
35814	GORDY	J	A
85191	DECREASE	R	W
06042	KIMBLE	I	S
71944	JONES	R	D
01104	Keeton	M	Q
02738	BALUN	E	J
79293	CARTER	J	A
85594	SIMPSON	E	E
14500	JW NEWMAIN	J	W
02116	WERNER	E	H
07130	HOSEIN	A	H
01012	JACKSON	M	G
05884	BROWNING	J	C
01644	BETHSCHNEIDER	L	P
73077	RIVERA	M	
28134	SARTAIN	D	A
80296	URBANEK	J	C
72187	PANTU	V	C
07215	LONGORIA	G	

(SAMPLE 1)

(SAMPLE 2)

UCC 093700

CT 27-2[illegible]3

LAST NAME, F.I., M.I.

JOB AS TRAIN
RETURN FORM TO: ________
BLDG. 197

EMPLOYEE TRAINING ATTENDANCE RECORD

TRAINER F. L. JOHNSON
PAYROLL # 35657
SUPERVISOR S. M. NORWOOD

TRAINING COURSE #	TRAINING COURSE DESCRIPTION	DATE MO. YR	DELETE CODE
070906	VINYL CHLORIDE SAFETY TRAINING	01 82	

PAYROLL NUMBER	LAST NAMES	INITIALS	
70307	CARBIDE	J Q	(SAMPLE 1)
05976	JONES	K	(SAMPLE 2)
35657	JOHNSON	F L	
85593	TASSIN	D J.	
49324	REX	J R	
85624	SHEELY	F D	
6372	TANFORD	M G	
	NAII	B L	
	FLOWERS	M L	
1100	KAY	S O	
7191	REED	B M	
6229	CHARGOIS		
6847	RIVAS	R	
6337	RYGAARD	D B	
5925	SUMMARAL	K	
3978	JOHNSON	W	
7245	LAYCOCK	L L	
6842	RATKY	L L	
5977	TERRELL	H	
3082	CUMMINS	W O	
7210	Harris	J H	
1246	DOLATO	R S	
1749	SAWYER	J R	
1360	MILLER	J A	
6506	MUNEZ	J S	

CT 22-788 3

UCC 093701

JOB AX TRAIN

RETURN FORM TO: _____

BLDG. 197

EMPLOYEE TRAINING ATTENDANCE RECORD

LAST NAME, F.I., M.I.

TRAINER E.L. JOHNSON

PAYROLL # 35657

SUPERVISOR D.L. REED

TRAINING COURSE #	TRAINING COURSE DESCRIPTION	DATE MO.	DATE YR.	DELETE CODE
070606	VINYL CHLORIDE SAFETY TRAINING			

PAYROLL NUMBER	LAST NAMES	INITIALS	
70307	CARBIDE	J	Q
05976	JONES	K	
83131	DEEJE	D	G
	DO	T	T
68245	NORWOOD	S	M
85191	DECREASE	R	N
52840	DANFORD	M	S
49324	REX	J	R
5889	BROWNING	J	C
42649	ZEUNIK	M	E
85629	SHEELY	E	D
42652	RISSKY	M	T
79293	CARTER	J	A
35657	JOHNSON	F	L

(SAMPLE 1)

(SAMPLE 2)

UCC 093702

T 27-788 B

FLJ
UC 149-2

UNION CARBIDE INTERNAL CORRESPONDENCE

P. O. BOX 471, TEXAS CITY, TEXAS 77590

TO: SVR Staff
SVR SPS

Date: January 5, 1982

cc: M. E. Eisenhour
F. S. Provenzano
D. G. Reese

Subject: Revised Training Schedule
January 1982

The new schedule of the SVR Unit Startup has necessarily changed the Startup Training Schedule. Also, we have obtained permission to have all operators back in the unit on days for one week (except for the minimum shift coverage) which will allow an unusual majority of all SVR operators to meet together. The amount of overtime necessary will also be minimized.

The attached revised schedule has all operators except the day minimum coverage attending one big session. The midnight and evening minimum coverage personnel will be the only overtime necessary. The day minimum coverage personnel will have a makeup session as shown.

Please see me if there is any confusion concerning this schedule, or if there are necessary changes to be made.

Sincerely,

S. M. Norwood

S. M. Norwood

SMN/gh
Attachment

SVR TRAINING SESSIONS

January, 1982

Subject	Trainer	Trainees	Time	Date	Shift	Place
1. State of Union and Vinyl Chloride	D. G. Reese F. L. Johnson	All SVR Operators and Staff	7 am - 10 am	1-18-82	All Shifts	No. 3 CR
2. Bldg. 115 Instrumentation and General Autoclave Operation Regular Distillation Control	J. A. Gordy and T. T. Do J. R. Rex	All Qualified B-115 Operators, Chiefs and Vacation Relief All Qualified B-114 Operators, SVR Staff	12 - 4 pm	1-18-82	All Shifts	No. 3 CR
3. Carbon Bed Operation Bldg. 121 Misc.	D. J. Tassin M. T. Rissky	All 121, 122 Outside Operators S. Chiefs and Vacation Relief	1 - 4 pm	1-19-82	All Shifts	No. 3 CR

MAKE-UP SESSIONS FOR THOSE COVERING UNIT DURING ABOVE SESSIONS

1. Same	Same	Same	12 - 3 pm	1-20-82	A	197 CR
2. Same	Same	Same	12 - 4 pm	1-21-82	A	197 CR
3. Same	Same	Same	12 - 3 pm	1-22-81	A	197 CR

LAST NAME, F.I., M.I.

JOB AX TRAIN

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BLDG. _____

EMPLOYEE TRAINING ATTENDANCE RECORD

TRAINER _____

PAYROLL # _____

SUPERVISOR _____

TRAINING COURSE #	TRAINING COURSE DESCRIPTION	DATE MO.	DATE YR.	DELETE CODE
	UNIT HAZARD REVIEW			

PAYROLL NUMBER	LAST NAMES	INITIALS
70307	CARBIDE	JQ
05976	JONES	K
14481	BRANDT	RO
06229	Chargois	S
07309	mERCADO	W
51195	ARNOLD	RM
49711	SHEETS	VQ

(SAMPLE 1)

(SAMPLE 2)

SIGN HERE:

Robert W Brandt

Eugene Chargois

Willie Smith

R M Arnold

J. D. Sheets

UCC 093705

JOB AX TRAIN

RETURN FORM TO: _____

BLDG. 3

EMPLOYEE TRAINING ATTENDANCE RECORD

LAST NAME, F.I., M.I.

TRAINER D. Hall

PAYROLL # _____

SUPERVISOR _____

TRAINING COURSE #	TRAINING COURSE DESCRIPTION	DATE MO.	DATE YR.	DELETE CODE
	UNIT HAZARD REVIEW			

UCC 093706

PAYROLL NUMBER	LAST NAMES	INITIALS	
7037	CARBIDE	J	Q
05976	JONES	K	
85719	D.O.	T	T
01012	JACKSON	N	G
02240	COOK	M	R
07210	Harris	J	M
01104	KEETON	M	O
07016	FLOWERS	M	L
06326	PEREZ	S	A
02029	URBANEK	S	C
06500	NUNEZ	J	S
06479	MORENO	M	F
07077	CANO	K	A
06941 2	RATKY	L	L
01699	BILBREY	J	D
06960	MORGAN	T	B
05978	TERRELL		H
07307	RIVERA		M
07191	REED	B	M
06563	CARPENTER	A	W
07310	MORALES	J	M
04496	Fairchild	J	J
07295	LAYCOCK JR	L	L
07461	HICKINSON	O	H

(SAMPLE 1)

(SAMPLE 2)

SIGN HERE:

JOB AX TRAIN
RETURN FORM TO: __________
BLDG. __________

EMPLOYEE TRAINING ATTENDANCE RECORD

LAST NAME, F.I., M.I.
TRAINER Thuy T DO
PAYROLL # 85799
SUPERVISOR [illegible]

TRAINING COURSE #	TRAINING COURSE DESCRIPTION	DATE MO. YR	DELETE CODE
070706	VINYL CHLORIDE TRAINING		

PAYROLL NUMBER	LAST NAMES	INITIALS		SIGN HERE:
70307	CARBIDE	J	Q	(SAMPLE 1)
05976	JONES	K		(SAMPLE 2)
85799	DO.	T	T	[signature]
02240	COOK	M	K	M.R. Cook
07210	Harris	J	M	Joe M. Harris
01104	KeeTOW	M	O	May Keeton
07016	FLOWERS	M	L	[signature]
06326	PEREZ	S	A	[signature]
07077	CANO			[signature]
05971	TERRELL		H	Henry Terrell
07307	RIVERA		M	[signature]
07191	REED	B	M	[signature]
06563	CARPENTER	A	W	[signature]
07310	MORALES	J	M	[signature]
044[illegible]	Fairchild	A	J	J. Fairchild
07309	MERCADO		W	[signature]
07245	LAYCOCK JR	L	L	[signature]
01012	JACKSON	M	G	[signature]
7461	HICKINSON	O	H	[signature]
14481	BRANDT	R	W	Robert W B[illegible]
49324	REX	J	R	[signature]
[illegible]229	Chargols			[signature]
06479	MORENO	M	F.	M.F. Moreno
06500	NUNEZ	U	S	[signature]
2029	URBANEK	J	C	Joe Urbanek

UCC 093707

LAST NAME, F. I., M. I.

JOB AX TRAIN

RETURN FORM TO: _____

BLDG. _____

EMPLOYEE TRAINING ATTENDANCE RECORD

TRAINER Troy T. Do

PAYROLL # 85799

SUPERVISOR MGSelden/ENHarrold

UCC 093708

TRAINING COURSE #	TRAINING COURSE DESCRIPTION	DATE MO.	DATE YR.	DELETE CODE
070706	VINYL CHLORIDE TRAINING			

PAYROLL NUMBER	LAST NAMES	INITIALS	
70307	CARBIDE	J	Q
05976	JONES	K	
C6842	RATKY	L	L
06169	BILBREY	J	D
06960	MORGAN	T	B
14301	RYGAARD	D	B
51195	ARNOLD	R	M
04971	SHEETS	J	D

(SAMPLE 1)

(SAMPLE 2)

SIGN HERE:

Lydia Ratky

J D Bilbrey

T B Morgan

D B Rygaard

R M Arnold

J D Sheets

UNION CARBIDE INTERNAL CORRESPONDENCE

P. O. BOX 471, TEXAS CITY, TEXAS 77590

TO: D. L. Berringer
G. W. Crody
W. W. Johnson
J. C. Kirl
C. P. Milligan
E. E. Simpson

Date: November 20, 1981

cc: H. J. Augustus
J. T. Floyd
F. S. Provenzano
D. G. Reese
A. O. Ross

Subject: Vinyl Chloride Training For Operators & Maintenance

OSHA Regulation 1910.1017(j) requires that "each employee engaged in vinyl chloride or polyvinyl chloride operations shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use". It further requires that this training be done annually.

If your personnel have not received this training in the last year, you should arrange to do so.

The Safety Department (Ext. 5153) has the Vinyl Chloride Training Film in both video tape and 35-minute slide module.

F. L. Johnson

FLJ/st

UCC 093709

VCM Press Releases

VINYL'S PROBLEMS CONTINUE TO MOUNT. It's difficult to put this one into perspective at this time. So let's just quickly review where the industry stands. The problem currently concerns the manufacturing of polyvinyl chloride and the exposure levels of vinyl chloride monomer that will be permitted during manufacturing. Last month, the CSHA standards were set at 50 parts per million (in air)--a level that industry could meet and was, in fact, above the exposure levels that many plants were already operating at. This month, however, CSHA changed its mind and came out with a new standard that called for "no detectable levels" of monomer as determined by devices capable of detecting concentrations of 1 ppm with an accuracy of 1 ppm, plus or minus 50%. Without going into technical aspects, it's a tough one. And most producers of PVC feel it's not only impractical, but unachievable. If it stands up--and theoretically, it's due for adoption by October--the vinyl industry is in for some really serious problems. The industry's efforts right now are going towards proving to CSHA that it's possible to insure the safety of workers without resorting to the extremes called for in the CSHA standard; while both CSHA and the SPI are undertaking separate studies on the economic impact that the standard could have.

I'm sure most of you don't need the studies to know what the impact would be --especially in key markets like automotive and construction. A disaster. So there's a good chance that the industry may get some relief on the standards before October that will make them possible to live with. I still feel strongly, however, about the need for educating the molders, fabricators, and end-users who work with polyvinyl chloride on the subject. Just judging by some of the talks I've had with these people, few are making the distinction between vinyl chloride and polyvinyl chloride. Their anxiety is showing and it could hurt in the days ahead.

FIBROUS GLASS-REINFORCED PLASTICS KEEP PACE WITH DETROIT'S INTEREST IN NEW FINISHING TECHNIQUES--LIKE POWDER COATING. Everyone's well aware of the advantages that powder coating offers the automotive industry as a competitive technique for conventional wet painting: lower cost, less waste, less pollution. But up to now, not many people considered reinforced plastics as a candidate to be powder coated by the electrostatic process (since RP is non-conductive, the charged powder particles would not be attracted to it). Well, the situation's changed. Owens-Corning now has in development a special primer mixture which provides conductivity to the glass-plastic part and allows it to be sent through paint curing ovens without loss of surface integrity. The new one-pass system is a big step over the two-coat system previously used (one coat to serve as a primer, the other to add conductivity) and it could be ready for production by the end of the year. Conventional spray equipment can be used. And although O-C has worked mostly so far with acrylic-metallic and epoxy-type powders, it looks like other powder paints would be equally as applicable.

FLAME-RETARDANT POLYOLEFINS IN SHEET FORM. Most of the publicity so far has gone to flame-retardant molding compounds. But the same formulations are also applicable to extrusion compounds--which opens the door to flame-retardant extrusion coatings and now even sheet. The supplier in this case is Portage Industries, Portage, Wis., who's [illegible] vacuum-formable sheet based on U.S.I. Chemical's Flamolin compounds (which include high-density polyethylene and cross-linkable polyethylene). The sheet meets ASTM D635, U/L Subject 94 rating 94 V-1, is non-dripping, and low smoke generating. Potential, of course, is in thermoformed products for aircraft, mass transit, automotive, construction, industrial, and electrical products--in fact, any application that might involve contact with large numbers of people or proximity to expensive industrial equipment.

THE WALL STREET JOURNAL.
Monday, Oct. 7, 1974

Health Hazards

Vinyl-Chloride Scare Points Up Dangers Of Other Chemicals

Substances Long Believed Safe Now Are Regarded With Greater Skepticism

A Hospital's Hidden Perils

By Barry Kramer
Staff Reporter of The Wall Street Journal

It's a simple molecule: two atoms of carbon, three atoms of hydrogen and a single atom of chlorine. At room temperature it is a gas. The molecule is called chloroethylene by chemists, but it is more commonly known as vinyl chloride.

The chemical structure of vinyl chloride has been known since the 1830s. Since a decade after the Civil War, scientists have known how to link, or polymerize, the vinyl-chloride molecules like beads on a chain to form a plastic called polyvinyl chloride, or PVC. Since the late 1930s, when B.F. Goodrich perfected a commercial process for polymerizing vinyl chloride, the plastic has come to be a staple in thousands of household products ranging from kitchen food wraps to construction materials.

Last January, the world learned something else about vinyl chloride: It can cause

This is the second of two stories concerning implications of the discovery that vinyl chloride can cause cancer.

cancer in humans. Twenty-six cases of a rare liver cancer have been discovered among workers in polyvinyl-chloride plants. All of the workers were exposed over many years to large quantities of vinyl-chloride gas. In recent months, further evidence has come to light indicating that the gas is also responsible for an increase of other cancers among the workers in the PVC plants. As a result, there now are standards regulating vinyl-chloride emissions in factories. Vinyl-chloride gas has also been banned for use as an aerosol propellant, and the Food and Drug Administration is toughening restriction of the amount of vinyl-chloride in PVC food wraps.

Vinyl chloride, of course, is far from the only man-made chemical known to cause cancer or, for that matter, other human ailments. Industry regularly works with toxic substances of all types known to cause ill effects ranging from skin disorders to damaged lungs, kidneys and livers. In fact, the findings about vinyl chloride point up the potential dangers of an entire group of similar chemicals, which, like vinyl chloride, contain hydrogen, carbon and chlorine. The chlorinated hydrocarbons, as the chemicals are collectively called, are used in a broad range of products to which every human being has multiple exposures.

It would be difficult to find a person anywhere who hasn't come into contact with products such as plastics, anesthetics, insecticides and herbicides, solvents and pharmaceuticals, all of which can be made from chlorinated hydrocarbons. As a result of their widespread manufacture and use, molecules from these products can be found everywhere on earth and in the upper atmosphere. Such molecules are also commonly found in human tissues.

What is particularly concerning some scientists is the fact that the compounds are rarely found in natural systems unless those systems have been exposed to man-made pollution. "Although all living things contain considerable amounts of chloride ion . . . very few chlorinated organic compounds actually occur in living things," says Dr. Barry Commoner, director of the Center for the Biology of Natural Systems at Washington University in St. Louis.

Trial and Error

Dr. Commoner further notes that biologic evolution is a process of trial and error over millions of years; therefore, he says, the assumption can be made that since the chlorinated hydrocarbons are virtually absent from all living things, the compounds are likely to be "evolutionary rejects." And that means, he says, that if such compounds invade a natural system like that of man, they are likely to be toxic.

"This means that industrial operations that synthesize or make use of such substances, and agricultural and other operations that disseminate them into the environment, ought to be governed by the level of prudence that is demanded by the inherently dangerous situation," Dr. Commoner says. "That we now are discovering, with increasing frequency, health hazards due to dissemination of synthetic organic substances, both in the workplace and the general environment, is evidence that we have thus far failed to appreciate the need for such care."

It is interesting to consider that vinyl chloride, in the early days following its discovery, was actively considered as an anesthetic for surgery. But animal tests showed that the gas caused heart irritation; and it was abandoned for that use in favor of other substances. However, many anesthetics in use today are chemically related to vinyl chloride—and there is growing evidence that they aren't without harmful side effects.

For the past several years, for example, there have been scattered reports of ill effects suffered by those who administer anesthesia and among others continually exposed to anesthetic gases while working in hospital operating rooms. It has also been known for some time that there is greater-than-expected incidences of spontaneous abortion among female anesthesiologists and nurse-anesthetists and, more tellingly, a greater than expected rate of certain types of fatal cancer among anesthesiologists of both sexes. (There is no evidence that such anesthetics pose long-term dangers to surgical patients.

One recent survey of nurse-anesthetists in Michigan showed that of those who worked in the operating room during pregnancy, more than 16% delivered infants with birth defects, compared with a birth-defect rate of under 6% among nurse-anesthetists who stopped working during their pregnancy. Other surveys have found higher-than-expected rates of miscarriage and

Please Turn to Page 25, Column 3

Health Hazards: Scientists Look Anew At 'Safe' Chemicals

Continued From First Page

stillbirths among the wives of anesthesiologists, even though these wives presumably didn't enter an operating room until the time of their deliveries. One explanation advanced by observers is that the anesthesiologists somehow carried home sufficient amounts of anesthetic gas in their breath or on their clothes to affect their spouses.

Studies are currently under way to determine whether or not the wives of vinyl chloride workers have been affected by minute amounts of the gas unwittingly carried home by their husbands from the plants. Of particular interest is the rate of stillbirths and miscarriages among these women. The studies are by no means simple, since the true rate of fetal wastage throughout the nation isn't exactly known and therefore a basis of comparison is difficult. Furthermore, the women's husbands are also ordinarily exposed to a wide variety of chemicals other than vinyl chlorides, hampering direct correlations.

There are, of course, other carcinogens, or cancer-causing agents, and toxic chemicals in widespread industry use that are even more dangerous than vinyl chloride. Before the Labor Department began setting standards for vinyl-chloride emissions in factories—by an emergency decree in May and then by a "permanent" standard effective next Jan. 1—it had issued standards last January for 14 other carcinogens.

The implications of all these studies and standards are clear: Industry will no longer be able to assume blithely that untested chemicals in the work environment are safe simply because they've never demonstrated any overt harm. Like vinyl chloride, which took years to take its toll on worker health, many chemicals thought to be harmless may be equally insidious. This may well mean that there will have to be extensive animal testing of new chemicals before they are introduced and that workers' health will have to be continually monitored to detect clusters of disease.

The task of such testing and monitoring would be mammoth indeed. There are currently 25,000 industrial chemicals. More than 500 new ones are introduced every year. With an array like this, it's likely that other vinyl chlorides are lurking in the background.

Allied Chemical Corp. and Dow Chemical Co., for example, recently reported to the Labor Department's Occupational Safety and Health Administration that they had found excess cancer mortality among workers at two plants that made pesticides with inorganic arsenic. One study, conducted by Johns Hopkins University's School of Hygiene and Public Health, found that of the 22 retired male workers from Allied's Baltimore pesticide plant who died between 1962 and 1972, 17 had died of cancer. At Dow's Midland, Mich., arsenical pesticide plant, which was closed down 20 years ago, Dow researchers found that of 173 workers who died between 1940 and 1972, 57 died of cancer. Both studies show higher-than-expected rates of cancer death.

Based on previous, less-conclusive evidence linking arsenic with cancer, the National Institute for Occupational Safety and Health last January recommended reducing maximum levels of arsenic in the air of factories from the present 0.6 milligrams per cubic meter of air to 0.05 milligrams. Industry has opposed that reduction, but there is growing pressure on the Occupational Safety and Health Administration to impose a "no detectable" limit on arsenic.

Obviously, it isn't enough to learn that workers exposed decades before to vinyl chloride, arsenic and asbestos—to name a few carcinogens—are dying today of cancer or of other toxic effects of those substances. But the question of how to go about determining whether chemicals are indeed lethal in the long term is the subject of some dispute.

One suggested solution is to test all chemicals already in the workplace and to test other chemicals before they are used. However, Dr. Irving J. Selikoff, an expert on environmental carcinogens at Mount Sinai School of Medicine in New York, claims that this would be "unrealistic and scientifically impossible."

Resources are limited," he says, "so we can't go charging off in all directions at once." Instead, Dr. Selikoff says that he and Dr. E. Cuyler Hammond, the chief health statistician of the American Cancer Society, have worked out some tentative testing guidelines. First, he says, chemicals to be tested should be those to which large numbers of workers are exposed. If many consumers are exposed to the chemical as well, he adds, the substance is an even likelier target for study.

An example of one such chemical is carbon black, an ingredient in rubber tires and, consequently, a widespread air pollutant. "We ought to be taking a look at what's happening to carbon-black workers," the doctor says. (Scientists currently know that massive doses of carbon black painted on the skin of mice has caused tumors.) Other prime study targets, he says, are substances whose chemical structure is "suspicious" (or not unlike the structures of known carcinogens).

The testing envisioned by Dr. Selikoff would be a combination of animal trials, in which hundreds of animals would be exposed for long periods to the chemicals being studied, and statistical surveys of working populations that have handled the chemicals. "There are agents to which millions of people have been exposed which now can be evaluated in terms of long-term human experience," he says. "The human data is there waiting for us to evaluate it." (Because animal studies don't always predict what will happen in humans exposed to the same substances, he says, the human monitoring is essential.)

All this testing would be complicated by the possibility that some chemicals in the workplace cause cancer only in combination with other chemicals. And the exposure of most workers to many chemicals at the same time would make it difficult to pinpoint the offending chemical.

The cancer danger of vinyl chloride was spotted only because it caused an exceedingly rare tumor, liver angiosarcoma, of which there are only slightly more than 100 cases in medical literature. If vinyl chloride were to cause a more common malignancy, such as lung cancer, it wouldn't have been so readily detected as a carcinogen.

But testing is only one part of the problem, the other part being what do do about toxic substances once their dangers are exposed. There's some risk in almost every activity, meaning that "acceptable" risks have to be determined for various substances. For example, even sugar, if injected in sufficiently large does, will cause cancer in laboratory animals; yet no one is suggesting that sugar use be drastically curtailed among humans for that reason.

To arrive at a balance between risks and benefits, the risks must be fully understood. But very little is known about the dangers posed to workers by the thousands of substances they work with, and there is little optimism that such substances will be fully tested in the near future. Government agencies are understaffed and working with limited funds. A Toxic Substances Control Act, which the Labor Department says it needs to strengthen its hand in controlling industrial chemicals, is stuck in a House-Senate conference committee.

Of course, even if such an act were to be passed, even the most sanguine aren't suggesting that the workplaces of American industry will be cleared of danger. Nevertheless, it is becoming more and more evident that there is less willingness to accept chemical dangers as simply an inescapable part of working life.

"Whatever happens," editorializes Lancet, the British medical journal, "the vinyl-chloride episode will have provided a salutary lesson. It will not be quite so easy in the future as it has been in the past for any chemical manufacturer to assume, until proved otherwise, that a chemical to which workers are exposed is carcinogenically safe. There must surely be more systematic evaluation of industrially used chemicals for carcinogenic risk to workers."

Bob -

reduce further the hazard and inconvenience of excess noise.

Also, high noise levels can prevent the transmission of warnings, both verbal and machine, and speech interference by noise can lead to errors, including safety-related errors. Wilson described the speech interference level for the normal male voice as approximately 69 dBA when the distance to the listener is two feet, although "truly reliable or error-free conversation" would require much lower background noise. A reasonable estimate for error-free communication, he said, would be levels 12 dBA lower, about 57 dBA for a normal male voice two feet from the listener.

Subjective judgments may be unreliable in assessing a noise problem, Wilson said, because most workers become accustomed to high noise levels after an initial period of adjustment. Hearing damage continues, however, dependent on noise level and time of exposure, even if discomfort is no longer experienced.

Noise Surveys

A manufacturing plant noise safety program should begin with a plant noise survey, Wilson said.

A noise contour map should be plotted over a floor plan, showing locations of steady noise sources, and amount of exposure. Wilson described a type 1 precision sound level meter, costing about $1,500, as a good investment if it can be expected that the noise surveys will lead to other noise measurements. For most noise surveys, a type 2 general purpose meter, costing about $400, would probably be adequate, he said. Useful accessories would include a windscreen, and sound level calibrator about $150. As a company grows, noise problems may increase to where more sophisticated equipment may be purchased, and personnel may be trained in their use.

The supervisor given responsibility for noise safety in a manufacturing operation, should be given the time and the authority necessary to do the job, according to Wilson. He should have a background in mechanical, safety, or industrial engineering. A small manufacturer may find it practical to contract for noise engineering services with an outside firm.

Wilson pointed out that, if the noise survey indicates levels above 90 dBA, the manufacturer will have to use both engineering and administrative controls. Access to high-noise areas should be limited. Noise monitoring and hearing conservation programs should be instituted immediately. Engineering solutions, such as reduction of noise at its source and elimination of noise transmission paths, are most effective attenuation measures, Wilson said.

Health Hazards

SNELL STUDY REPORTS ECONOMIC IMPACT OF PROPOSED OSHA VINYL CHLORIDE RULE

The estimated economic impact of standards for the vinyl chloride monomer industry ranges from 0.073 cents per pound to meet a 50 ppm ceiling VCM level, to 0.42 cents per pound to meet a less than 10 ppm ceiling VCM level, both with a one to five ppm time-weighted average (TWA), if the 1974 capacity is to be sustained, according to the first results of study by Foster D. Snell, Inc. Florham Park, N.J.

The Snell study, commissioned by the Occupational Safety and Health Administration to assess the economic impact of proposed vinyl chloride standards on industry, divided the industry costs of reducing VCM levels in VCM plants into five categories: engineering costs, personal protective equipment costs, monitoring costs, productivity loss, and expensed items.

Information for assessing the economic impact under various VCM regulatory levels was collected through an industry survey conducted by Snell. Figures were based on Snell audits of industry assessments of required engineering, personal protective, and monitoring equipment.

Within the five categories, engineering costs included ventilation, vapor recovery, stripping, loading for shipping, and "other (pumps, piping, etc.)." Personal protective equipment costs included shower and eating facilities, breathing equipment (respirators, air lines and bottled air), and clothing (uniforms, and protective clothing). Monitoring costs included personal monitoring equipment, area and leak monitoring equipment, medical testing, and recordkeeping. Productivity loss included the cost of keeping at the levels unimpacted by OSHA capacity otherwise derated as a result of regulation, the cost of equipment, personnel, etc. The expensed items included consultant costs, management time, (out-of-pocket expenses of 0.01 cents per pound are not included in the cost summaries).

The study included tables of summarized estimates of VCM industry cost impacts and timing to meet selected VCM compliance levels.

Polyvinyl Chloride

The results showed the estimated economic impact on the polyvinyl chloride industry ranged from 0.72 cents per pound to meet a 50 ppm VCM ceiling to 2.73 cents per pound to meet a 25 ppm VCM ceiling with a 10 to 15 ppm TWA and sustain 1974 production capacity. These figures were computed from similar category determinations.

Price Escalation

The study noted increasingly strict VCM compliance requirements are expected to result in significantly greater price escalations for PVC than for VCM. VCM prices are estimated to be reasonable through a 15 ppm ceiling and 5 to 10 ppm TWA since supplies are not expected to be affected. The eight cent per pound price at the less than 10 ppm VCM ceiling and one to five ppm TWA is viewed as being on the low side since the effect of the claimed 42 percent of industry capacity possibly lost as a result of this standard should cause additional price increases due to supply and demand factors, the report said. Also, PVC prices are estimated to be reasonable through a 25 ppm ceiling with a 15 to 25 ppm TWA since only 9 percent of supplies may be affected.

Snell said a 9 percent expected reduction in supply was claimed in the industry sample. The 22.9 cents per pound through 30.5 cents per pound prices at less than a 25 ppm ceiling and less than a 10 to 15 ppm TWA are viewed as being on the low side, since the effect of the

claimed 31 percent to 100 percent of industry capacity possibly lost as a result of the lower standards should cause additional price increases due to supply and demand factors.

Protective Equipment

Two of the four types of respirators listed under the proposed permanent standard are available readily from at least one equipment manufacturer, Snell said. These are the pressure demand full-facepiece self-contained breathing apparatus, and combination pressure demand full-facepiece respirator and pressure demand self-contained breathing apparatus. The other two types in the proposal "are not currently produced," according to Snell interviews with manufacturers who indicated these devices are considered wasteful of compressed air. These types are: positive pressure full-facepiece self-contained breathing apparatus. and combination continuous flow respirators and a pressure demand self-contained breathing apparatus.

The results showed the required types of respirators purchased under the 50 ppm temporary standard may be used under low VCM ceiling concentrations.

Industry and employees prefer half-mask air lines, canister, or cartridge type respirators over those required under the OSHA proposal, Snell said. Also, the number of covered workers needing respiratory protection increases with a decrease in permissible VCM concentration levels or require higher respiratory wearing times, the report indicated.

Most types of protective clothing are available within four weeks from order placement, according to the report. Disposable clothing, hoods, shoe covers, gloves and overalls are available within one week from the manufacturers including one piece pressurized suits. Permanent (reusable) work clothing is available also within one month of order. Full impervious pressurized suits, however, have a procurement lead time of at least two months.

The report indicated also that costs for protective clothing vary with type, with a low of $3.50 for disposable clothing, to a high of $178 for a permanent, impervious full pressurized suit.

Monitoring

The results indicated the following points with respect to monitoring equipment:

(1) The three major classes of VCM monitoring devices, personal, data. and leak, are all available to the VCM and PVC producing industries.

(2) The costs of monitoring equipment range widely depending on type; however, most equipment purchased under the temporary 50 ppm standard may be used at levels down to, and below, one ppm VCM.

(3) Expenditures for monitoring equipment for a typical VCM or PVC plant average $100,000 in capital with annual operating expenses of $80,000.

(4) The industry as a whole, shows no preference for particular types of monitoring equipment, although the concept of area monitoring appears well accepted.

(5) Automatic sequential monitoring systems can serve as a long term data collection system for an entire plant.

(6) The automatic sequential monitoring system can protect workers and alert maintenance personnel when excessive VCM concentrations occur.

Medical Surveillance

The report found that with regard to medical surveillance costs, the average time required per employee for the required medical examination is four hours when performed outside the plant. The Snell estimate for total examination cost per employee is $160. Industry estimates of present medical surveillance costs average $140 per worker per year.

An OSHA spokesman said the report received from Snell fulfills the information requested by the OSHA contract and constitutes another economic input into final deliberations. Snell will submit more recommendations, but the study, at this point, is what was needed in the OSHA Office of Standards.

Industry Comment:

Joseph R. Shaw, president, Associated Industries of New York State, Inc., protested the length of time allotted for comment on the economic impact statement in a telegram sent to Assistant Labor Secretary John H. Stender on August 27.

The telegram is as follows:

"Associated Industries of New York, Inc., protests the overly short time permitted for comment on the new impact statement for vinyl chloride as published in the Federal Register on August 26. The notice was not issued until after the hearing record closed, and the new impact statement has not been sent to the hearing participants, unlike the environmental impact statement in June. The opportunity to comment is effectively foreclosed. We recommend a time extension to September 26 and a mailing to all participants in the hearing, in accordance with normal procedures."

Notice of the availability of the study was published by OSHA on August 26. The study is available for examination and copying in Room 230, 1726 M St., NW., Occupational Safety and Health Administration, Washington, D.C. 20210. All comments regarding the study should be mailed to the Docket Officer, Docket OSH-36, at the above address, and must be postmarked no later than September 6, 1974.

Health Hazards

SELIKOFF SUGGESTS VC IS "MUTAGEN," INDUSTRY CONTINUES BATTLE ON STANDARD

Possible mutagenic effects from exposure to vinyl chloride were seen in examination of 11 workers, Dr. Irving J. Selikoff, Mount Sinai School of Medicine, New York City, N.Y., told the Senate environmental subcommittee on August 21.

Selikoff described work by a graduate student which showed VC may cause both genetic damage and birth defects.

The white blood cells of the 11 men were examined and abnormal chromosomes in more of the sample than would have been expected were found, when the findings

B.6

A new catalytic-oxidation system for disposing of waste chlorinated hydrocarbons has started up smoothly for developer B. F. Goodrich Chemical Co. at its vinyl chloride monomer plant in Calvert City, Ky.

Dubbed the Catoxid process, it operates at lower temperatures than conventional incineration, improving operating safety and allowing low-cost materials of construction without excessive maintenance. The process generates a substantial amount of steam from the wastes during treatment, and can handle liquid feedstocks carrying suspended solids. In oxychlorination VCM plants such as Goodrich's, furthermore, chlorine values (as hydrogen chloride) can be recycled for making precursor ethylene dichloride. The process is offered for license.

It's official now: Dow will build a petroleum refinery on the U.S. Gulf Coast, to supply feedstock and fuel to its operations in Texas and Louisiana. The 200,000-bbl/d, more-than-$200-million facility at Brazosport, Tex., will produce naphtha, distillate fuel oil and residual fuel oil, plus byproduct sulfur that will go to outside customers. Ralph M. Parsons Co. has the engineering contract. First phase of the facility is to go onstream the second half of 1977.

This confirms speculations last spring (*Chem. Eng.*, Apr. 15, p. 48), in connection with Dow's stepped-up efforts in crude-oil exploration and production. The firm expects that several such Dow joint ventures with other companies will indeed supply part of the domestic crude-oil input. Most of the feedstock will be domestic; some will be imported.

A low-nitrogen-oxides diesel engine for emergency electric power, just unveiled by Japan's Niigata Engineering Co. (Tokyo), will be on the job by March in a Tokyo skyscraper. Design improvements in the engine's combustion chamber and fuel-injection system reportedly slash NO_x emissions to 300 ppm or less, about one-third the level from conventional diesels. Japanese air-pollution codes already cover NO_x from boilers; Niigata anticipates that stationary engines may be next.

Top size for the new diesel is about 15,000 hp (the inaugural unit is 1,200 hp, equivalent to 800 kW). Operation, inspection, maintenance and space needs are normal. Fuel consumption, however, drops by 2-10%, and initial cost rises 10-20%.

Iran now becomes even more fertile hunting-ground for engineering-and-construction firms seeking contracts. That country's already massive plans for industrial development get a hefty new boost in a revision of Iran's 1973-1977 economic plan, sparked by increased oil income. The chemical process industries play a big role in the revision, both directly and indirectly.

Overall planned spending during the four-year period has jumped from $36 billion to over $68 billion. Investments related to petroleum will more than double, to about $5 billion. Capital outlays in gas are now put at about $760 million, likewise more than doubled. Mining gets a boost by more than one-third, to over $900 million. Chemical (including petrochemical) investments reportedly rise from $625 million to about $1.6 billion.

Strikingly, Iran plans heavy use of nuclear energy as power source for its industry and agriculture, despite the nation's abundant petroleum.

In a speech prepared for the Pacific Coast Gas Convention at Honolulu, Hawaii, this month, the Iranian ambassador to the U.S., Ardeshir Zahedi, explains that the

cc: Dr. Allen
TBC
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The Society of the Plastics Industry, Inc.
355 Lexington Avenue, New York, New York 10017
(212) 573-9400

VCM-PVC MANAGEMENT SUMMARY

Vol. 1, No. 2

ON THE REGULATORY FRONT

Requests denied for variances from OSHA standard requiring wearing of respirators by workers exposed to more than 1 ppm of vinyl chloride ... OSHA says three companies -- Air Products, Union Carbide and Borden -- failed to meet test showing an unavailability of materials or personnel needed to comply with standards ... FDA now states it is committed to finalizing long-awaited regulatory package for PVC food contact applications to June 30, 1976 ... likelihood of timely publication of EPA emission standard for VCM in Federal Register diminishing due to volume of comments filed and Agency's heavy workload.

BRIEFS: FDA discussing cosmetics regulation that may include banning of baby oil in PVC containers ... proposed regulation nowhere near promulgation and highly likely will not be promulgated until decision reached on food additive status of PVC ... EPA Administrator Train announced new risk/benefit guidelines for future actions on chemicals, pesticides etc ... provides for expanded and independent evaluation of health risks and economic impact before Administrator decides whether or not to take action against chemicals suspected of causing cancer . EPA action noteworthy because it constitutes step forward in properly assessing health risk decisions.

ON THE LEGISLATIVE FRONT

In California, an SPI legislative team has reported that author of bill re regulation of carcinogenic substances (see Management Summary #1) has agreed to accommodate almost completely PVC industry's demand that nothing be required of industry beyond that now mandated by federal OSHA standard ... Some 20 other states still in legislative session -- no VCM-PVC bills of threatening nature detected.

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In U.S. Congress, House Commerce Committee began mark-up sessions on H.R. 10318, toxic substances control bill approved by subcommittee in October 1975 ... Senate passed similar bill this past March ... Manpower and Housing Subcommittee of House Government Operations Committee expected to hold three-day hearing in June on worker exposure to toxic substances ... subcommittee Chairman Floyd W. Hicks (D-Wash.) concerned over "shocking examples of workers being poisoned on the job" ... cites specifically asbestos, vinyl chloride, lead and Kepone incidents. On May 13 both Senate and House approved S. 510 that will materially strengthen FDA power over medical devices, particularly life-supporting devices implanted in body (i.e. pacemaker) or used outside body (i.e. kidney dialysis machine) ... this is land-mark legislation which has been pending last ten years and is supposed to cover regulatory gaps existing for 38 years ... could increase FDA regulatory authority over plastic materials used in any of these devices ... Senate floor action on clean air amendments bill begins last week in May or first week in June ... House bill on same issue may come up on floor early in June.

ON THE MEDIA FRONT

Contact with producer of "CBS Reports" program in the making "Politics of Cancer" elicited comment she is taking a balanced perspective ... no "bad guys" will be portrayed ... she added "some are gray, however" and industry "not on the hot seat". program now scheduled for July or August to examine process of federal regulation looking at industry and government interaction.

Dr. Elizabeth Whelan, author of book, "Panic in the Pantry" interviewed a group of industry representatives ... Whelan working on sequel in which she'll examine VCM/PVC-FDA situation among other related case histories ... her credentials and book establish she is clear-thinking in pursuit of establishing rational regulation of food and food additives.

Ralph Harding's response to editor of the Sierra Club Bulletin finally published in Bulletin's April issue ... as expected, Bulletin used considerable space to respond to SPI and tends to skirt many of points raised by Harding ... no plans to respond to their response to industry's response ... could go on ad infinitum.

ON THE TECHNICAL FRONT

EPA's report on vinyl chloride in natural water systems -- "Dynamic Behavior of Vinyl Chloride in Aquatic Ecosystems" -- summarized in April 23 Environment Reporter ... makes main point that "unrealistically high levels" of vinyl chloride would have to accumulate in aquatic ecosystems before significant damage to systems could occur.

According to April 1 Internal Medicine News, high rates of airway impairment found among 369 current and former employees of PVC polymerization plant in West Virginia ... prevalence of obstructive airway changes higher among workers who smoked cigarettes when duration of exposure to VCM and PVC less than ten years ... study conducted by Dr. Irving Selikoff's team at New York's Mount Sinai School of Medicine.

April 17 British Medical Journal contained paper on syndrome sometimes called "vinyl chloride disease" ... titled "Immunological Mechanisms in the Pathogenesis of Vinyl Chloride Disease", paper reports results of examining 58 patients from a single polymerization plant in Great Britain ... investigations showed presence of circulating immune complexes in 19 out of 28 patients with the disease, and in a further two out of 30 workers exposed to VCM.

April Radiology News Digest carried short summary of paper on the use of liver scans for detection and diagnosis of angiosarcoma among vinyl chloride workers ... full paper appeared in March Radiology.

NEWS BRIEFS

Final TV and Radio Training Session in June

Fourth -- and final -- television and radio training session to be held sometime in June ... will add successful trained people to existing teams or make up new teams for face-to-face briefings with leading media reps in major cities ... training challenging and valuable ... if your company wants to send representative contact Bob Ferrante at Hill and Knowlton (212) 697-5600 ... future visits planned for Boston, Pittsburgh, Denver, Minneapolis, Salt Lake City and Detroit ... and subsequently San Francisco, Los Angeles, Houston, Dallas, Chicago, New York and Washington ... appearances also planned on major television and radio shows.

Q&A Booklet on "PVC and Health" Being Prepared

In preparation for all members of VCM-PVC Producers Group is question and answer booklet on PVC and Health, a handy, concise, easy-to-understand document for use by member company marketing and management personnel in answering questions from customers and the general public ... questions based on those most commonly asked. Each member company will be provided with 750 copies ... additional booklets can be ordered for nominal fee to cover printing and mailing.

ACS Symposium on VCM August 29-September 3

American Chemical Society will hold symposium on VCM in conjunction with its annual meeting in San Francisco August 29-September 3 ... Dr. Dan Dixler of Keller & Heckman, SPI legal counsel, co-chairman with Dr. Seymour Gilbert of Rutgers University ... format will be overview of genesis of problem, government activity, and industry's response ... Dr. Dixler looking for speakers, participants etc ... Member companies can contribute ... contact Dr. Dixler (202) 296-2700 if you are interested.

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