CHEMICAL EXPOSURE
INDEX AUDIT

CHLORINE I
LOUISIANA DIVISION

JULY 1991

Paul Yonts
July 17, 1991
CEI:AA3

CHEMICAL EXPOSURE INDEX AUDIT

PREPARATION INSTRUCTIONS

These Audit Instructions are being sent to Louisiana Division plants/departments as an audit to be accomplished in the Consolidated Audit Program. You should start your preparation early to assure a thorough review package. A copy of the audit package should be sent to the Functional Team Leader at least ten calendar days prior to the audit.

A. AREAS OF CONCERN

Only the area(s) of your operation which has a calculated Chemical Exposure Index(es) greater than 100 is covered by this audit, or those that show an odor detection radius beyond the fence line.

(A CEI of less than 100 requires a review by the Superintendent and his Manager only!)

B. REVIEW PACKAGE

The following package requirements must be completed and sent to the Louisiana Division Auditing Facilitator at least 10 calendar days prior to the audit.

1. LIST OF ALL CHEMICALS FOR WHICH CEI CALCULATIONS DONE

   This includes those with CEI's less than 100 or those with a potential odor detection beyond the fence line.

2. A CHEMISTRY SHEET

   This sheet should include all desired reactions as well as all undesired reactions.

3. A SIMPLIFIED PROCESS FLOWSHEET

   This flowsheet should include the vessels and quantity of chemicals with CEI's 100 or greater or those with an odor problem.

4. A BRIEF DESCRIPTION OF THE "WORST CREDIBLE" SCENARIO FOR EACH SCENARIO WITH A CEI GREATER THAN 100.

5. A COPY OF THE SUMMARY SHEETS AS PER ATTACHED CE INDEX PROGRAM FOR CEI AND DISPERSION FOR EACH SCENARIO WITH A CEI GREATER THAN 100 OR THOSE WITH AN ODOR PROBLEM.

6. A PLOT PLAN AND AREA MAP WITH:

   a. Three circles based on EEPG numbers

      These circles represent the distance (radii of exposure) that 1, 10 and 100 times the EEPG concentrations are predicted to travel for NEUTRAL atmospheric conditions.

   b. A circle based on the Odor Threshold

      If the Odor Threshold is less than the EEPG concentration, include a circle for the distance that concentration is predicted to travel for NEUTRAL atmospheric conditions.

   c. Location of gas monitors, spill detectors, etc.

      Clearly show the location and type of any device used to detect a release.

7. THE CEI PRE-AUDIT QUESTIONNAIRE (Attached, nine pages)

8. ONE COPY OF THE MASS & ENERGY BALANCE FOR YOUR PLANT.

   One mass and energy balance flowsheet set should be sent to the Process Engineering representative only.

C. U.S. Area and Corporate Representatives

The Functional Team Leader will invite appropriate Dow U.S. Area or Corporate Safety and Loss Prevention representatives for for reviews with CEI's of greater than 300 or greater than 400 respectively. Notification for outside auditors must be done thirty days in advance of the audit.

Chemical Exposure Index Audit
Agenda

I. OVERVIEW PRESENTATION TO THE AUDIT TEAM (*Allow 30 Minutes)

1. What is the status of the recommendations made in the previous review?

   a. Have there been any major changes or additions to the plant since the last review?

   b. Are there any other specific concerns which should be addressed but were not identified in the CEI review?

2. Summarize the results of the CEI calculations. Include results of the odor threshold dispersion modeling.

3. Review the "worst credible" case loss of containment release scenarios including plot plans showing dispersion model results.

4. Discuss any CEI related incidents that have occurred.

5. Discuss your lines of defense that would prevent your "worst credible" release scenario from occurring.

6. Discuss the mitigation procedures for each scenario.

7. Discuss your plant's CEI related concerns generated from the audit preparation.

8. Discuss your plans for improving your operations from a CEI standpoint.

II. PRE-AUDIT QUESTIONNAIRE (* Allow 30 minutes)

A. Review the information provided in the questionnaire on an exception basis.

III. DOCUMENTATION AUDIT (* Allow one hour)

Following the plant's presentation, two members of the audit team will examine the plant's program documentation. The plant's documentation should include:

Emergency Plan
P&ID's/Material Balance Flowsheet
Operation Discipline
In-Plant Training Program
Maintenance Checklist
Operating Procedure
Area Monitoring System Records
Piping Specifications

Completeness and quality will be used as a criteria for evaluating the documentation.

CHLORINE I CHEMICAL LIST

? LATER

CHEMICAL	CEI	AHH	TO	EEPG	EEPGX1	EEPGX10	EEPGX100	ERPG-1
Chlorine	288	4	1	3	4.36	1.08	.27	8.95
Freon	96	1	NA	2000	.13	.04	.01	NA
CO2	72	1	0	2000	.32	.09	.02	0
HCl	54	3	3	25	.51	.15	.06	1.75
H2SO4	12	1	NA	25	.05	.004	.004	NA
CCl4	0	1	NA	100	.001	.001	.001	NA

CEI = Chemical Exposure Index
AHH = Acute Health Hazard Scale Numbers
TO = Odor Threshold, (ppm)
EEPG = Dow Emergency Exposure Planning Guidelines, (ppm)
EEPGX1 = Radii of Exposure at 1 times EEPG, (miles)
EEPGX10 = Radii of Exposure at 10 times EEPG, (miles)
EEPGX100 = Radii of Exposure at 100 times EEPG, (miles)
EPRG-1 = Radii of Exposure at 1 times Odor Threshold, (miles)

Paul Yonts
July 18, 1991
CEI:AA2

CHLORINE CHEMISTRY

DESIRED REACTION

$2NaCl + 2H_2O \text{ ---> } H_2 + Cl_2 + 2NaOH$ (Electrolysis)
2.5 pH (Aqueous HCl)

UNDESIRED REACTIONS

Cl_2 + Organics ---> Heat (Possible Fire OR Explosion)

Inadvertent Use Of Reactive Lubricants And Solvents In Chlorine Service. Prevented By Training And Material Controller

Cl_2 + Fe + Heat ---> Fire

Compressor Discharge Temperature Alarms At 300°F, Compressors Trip At 325°F

Dry Cl_2 + Ti ---> Explosion

Inadvertent Use Of Titanium Parts In Dry Chlorine Service. Prevented By Engineering Controls, Training, Special Labeling, And Segregated Parts Storage.

$Cl_2 + H_2$ ---> Explosion (H_2 LEL 6%)

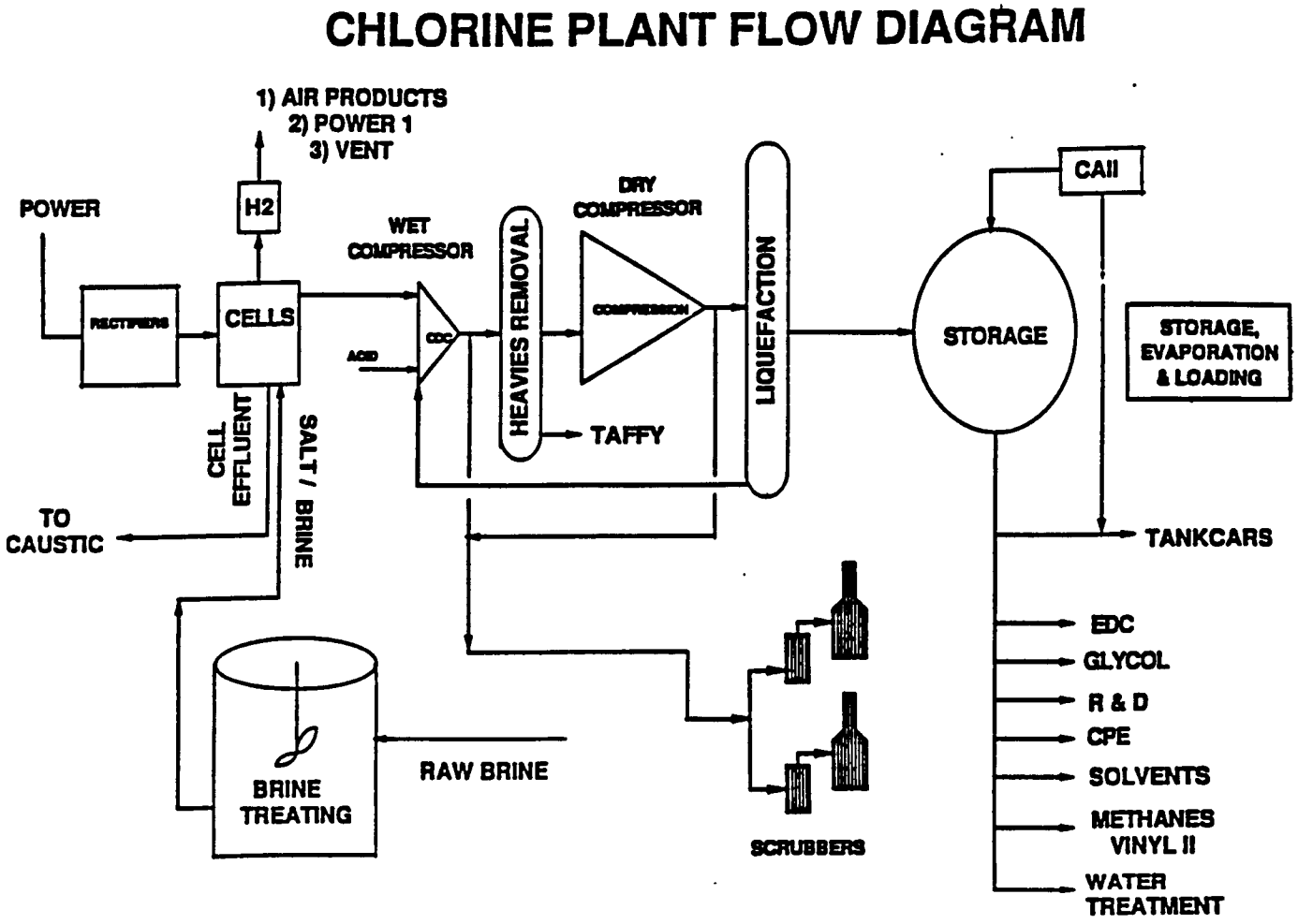
Auxiliary Brine Supply And Redundant Instrumentation To Ensure Adequate Brine Head Level In Cells.

H_2 In Cl_2: Chromatograph Analyzers In Cell Area, Distribution Systems and Liquefaction Plant.

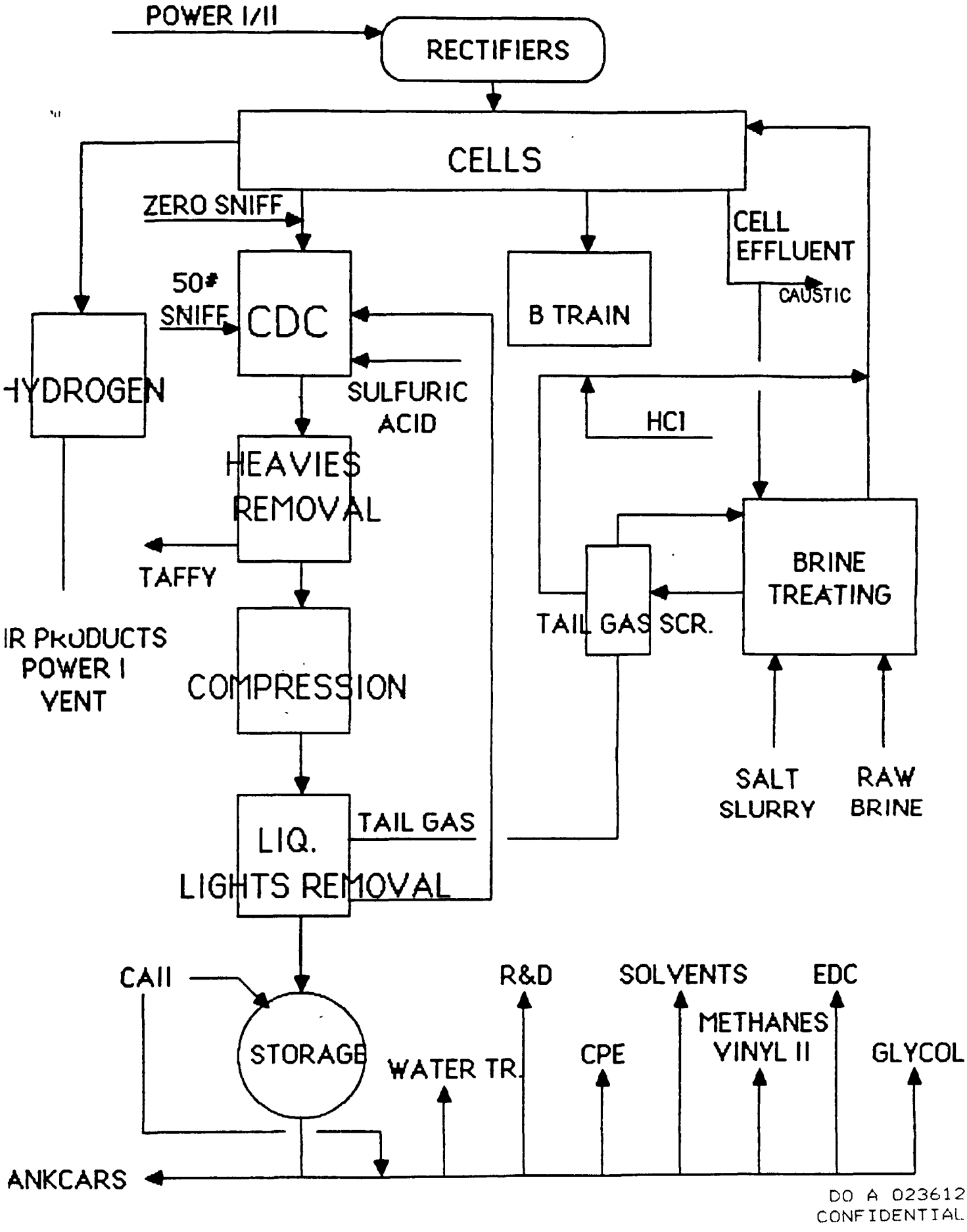
Chlorine Into Liquefaction Plant Blocked Automatically At 5% H_2 Concentration In Tail Gas.

Paul Yonts
CEI:AA6
July 17, 1991

Chlorine I Block Flow Diagram:



Paul Yonts
July 17, 1991
CEI Audit



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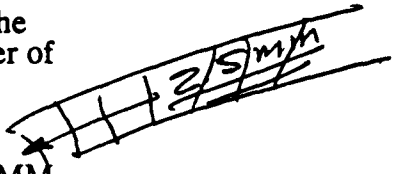
WORST CASE SCENARIOS
FOR CEI GREATER THAN 100

CHLORINE

Liquid Sphere:

A 1" hole develops in the bottom of the chlorine sphere and cannot be blocked in. Liquid chlorine is lost to the ground and adiabatic vaporization occurs. The liquid is collected in an underground containment pit. Vapors from the containment pit are blown to the Chlorine Scrubbers. The surface vaporization disperses to the atmosphere. A layer of ice will soon form over the liquid chlorine pool. The maximum chlorine in either sphere is 4.2 MM lbs.



The total amount of liquid inventory is controlled at 3.5 MM lbs. At no time will either storage sphere exceed an 80 % level with the total combined inventory never to exceed 7.0 MM lbs. T-54 has a maximum capacity of 5.2 MM lbs. T-56 has a maximum capacity of 4.0 MM lbs.

In 15 minutes approximately 12,500 lbs. of liquid chlorine will spill. Of this, 6600 lbs would evaporate in 15 minutes.

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Liquid Distribution Manifold:

A liquid full section of line is blocked in. An over pressure occurs. The pressure is relieved from an 6" asbestos gasket failure. The leak is detected by the area chlorine monitors. The line pressure is 180 psia at -22 ^{o}F.

The leak can not be blocked in, but the line can be isolated. The over pressure can be relieved by manually valving the line to a dump tank, T-36.

The longest liquid chlorine line section is approximately 275 feet. The total contents is 5100 lbs. of liquid chlorine which can be released and vaporized in 8 minutes.

Paul Yonts
CEI:AA0
July 17, 1991

WORST CASE SCENARIOS FOR CEI LESS THAN 100

SULFURIC ACID

The strong drying tower recycle line ruptures, spilling 45 M lbs. of 98% sulfuric acid to the ditch in 15 minutes. Due to the low vapor pressure of 98% H_2SO_4 (P^{vap} < 1 mm Hg), no more than 50 lbs of acid would vaporize.

HYDROCHLORIC ACID

A 1" hole develops in the 36% HCl line from Solvents. The line can be isolated within 10 minutes. 1000 lbs of HCl would vaporize.

FREON

A 1" hole develops in the bottom of the freon storage tank and cannot be blocked in. 17 M lbs of freon would vaporize to the atmosphere in 15 minutes.

CARBON DIOXIDE

A 2" hole develops near the bottom of the CO2 storage tank and cannot be blocked in. 28 M lbs of CO2 will be released to the atmosphere.

CARBON TETRACHLORIDE

A 2" hole develops near the bottom of the CCl4 storage tank and cannot be blocked in. 20 M lbs of CCl4 spill. In 15 minutes, only 2.5 lbs will evaporate.

Paul Yonts
CEI:AA0
July 17, 1991

CHEMICAL EXPOSURE INDEX SUMMARY

Complete the following Table (See Note 1) by filling in and multiplying the appropriate Risk Factor Scale numbers for each of the major Risk areas as identified in the following formula (See "Definitions of Scale Numbers" CEI, page 6):

I.		II.		III.		IV.		V.		VI.
ACUTE HEALTH HAZARD SCALE NO.	X	VAPOR QUANTITY SCALE NO.	X	DISTANCE (RECIPROCAL) SCALE NO.	X	MOLECULAR WEIGHT SCALE NO.	X	PROCESS PENALTIES SCALE NO.	=	CHEMICAL EXPOSURE INDEX

Identification of Containment Vessels being evaluated:
Name or Number (See Notes 2 & 3)

Source #1 Liquid Sphere

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

Source #2 (if needed) Liquid Distribution Manifold

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

I.	II.	III.	IV.	V.	VI. (CEI)
4	3	3	4	2	288
4	3	4	4	2	384
4	3	3	4	2	288
4	3	3	4	2	288
4	3	4	4	2	384
4	3	3	4	2	288

NOTE 1 — The distance scale number in column III is the only factor normally expected to change, so column III and the corresponding CEI (column VI) are all that would normally be expected to differ from the first calculation for each source.

NOTE 2 — Only different sources of the same chemical should be evaluated on this sheet. Use a separate Chemical Exposure Index for every different chemical.

NOTE 3 — Use additional sheets if additional sources with differing potential impact are present.

NOTE 4 — It is important to document the worst case scenarios for future reference. See "Review Procedure and Check List," page 7.

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TT-3548

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CHEMICAL EXPOSURE INDEX SUMMARY

Complete the following Table (See Note 1) by filling in and multiplying the appropriate Risk Factor **Scale** numbers for each of the major Risk areas as identified in the following formula (See "Definitions of Scale Numbers" CEI, page 6):

I.	X	II.	X	III.	X	IV.	X	V.	=	VI.
ACUTE HEALTH HAZARD SCALE NO.		VAPOR QUANTITY SCALE NO.		DISTANCE (RECIPROCAL) SCALE NO.		MOLECULAR WEIGHT SCALE NO.		PROCESS PENALTIES SCALE NO.		CHEMICAL EXPOSURE INDEX

Identification of Containment Vessels being evaluated:
Name or Number (See Notes 2 & 3)

Source #1 Freon Storage Tank

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

I.	II.	III.	IV.	V.	VI. (CEI)
1	4	3	4	2	96
1	4	4	4	2	128
1	4	3	4	2	96

NOTE 1 — The distance scale number in column III is the only factor normally expected to change, so column III and the corresponding CEI (column VI) are all that would normally be expected to differ from the first calculation for each source.

NOTE 2 — Only different sources of the same chemical should be evaluated on this sheet. Use a separate Chemical Exposure Index for every different chemical.

NOTE 3 — Use additional sheets if additional sources with differing potential impact are present.

NOTE 4 — It is important to document the worst case scenarios for future reference. See "Review Procedure and Check List," page 7.

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DO A 023616
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CHEMICAL EXPOSURE INDEX SUMMARY

Complete the following Table (See Note 1) by filling in and multiplying the appropriate Risk Factor Scale numbers for each of the major Risk areas as identified in the following formula (See "Definitions of Scale Numbers" CEI, page 6):

I.	X	II.	X	III.	X	IV.	X	V.	=	VI.
ACUTE HEALTH HAZARD SCALE NO.		VAPOR QUANTITY SCALE NO.		DISTANCE (RECIPROCAL) SCALE NO.		MOLECULAR WEIGHT SCALE NO.		PROCESS PENALTIES SCALE NO.		CHEMICAL EXPOSURE INDEX

Identification of Containment Vessels being evaluated:
Name or Number (See Notes 2 & 3)

Source #1 CO_2 Storage Tank

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

I.	II.	III.	IV.	V.	VI. (CEI)
1	4	3	3	2	72
1	4	4	3	2	96
1	4	3	3	2	72

NOTE 1 — The distance scale number in column III is the only factor normally expected to change, so column III and the corresponding CEI (column VI) are all that would normally be expected to differ from the first calculation for each source.

NOTE 2 — Only different sources of the same chemical should be evaluated on this sheet. Use a separate Chemical Exposure Index for every different chemical.

NOTE 3 — Use additional sheets if additional sources with differing potential impact are present.

NOTE 4 — It is important to document the worst case scenarios for future reference. See "Review Procedure and Check List," page 7.

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CHEMICAL EXPOSURE INDEX SUMMARY

Complete the following Table (See Note 1) by filling in and multiplying the appropriate Risk Factor Scale numbers for each of the major Risk areas as identified in the following formula (See "Definitions of Scale Numbers" CEI, page 6):

I.	X	II.	X	III.	X	IV.	X	V.	=	VI.
ACUTE HEALTH HAZARD SCALE NO.		VAPOR QUANTITY SCALE NO.		DISTANCE (RECIPROCAL) SCALE NO.		MOLECULAR WEIGHT SCALE NO.		PROCESS PENALTIES SCALE NO.		CHEMICAL EXPOSURE INDEX

Identification of Containment Vessels being evaluated:
Name or Number (See Notes 2 & 3)

Source #1 HCl Line from Solvents

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

I.	II.	III.	IV.	V.	VI. (CEI)
3	2	3	3	1	54
3	2	4	3	1	72
3	2	3	3	1	54

NOTE 1 — The distance scale number in column III is the only factor normally expected to change, so column III and the corresponding CEI (column VI) are all that would normally be expected to differ from the first calculation for each source.

NOTE 2 — Only different sources of the same chemical should be evaluated on this sheet. Use a separate Chemical Exposure Index for every different chemical.

NOTE 3 — Use additional sheets if additional sources with differing potential impact are present.

NOTE 4 — It is important to document the worst case scenarios for future reference. See "Review Procedure and Check List," page 7.

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TT-3548

CHEMICAL EXPOSURE INDEX SUMMARY

Complete the following Table (See Note 1) by filling in and multiplying the appropriate Risk Factor **Scale** numbers for each of the major Risk areas as identified in the following formula (See "Definitions of Scale Numbers" CEI, page 6):

I.	X	II.	X	III.	X	IV.	X	V.	=	VI.
ACUTE HEALTH HAZARD SCALE NO.		VAPOR QUANTITY SCALE NO.		DISTANCE (RECIPROCAL) SCALE NO.		MOLECULAR WEIGHT SCALE NO.		PROCESS PENALTIES SCALE NO.		CHEMICAL EXPOSURE INDEX

Identification of Containment Vessels being evaluated:
Name or Number (See Notes 2 & 3)

Source #1 Drying Tower Recycle Line

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

I.	II.	III.	IV.	V.	VI. (CEI)
1	1	3	4	1	12
1	1	4	4	1	16
1	1	3	4	1	12

NOTE 1 — The distance scale number in column III is the only factor normally expected to change, so column III and the corresponding CEI (column VI) are all that would normally be expected to differ from the first calculation for each source.

NOTE 2 — Only different sources of the same chemical should be evaluated on this sheet. Use a separate Chemical Exposure Index for every different chemical.

NOTE 3 — Use additional sheets if additional sources with differing potential impact are present.

NOTE 4 — It is important to document the worst case scenarios for future reference. See "Review Procedure and Check List," page 7.

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CHEMICAL EXPOSURE INDEX SUMMARY

Complete the following Table (See Note 1) by filling in and multiplying the appropriate Risk Factor **Scale** numbers for each of the major Risk areas as identified in the following formula (See "Definitions of Scale Numbers" CEI, page 6):

I.	X	II.	X	III.	X	IV.	X	V.	=	VI.
ACUTE HEALTH HAZARD SCALE NO.		VAPOR QUANTITY SCALE NO.		DISTANCE (RECIPROCAL) SCALE NO.		MOLECULAR WEIGHT SCALE NO.		PROCESS PENALTIES SCALE NO.		CHEMICAL EXPOSURE INDEX

Identification of Containment Vessels being evaluated:
Name or Number (See Notes 2 & 3)

Source #1 I-54, Carbon Tetrachloride Storage

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

I.	II.	III.	IV.	V.	VI. (CEI)
2	0	3	4	2	0
2	0	4	4	2	0
2	0	3	4	2	0

NOTE 1 — The distance scale number in column III is the only factor normally expected to change, so column III and the corresponding CEI (column VI) are all that would normally be expected to differ from the first calculation for each source.

NOTE 2 — Only different sources of the same chemical should be evaluated on this sheet. Use a separate Chemical Exposure Index for every different chemical.

NOTE 3 — Use additional sheets if additional sources with differing potential impact are present.

NOTE 4 — It is important to document the worst case scenarios for future reference. See "Review Procedure and Check List," page 7.

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77-3648

DO A 023620
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CH. .ICAL EXPOSURE INDEX

PLANT: CHLORINE I
LOCATION: LAD
CHEMICAL: CHLORINE

TOTAL QUANTITY IN PLANT: 7000000.00 lb
LARGEST SINGLE CONTAINMENT: 4200000.00 lb
STORAGE TEMPERATURE: 1.00 deg F
STORAGE PRESSURE: 45.00 psia
BOILING POINT: -30.00 deg F
FLASH POINT: 0.00 deg F
MOLECULAR WEIGHT: 70.90
EEPG CONCENTRATION: 3.0 ppm

EXPOSURE RISK POTENTIAL SUMMARY

ACUTE HEALTH HAZARD FACTOR: 4 (1.0 - 9.9)
VAPOR QUANTITY FACTOR: 3 (1,000 lbs - 10,000 lbs)
MOLECULAR WEIGHT FACTOR: 4 (> 45)
ESS PENALTIES: 2 (overpressure or run-away reaction potential)

DISTANCE	DISTANCE FACTOR	E.R.P. VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	288
TO DOW PLANTS	4 (< 1000 ft)	384
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	288

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 288

BIANNUAL REVIEW - SITE, SUPERINTENDENT AND MAJOR MANAGER

THE CHEMICAL EXPOSURE INDEX IS A SIMPLE, EMPIRICAL AND RELATIVE METHOD FOR RATING THE TOXIC HAZARDS OF CHEMICALS IN A QUANTITATIVE MANNER.
** FOR INTERNAL DOW USE ONLY **

L ,PERSION SUMMARY

TOTAL DISCHARGED =	6600.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.00 FT
MOLECULAR WEIGHT =	70.90	EXIT VELOCITY =	0.00 FT/S
SOURCE TEMPERATURE =	1.00 DEG F	PERCENT DILUTION =	0.00
EEPG CONCENTRATION =	3.0 ppm	AMBIENT TEMPERATURE =	86.00 DEG F

THE RELEASE IS A GAS RELEASE

THE RELEASE IS CONTINUOUS

THE RADII OF EXPOSURE ARE BASED ON PEAK CONCENTRATIONS

RADII OF EXPOSURE (miles)
@ ground level - @ plume centerline

CONC (ppm)	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
3.0	0.762	3.644	23.848
30.0	0.261	0.907	3.726
300.0	0.103	0.244	0.841

* APPROXIMATE % OF TIME IN THIS WEATHER CONDITION

UNSTABLE ATMOSPHERIC CONDITION - SLIGHT SOLAR RADIATION WITH LOW WIND SPEEDS (<10 mph) OR STRONG RADIATION WITH HIGH WIND SPEEDS (>10 mph).

NEUTRAL ATMOSPHERIC CONDITION - WELL MIXED ATMOSPHERE DUE TO MODERATE/STRONG WIND SPEEDS (>7 mph) AND SLIGHT/MODERATE SOLAR RADIATION. ANY OVERCAST CONDITION.

STABLE ATMOSPHERIC CONDITION - LOW WIND SPEEDS (<10 mph) AT NIGHT.

THE CHEMICAL EXPOSURE INDEX IS A SIMPLE, EMPIRICAL AND RELATIVE METHOD FOR RATING THE TOXIC HAZARDS OF CHEMICALS IN A QUANTITATIVE MANNER.
** FOR INTERNAL DOW USE ONLY **

Hol In Chlorine Sphere, 12,500 lbsSpilled Instantaniously

lN ,T DATA

CHEMICAL NAME: pp400

LEAK TYPE: I (C=CONTINUOUS I=INSTANTANEOUS)

TOTAL AMOUNT SPILLED: 12500.00 LBS

SPILL AREA: 1000.00 FT**2

AMBIENT TEMPERATURE: 86.00 deg F

CHEMICAL STORAGE TEMPERATURE: 1.00 deg F

SUBSTANCE OF GROUND: c (D=DRY SOIL, W=WET SOIL, C=CEMENT)

GROUND TEMPERATURE: 86.00 deg F

WIND VELOCITY: 8.00 MPH

THE SPILL FALLS INTO CATEGORY 3 AS DEFINED IN THE SHELL SPILLS MANUAL

1. THIS ASSUMES THE AMOUNT FLASHED ADIABATICALLY IS NEGLIGIBLE COMPARED TO THE HEAT TRANSFER RATE IN THE FIRST MINUTE.
2. THIS ASSUMES EVAPORATION DUE TO HEAT TRANSFER DOMINATES THE FIRST SEGMENT OF TIME.
3. THIS ASSUMES EVAPORATION DUE TO MASS TRANSFER DOMINATES THE FINAL SEGMENT OF TIME.

THE AMOUNT EVAPORATED BY HEAT TRANSFER: 2837.41 LBS

THE TIME REQUIRED: 5.76 MIN

THE AMOUNT EVAPORATED BY MASS TRANSFER: 9662.59 LBS

THE TIME REQUIRED: 37.10 MIN

Hol In Chlorine Sphere, 6600 lbs ~~Spill~~ Evap in 15 Minut s

lᴧ I DATA

CHEMICAL NAME: pp400

LEAK TYPE: I (C=CONTINUOUS I=INSTANTANEOUS)

TOTAL AMOUNT SPILLED: 6600.00 LBS

SPILL AREA: 1000.00 FT**2

AMBIENT TEMPERATURE: 86.00 deg F

CHEMICAL STORAGE TEMPERATURE: 1.00 deg F

SUBSTANCE OF GROUND: c (D=DRY SOIL, W=WET SOIL, C=CEMENT)

GROUND TEMPERATURE: 86.00 deg F

WIND VELOCITY: 8.00 MPH

THE SPILL FALLS INTO CATEGORY 3 AS DEFINED IN THE SHELL SPILLS MANUAL

1. THIS ASSUMES THE AMOUNT FLASHED ADIABATICALLY IS NEGLIGIBLE COMPARED TO THE HEAT TRANSFER RATE IN THE FIRST MINUTE.
2. THIS ASSUMES EVAPORATION DUE TO HEAT TRANSFER DOMINATES THE FIRST SEGMENT OF TIME.
3. THIS ASSUMES EVAPORATION DUE TO MASS TRANSFER DOMINATES THE FINAL SEGMENT OF TIME.

THE AMOUNT EVAPORATED BY HEAT TRANSFER: 2837.41 LBS

THE TIME REQUIRED: 5.76 MIN

THE AMOUNT EVAPORATED BY MASS TRANSFER: 3762.59 LBS

THE TIME REQUIRED: 14.45 MIN

CHLORINE WORST CASE (SOURCE 1):

Scenario: A 1" hole develops in the bottom of the Chlorine sphere and cannot be blocked in.

From the liquid jet formula:

$$Q_L = 8.02\ C_o A\ (Dens._L)\quad H_L + \left\{\frac{(P_1-P_2)}{(Dens._L)}\right\}^{0.5}$$

and assuming approximately 30 ft. of liquid (H_L) in the sphere, the amount discharged, Q_L is 1277.9 lb/min = 21.3 lb/sec.

Using this value in the two phase jet formulas:

$$w = \left\{\frac{g_c\ P_o\ (Dens._L) A^2}{Q^2_L}\right\} \quad \text{and}$$

$$Q = 0.66\ W^{-0.39} * \quad A\{(P_o)(Dens._L)(g_c)\}^{0.5}$$

Q = 828.9 lb/min discharged, therefore for 15 minutes...

Q = 12,433 lb liquid discharged.

Variables used in formulas:

$Dens._L$ = 94.732 lb/cf (@ 1° from CRPROP)

P_1 = 29.161 psia (P^{vap} @ 1°F from CRPROP)

P_2 = 14.696 psia

CHEMICAL EXPOSURE INDEX

PLANT: CHLORINE I
LOCATION: LAD
CHEMICAL: CHLORINE

TOTAL QUANTITY IN PLANT: 7000000.00 lb
LARGEST SINGLE CONTAINMENT: 4200000.00 lb
STORAGE TEMPERATURE: -22.00 deg F
STORAGE PRESSURE: 180.00 psia
BOILING POINT: -30.00 deg F
FLASH POINT: 0.00 deg F
MOLECULAR WEIGHT: 70.90
EEPG CONCENTRATION: 3.0 ppm

EXPOSURE RISK POTENTIAL SUMMARY

ACUTE HEALTH HAZARD FACTOR: 4 (1.0 - 9.9)
VAPOR QUANTITY FACTOR: 3 (1,000 lbs - 10,000 lbs)
MOLECULAR WEIGHT FACTOR: 4 (> 45)
ESS PENALTIES: 2 (overpressure or run-away reaction potential)

DISTANCE	DISTANCE FACTOR	E.R.P. VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	288
TO DOW PLANTS	4 (< 1000 ft)	384
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	288

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 288

BIANNUAL REVIEW - SITE, SUPERINTENDENT AND MAJOR MANAGER

THE CHEMICAL EXPOSURE INDEX IS A SIMPLE, EMPIRICAL AND RELATIVE METHOD FOR RATING THE TOXIC HAZARDS OF CHEMICALS IN A QUANTITATIVE MANNER.
** FOR INTERNAL DOW USE ONLY **

D. ?ERSION SUMMARY

TOTAL DISCHARGED =	5100.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	8.70 MIN	SOURCE DIAMETER =	0.00 FT
MOLECULAR WEIGHT =	70.90	EXIT VELOCITY =	0.00 FT/S
SOURCE TEMPERATURE =	-22.00 DEG F	PERCENT DILUTION =	0.00
EEPG CONCENTRATION =	3.0 ppm	AMBIENT TEMPERATURE =	86.00 DEG F

THE RELEASE IS A GAS RELEASE

THE RELEASE IS CONTINUOUS

THE RADII OF EXPOSURE ARE BASED ON PEAK CONCENTRATIONS

RADII OF EXPOSURE (miles)
@ ground level - @ plume centerline

CONC (ppm)	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
3.0	0.877	4.364	33.039
30.0	0.298	1.075	4.512
300.0	0.116	0.286	1.000

* APPROXIMATE % OF TIME IN THIS WEATHER CONDITION

UNSTABLE ATMOSPHERIC CONDITION - SLIGHT SOLAR RADIATION WITH LOW WIND SPEEDS (<10 mph) OR STRONG RADIATION WITH HIGH WIND SPEEDS (>10 mph).

NEUTRAL ATMOSPHERIC CONDITION - WELL MIXED ATMOSPHERE DUE TO MODERATE/STRONG WIND SPEEDS (>7 mph) AND SLIGHT/MODERATE SOLAR RADIATION. ANY OVERCAST CONDITION.

STABLE ATMOSPHERIC CONDITION - LOW WIND SPEEDS (<10 mph) AT NIGHT.

THE CHEMICAL EXPOSURE INDEX IS A SIMPLE, EMPIRICAL AND RELATIVE METHOD FOR RATING THE TOXIC HAZARDS OF CHEMICALS IN A QUANTITATIVE MANNER.
** FOR INTERNAL DOW USE ONLY **

Blown Gasket In Liquid Chlorine Line, 5100 lbs Spill

INPUT DATA

CHEMICAL NAME: pp400

LEAK TYPE: I (C=CONTINUOUS I=INSTANTANEOUS)

TOTAL AMOUNT SPILLED: 5100.00 LBS

SPILL AREA: 1000.00 FT**2

AMBIENT TEMPERATURE: 86.00 deg F

CHEMICAL STORAGE TEMPERATURE: -22.00 deg F

SUBSTANCE OF GROUND: c (D=DRY SOIL, W=WET SOIL, C=CEMENT)

GROUND TEMPERATURE: 86.00 deg F

WIND VELOCITY: 8.00 MPH

THE SPILL FALLS INTO CATEGORY 3 AS DEFINED IN THE SHELL SPILLS MANUAL

1. THIS ASSUMES THE AMOUNT FLASHED ADIABATICALLY IS NEGLIGIBLE COMPARED TO THE HEAT TRANSFER RATE IN THE FIRST MINUTE.
2. THIS ASSUMES EVAPORATION DUE TO HEAT TRANSFER DOMINATES THE FIRST SEGMENT OF TIME.
3. THIS ASSUMES EVAPORATION DUE TO MASS TRANSFER DOMINATES THE FINAL SEGMENT OF TIME.

THE AMOUNT EVAPORATED BY HEAT TRANSFER: 2837.41 LBS

THE TIME REQUIRED: 5.76 MIN

THE AMOUNT EVAPORATED BY MASS TRANSFER: 2262.59 LBS

THE TIME REQUIRED: 8.69 MIN

CEI
LIQUID CHLORINE

BLOWN GASKET OVERPRESSURE

ORIFICE SIZE FROM BLOWN GASKET

GASKET BOLT CIRCLE	10-5/8"
GASKET THICKNESS	1/8"
NUMBER OF BOLTS (300#)	8

$A = \frac{C}{8} \times W = \frac{2\pi RW}{8} = \frac{\pi}{4}(5\text{-}5/16 \times .125) = .521 \text{ in}^2$

A = .004 ft.^{2}

MAXIMUM LINE CONTENTS:

$V = L\Pi R^2$ DIA = .5 FT. LENGTH = 275 FEET

$V = 275\ (\Pi)\ \frac{(.5)^2}{4} = 54 \text{ FT } 3$

$MASS = 54FT^3 \times \frac{95 \text{ LBS}}{FT^3} =$ **5100 LBS CHLORINE**

LIQUID SPILL QUANTITY:

$Q_L = (.61)\ (A)\ P_L \times \sqrt{\frac{2gc\ (P_1 - P_2)}{P_L}}$

$Q_L = .61\ (.004)\ (95)\ (8) \sqrt{\frac{28080\text{-}2160}{95}}$

A = .004 ft^2
P_1 = 28080 psfa
P_2 = 2160 psfa

$Q_L = 30.6 \frac{lb}{s}$ => 1850 lbs/min.

DO A 023629
CONFIDENTIAL

7/19/91
P YONTS:GSH

TWO PHASE FLOWS:

$$w = \frac{qc\ P_0\ P_L A^2}{Q_L^2} + \frac{X_0 P_L}{P_L - P_G}$$

$$w = \frac{32\ \frac{ft}{S^2}\ (95\ lb)\ (28080\ \frac{lb}{ft^2})\ (.004 ft^2)\ (.004\ ft^2) + \frac{1\ (95)}{(95\ -.027)}}{936.4\ \frac{lb^2}{S^2}}$$

$w = 1.5 + 1 = 2.5$

and $2.5 < 4.0$ ... Therefore, Two Phase Flow applies.

$Q = .66\ (w\ -.^{39})\ [A\ [P_0 * P_L qc)^{.5})]$

ACTUAL 2 PHASE CHLORINE LOSS:

$Q_S = .66\ (w\ -.^{39})\ [A\ [P_0 * P_L qc)^{.5})]$

$Q_S = ..66\ (2.5)^{-.39}\ [.004[(28080)\ (95)(32)]^{.5}]$

$Q_S = 17.1$ LBS/S

$Q_M = 1023.8$ LB/MIN.

Q_{15} = 1023.8 LB/MIN X 15 MIN. = 15,356 LB/15MIN.

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7/19/91
P YONTS:GSH

MAJOR CHLORINE PLANT CHANGES SINCE 1989 CEI AUDIT

Installed Dual Train, Oversized, Titanium Chlorine Scrubbers

Eliminated "Worst Case Scenario" From Chlorine Liquid Manifold: 1" Nipples Removed

Rectifiers 2 & 3 On MOD V Control

Implementing Successful IPT Program

Began Program To Replace Standard Packed Valves With Bellows Seal Valves In Liquid Chlorine Service

Completed Preventative Maintenance On Gas Distribution Lines To EDC, Solvents And Glycol

Installed Dual Nitrogen Feed System For Improved Plant Reliability

Increase Plant Air Reliability Through Piping Upgrades And Completed Tie With Divisional Air System

Transferred Cell Header Pressure Controller To MOD V Control

Paul Yonts
July 19, 1991
CEI:AA4

SUPERVISORS INVESTION OF ACCIDENT/INCIDENT - S-305 L-63 (REV. 5-90)

DOW CHEMICAL U.S.A. - LOUISIANA DIVISION
SUPERVISOR'S INVESTIGATION OF ACCIDENT/INCIDENT

()D-RMTC#		()C-RMTC#		ACCIDENT CLASSIFICATION		DATE OF ACCIDENT:	01-24-91
()D-RWC#		()C-RWC#		INJURY	NON INJURY	TIME OF ACCIDENT:	1205
()D-DAW#		()C-DAW#		S&LP STANDARD VIOLATION		DATE INVESTIGATED:	01-24-91
()P[illegible]		()$50000PD		EVIRON. X	RxCHEM.	DATE REP SUBMITTED:	01-25-91

Block and Location of Accident Chlorine I Block 26 1991-4

Name of Injured\Involved Employee N/A **Class** N/A

Time at Dow (Mos). N/A **Master No.** N/A **Time on Job (Mos.)** N/A

Contractor Involved/Supervisor N/A

Chemical Released (Eviron/RxChem only) Chlorine

Am unt/Unit of Measure (Envir/RxChem only) 15 lbs.

Accident/Incident Description (10 Words or Less) Backpressure Due To C-100 Inst. Failure

Accident / Incident Description (Full)

A chlorine release occurred due to a pressure upset in the Chlorine Cell Area. Cell header pressure control failed (chlorine compressor surge controller) causing a positive pressure in the cells. The emergency pressure control system activated, starting the vent scrubber and reducing load by 40%. The control system was taken over by plant operators and brought under control. The situation was corrected before production was increased.

[illegible].TS CLASSIFICATION (List all that apply with code number and description from back page)

ACCIDENT / INCIDENT	INJURY	BODY PART
355 Air Release Agency Reportable		

JOB BEING PERFORMED (List one from Group I and all that apply from Group II

100 OPERATION / ROUTINE

CAUSES (List All that with code number and description from back)

ON SITE	PRE-EXISTING
810 Equipment Failure	015 Improper Design

FOLLOW UP ACTION TO PREVENT RECURRENCE

Action : Replace surge control device.

Responsibility : J. Haney Expected Completion Date : 01-24-91 Actual Completion Date : 01-24-91

Action : Install remote seal flow & press. transm. to prevent plugging of process nozzle.

Responsibility : J. Haney Expected Completion Date : 05-01-91 Actual Completion Date :

Action :

Responsibility : Expected Completion Date : Actual Completion Date :

Superintendent's Signature	Investigated By	Signature of Injured
Joe Muller	Haney, Serpas, Cutrer, Hebert, Cooke	None

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LINES OF DEFENSE

LIQUID CHLORINE STORAGE AREA

- o Leak Detection System
- o Underground Containment Sump
- o EBV, PSV Protection
- o Ability To Pump One Sphere To The Other
- o Procedures And Equipment For Operator Mitigation
- o Yearly NDT Thickness Testing For Both Spheres

LIQUID CHLORINE DISTRIBUTION AREA

- o Leak Detection System
- o Quarterly NDT Thickness Testing On Discharge Lines
- o Procedures And Equipment For Operator Mitigation

Paul Yonts
July 19, 1991
CEI:AA5

E
RESPONSE.EMP #672

RESPONSE TO CHLORINE, TOXIC RELEASE OR ENVIROMENTAL INCIDENT

CHLORINE RELEASE

1. Notify Gate 1 by telephone at 333 or by emergency radio :
   a. Tell them the type of release, gas or liquid.
   b. Magnitude of the release, small or large.
   c. Area of the release.
2. Sound the general alarm for the block :
   a. Announce the area of the release.
   b. Announce the wind direction and safe areas.
   c. In the event of a large release, account for all personnel.
   d. Evacuate all non-essential personnel.
3. Keep Gate 1 informed with frequent status reports of progress in containing the release.

TOXIC RELEASE

1. Notify Gate 1 by telephone at 333 or by emergency radio :
   a. Tell them the type of release
   b. Magnitude of the release
   c. Area of the release.
2. Sound the general alarm for the block:
   a. Announce the area of the release.
   b. Announce the wind direction and safe areas.
3. Keep Gate 1 informed with frequent status reports of progress in containing the release.

ENVIRONMENTAL INCIDENT

1. Refer to the POP-I [illegible] for reporting guidelines and action

T-54/T-56 LEAK PROCEDURE

IF T-54 OR T-56 DEVELOPS A LEAK:

1. Call 333 and notify Plant security immediately that there is a siginificant liquid spill in the Chlorine Plant. Make an announcement in the Chlorine block. Evacuate non-essential personnel to the appropriate assembly area.

2. Locate the leak - isolate if possible

3. Allow chlorine to drain to sump. Turn off sphere sump pump. Turn on sump blower to AT-250. Keep caustic excess high in scrubbers. Cover sump drain under sphere that is not leaking.

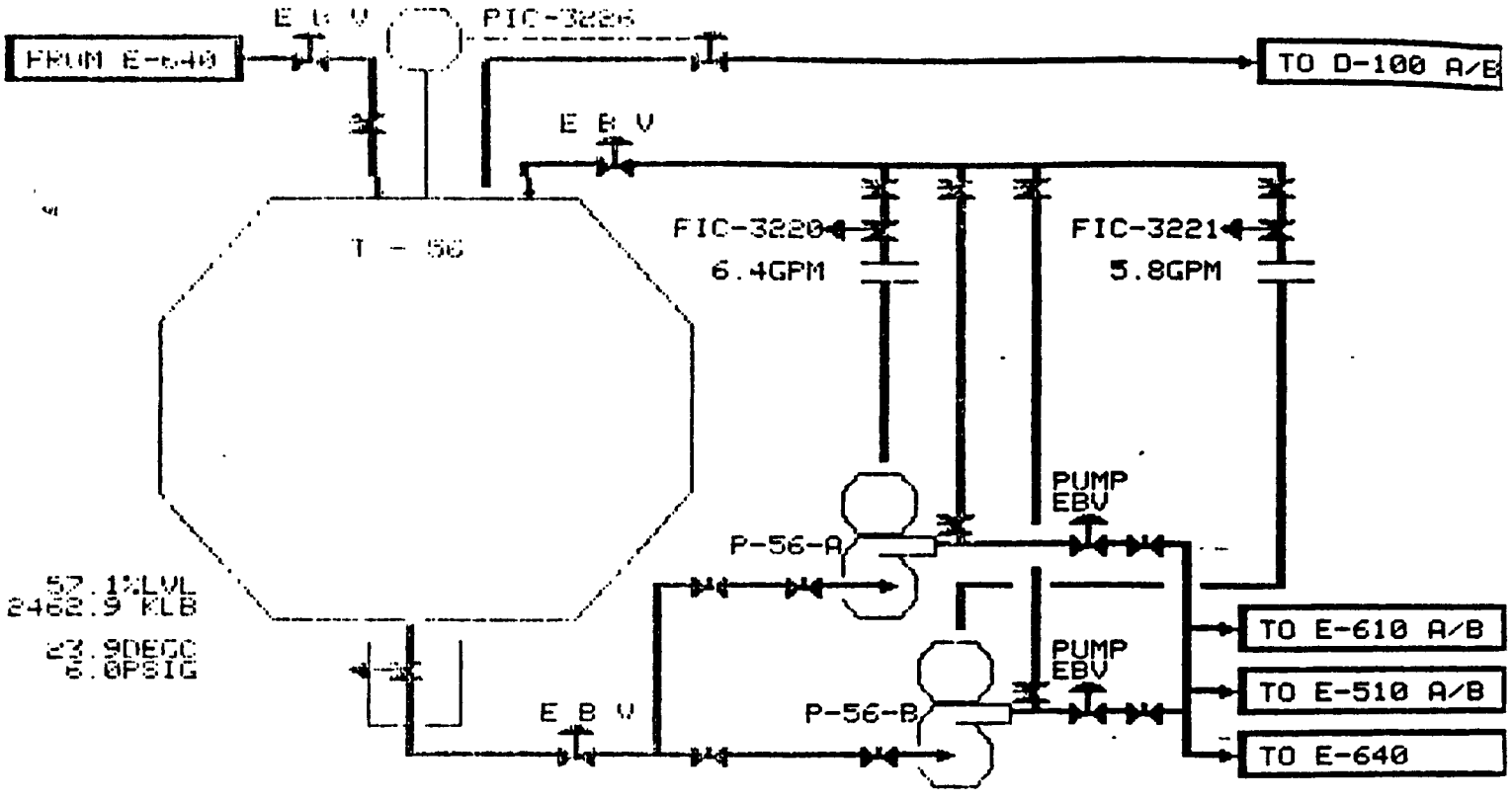
4. Block in the "liquid in" EBV to the leaking sphere. Reduce the pressure in the sphere as muck as possible. Rapidly pump out of the sphere to the evaporators, Methanes, and/or tank cars. Consider using outside reflux on ST-55/65.

5. Ask CA-II to stop sending liquid. Chlorine can be pumped from leaking sphere to the other by flowing from : the pumps > manifold > load rack > offloading line > CA-II meter run > sphere.

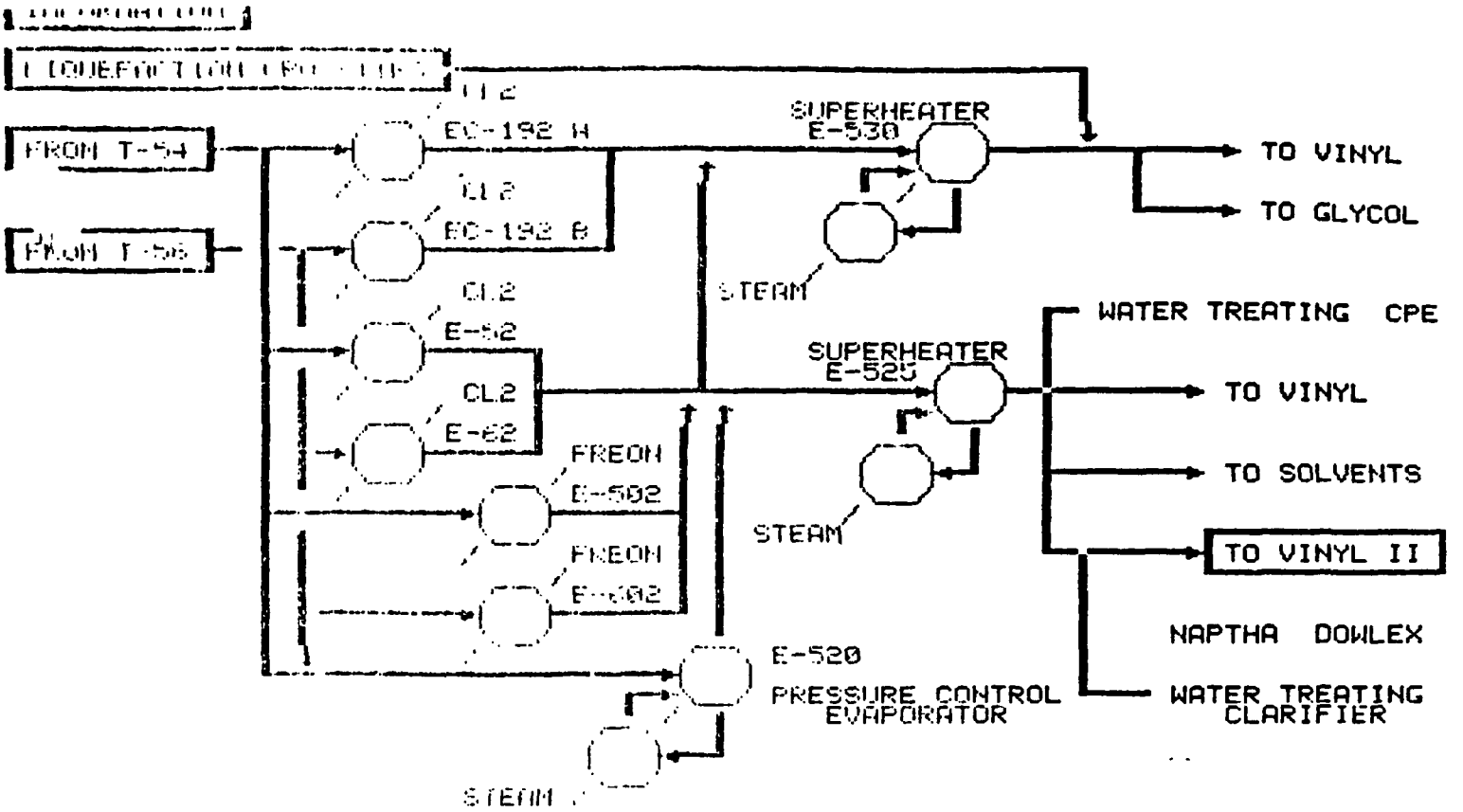
6. Check breathing air and face masks in Control Room. Monitor wind direction closely.

7. Chlorine should continue to drain to sump. Once sphere is evacuated r leak has stopped, cover sphere drain. Keep blower on.

REVISED 11-21-89
`HERELEK.OPR #614 RL002028.DOC 60-05-03-00



T-56 27 17-SEP-86



OVERVIEW - DISTRIBUTION SYSTEM 261 17-SEP-86

FUTURE PLANS

- o PPM Chlorine Storage Sphere: Strip, Blast, Thickness Test, Hydrostatic Test, Paint and Re-insulate T-54
- o PPM Liquid Chlorine Line: Strip, Blast, Thickness Test, Hydrostatic Test, Paint and Re-insulate P-54 Discharge Piping To Manifold
- o PPM CPE User Line: Strip, Blast, Thickness Test, Hydrostatic Test, Paint, Heat Trace and Re-insulate
- o Achieve Ability For Periodic Testing Of The EBV's On The Bottom Of The Chlorine Spheres
- o Continue With Formalized Training: IPT, Procedure Documentation, Operational Check Sheets And Spill Prevention
- o Continue With Bellow Seal Valve Installations
- o Continue Program To Prevent External Corrosion
- o Expand Usage Of Mod5 And Mod5 Remotes
- o Develop PM Program For Critical Liquid Chlorine Piping.
- o Develop Adjacent Plant Spill Scenarios With Collective Inter-Plant Participation
- o Continue With Yearly And Monthly Emergency Drills
- o Continue P&ID Updates

Paul Yonts
July 19, 1991
CEI:AA5

PERSION SUMMARY

TOTAL DISCHARGED =	999.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.00 FT
MOLECULAR WEIGHT =	36.00	EXIT VELOCITY =	0.00 FT/S
SOURCE TEMPERATURE =	86.00 DEG F	PERCENT DILUTION =	0.00
EEPG CONCENTRATION =	3.0 ppm	AMBIENT TEMPERATURE =	86.00 DEG F

THE RELEASE IS A GAS RELEASE

THE RELEASE IS CONTINUOUS

THE RADII OF EXPOSURE ARE BASED ON PEAK CONCENTRATIONS

RADII OF EXPOSURE (miles)
@ ground level - @ plume centerline

CONC (ppm)	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
3.0	0.422	1.745	8.053
30.0	0.149	0.455	1.718
300.0	0.063	0.136	0.407

* APPROXIMATE % OF TIME IN THIS WEATHER CONDITION

UNSTABLE ATMOSPHERIC CONDITION - SLIGHT SOLAR RADIATION WITH LOW WIND SPEEDS (<10 mph) OR STRONG RADIATION WITH HIGH WIND SPEEDS (>10 mph).

NEUTRAL ATMOSPHERIC CONDITION - WELL MIXED ATMOSPHERE DUE TO MODERATE/STRONG WIND SPEEDS (>7 mph) AND SLIGHT/MODERATE SOLAR RADIATION. ANY OVERCAST CONDITION.

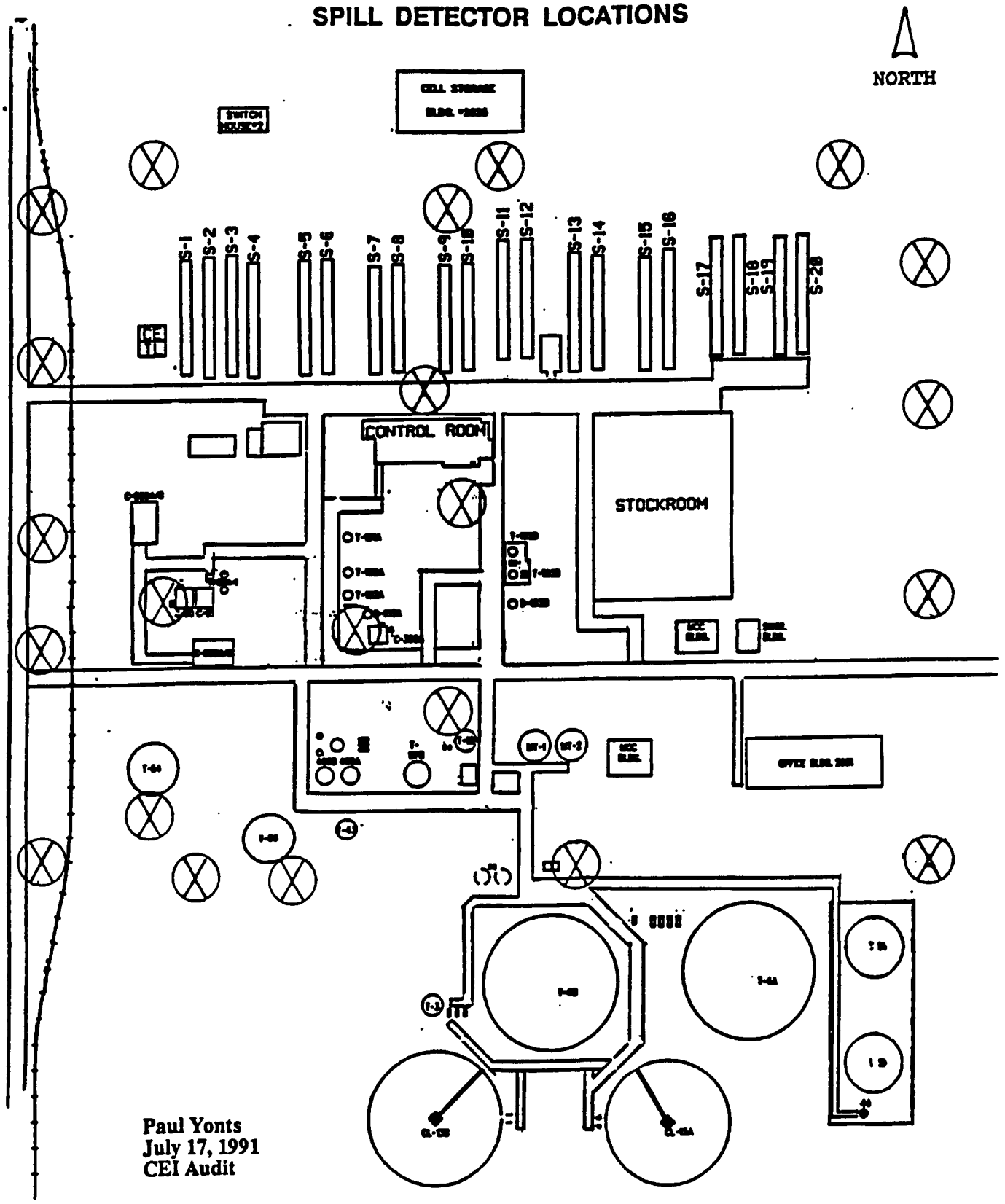
STABLE ATMOSPHERIC CONDITION - LOW WIND SPEEDS (<10 mph) AT NIGHT.

THE CHEMICAL EXPOSURE INDEX IS A SIMPLE, EMPIRICAL AND RELATIVE METHOD FOR RATING THE TOXIC HAZARDS OF CHEMICALS IN A QUANTITATIVE MANNER.

** FOR INTERNAL DOW USE ONLY **

BLOCK 26 CHLORINE I

SPILL DETECTOR LOCATIONS



Paul Yonts
July 17, 1991
CEI Audit

DO A 023640
CONFIDENTIAL

CHEMICAL EXPOSURE INDEX AUDIT
PRE-AUDIT QUESTIONNAIRE

owi

Please check off YES, NO or N/A (not applicable) for each question. Provide additional details if requested.

When was the last CEI review? June 21, 1989.

What chemicals were discussed and what were the CEI values?

Chemical	CEI
Sulfuric Acid (98%)	12
Hydrochloric Acid (36%)	54
Carbon Dioxide	72
Freon 12	96

Please list all chemicals in your plant that exhibit a Chemical Exposure Index (CEI) of 100 or greater.

Chlorine	**Liquid Sphere**	**288**
Chlorine	**Distribution Manifold**	**288**

Please list all chemicals that have spill/release scenarios (neutral atmospheric condition and "EEPG X 1") exhibiting a radius of exposure that exceeds the distance from your plant to the public.
Chlorine

Have these scenarios been included in the CAER/MIDAS program?
Yes

Please have appropriate map plots available for review at the audit.

Please list all chemicals that have spill release scenarios (neutral atmospheric condition and "ODOR THRESHOLD X 1") exhibiting a radius of exposure that exceeds the distance from your plant to the public.
Chlorine

Have these scenarios been included in the CAER/MIDAS program?
Yes

Please have appropriate map plots available for review at the audit.

The following pre-audit questions apply to those areas of the operation that process, transfer, or store chemicals whose impact in the event of a release incident would have a significant negative impact on public areas. Impacts on or of immediately surrounding facilities should be considered in a secondary way.

A. OPERATING PROCEDURES

1. Does the plant have checklists that are used to shutdown and clear equipment/piping to insure that the contents are not left in the equipment, or accidentally released into the environment?
Yes, Reference 1, Attached, IPT.

2. Does the plant have checklists that are used for starting up out of service equipment/piping that insures that no raw materials, process streams or product will be accidentally released into the environment?
Yes, Reference 2, Attached, IPT.

3. Does the plant have procedures for the initial opening of lines and equipment?
Yes, Reference 3, Attached.

4. Does the plant have procedures that define exactly who is responsible for the operation, inspection and maintenance of adjacent and intra/interplant pipelines and associated equipment?
Chlorine to user's C-9, Reference 4, Attached.

   a. Do they include normal operations?
   Monthly shift check C-9

B. PLANT COMMUNICATIONS

5. Does the plant have an up-to-date emergency call list?
Yes, Reference 5, Attached.

6. Does the plant have written notification procedures for the following emergencies? **Reference 6, Attached.**

   a. Gas Release **Yes**

   b. Spill **Yes**

   c. Fire **Yes**

   d. Emergency Response **Yes**

7. Does the plant have procedures for establishing contact with Field Headquarters during an emergency?
Yes, Reference 7, Attached.

C. AREA MONITORING SYSTEMS

8. Does the plant use an area monitoring system for toxic materials?
Yes, Reference 8, Attached.

   a. How often are these monitors checked and calibrated?
   Not designed to be calibrated. Checked once per week by Lab Tech.

9. Are plant personnel trained to respond to the alarms from area monitors?
Yes, Reference 9, Attached.

   a. What is the frequency of retraining?
   Annual Drill, Monthly emergency drills

D. PLANT PIPING SYSTEMS

10. Does the plant monitor corrosion in the piping systems of the facility?
No

   a. How is monitoring done?

11. Does the plant have areas in the piping system that requires constant or repetitive repairs?
Yes, CPE user line. Reference 10, Attached.

   a. Please describe what is being done to prevent recurrence.
   $80M to strip, blast, paint, replace and retrace.

12. Does the plant have a preventive maintenance program in place to monitor the integrity of the piping system? Consider all elements; i.e., paint, insulation, corrosion, supports, shoes, etc.
Yes, $310M Preventive painting program. Reference 11, Attached.

13. Are outside-the-block material distribution systems monitored for leaks?
Yes

   a. How is this done?
   C-9

   b. How frequently?
   Monthly

14. Do the plant's toxic material distribution systems undergo pressure testing on a routine basis?
No, always done after maintenance.

15. Do the plant's toxic material distribution systems have prominently displayed phone numbers for notification of problems and emergencies?
Yes

E. PLANT MECHANICAL EQUIPMENT

16. What kind of pumps does the plant use in toxic service?
4-sealess canned pumps. (2-P-54, 2-P-56)

17. Are these the kind of pump systems that will minimize leak potential? (i.e., tandem or dual seals, sealess pumps, etc.)
Yes

18. Does the plant have a preventive maintenance program in place for mechanical equipment?
Yes, Reference 12, Attached.

F. TRAINING FOR EMERGENCY RESPONSE

19. Have the scenarios for chemical spills and gas releases, that have the most probable chance of occurring, been reviewed with: **Reference 13, Attached.**

a. Plant operators/technicians?
Yes

b. Supervision?
Yes

c. Other affected employees?
Yes

d. Process Engineering (CEINDEX Program)?
Yes

e. Safety and Loss Prevention?
Yes

f. Environmental (data of MIDAS system)?
Yes

g. Adjacent plant supervision?
No

20. Have your reviews included all possible scenarios that would be deemed "major releases", affecting the public beyond the Dow fence line?
Yes

21. Does the plant conduct routine, periodic "what if" emergency drills on the release of toxic chemicals?
Yes, Reference 14, Attached.

a. Is each shift involved?
Yes

b. Do supervisors participate?
Yes

If yes, what level of supervision?
Shift Supervisors and staff

c. Is there a regular schedule for these exercises?
Yes

d. Is Industrial Security involved in these practice drills in any way?
Yes, yearly

If yes, in what way?
Divisonal warning contacts with Dow Fire Department, State and Local Officals. Directs local traffic.

e. How often are drills conducted?
Yearly

f. When was the last time your plant had a planned emergency drill involving the release of a toxic gas or liquid?
9/90

g. What chemical was used in your last planned emergency drill?
Chlorine

h. Have you used different toxic or odorless chemicals in previous drills?
No

22. Does the plant have a formalized training program for those people who conduct periodic inspections of concerned facilities? (Example: weekly pipe inspection checklist, what to look for, etc.)
No, in IPT development, estimated 1Q 1992 completion.

23. How do you insure that "lessons to be learned" from incident investigations are passed on to all concerned personnel?
Follow up to yearly Drill Safety Meetings, Long Term Notes, tailgates and IPT Documentation.

24. Does the plant have written procedures detailing how to mitigate releases of toxic chemicals in the plant? (Examples: pump to another tank, apply foam, drive a wooden peg, etc.)
Yes, Reference 15, Attached.

a. Does the plant periodically train operating personnel on these procedures and methods for mitigating liquid spills or gas releases from the facility?
Yes

How often?
Yearly

How is the training documented?
C-9

25. Has the plant reviewed its emergency response personnel protective equipment inventory with Industrial Hygiene? (appropriateness, types, numbers, etc.)
~~No~~ / Yes SOME EQUIPMENT AS USED IN PLANT IS NOT IH ROLES ?

26. Does the plant have sufficient quantities of emergency response personnel protective equipment on hand to satisfy the need in the event of a major emergency?
Yes

a. Is it kept at strategic locations for ease of access in case of an emergency?
Yes, Emergency Response Room, Control Room, Brine Treating Lab.

27. Are there checklists employed for the periodic inspection, maintenance, and testing of the plant emergency equipment? (ammonia curtains, foam deluge systems, and fire monitors)
Yes, Reference 16, Attached, C-9.

a. How often?
Weekly/Monthly

b. Who does it?
Shifts

28. Are all plant personnel trained in the proper use of the various personnel protective equipment employed for combatting liquid spills, gas releases, and fires?
Yes

a. How often?
Respirator - Annually, Quarterly - SCBA
SCBA - Quarterly

b. How is this training documented?
C-9

29. How many people are involved in training on the proper emergency response to a liquid/vapor chemical release of concern?

a. Operators/technicians	36	INCORRECT ?
b. Supervision (all levels)	4	
c. Others	4	
d. Total of above	44	

30. Have you consulted with neighboring plants immediatley surrounding your facility to determine the effects of spills/releases by them on your plant and personnel?
Yes, Reference 17, Attached.

a. Do you have the proper type of personnel protective equipment if your plant is downwind of a spill or release from those facilities?
Yes

b. Sufficient quantities of equipment?
Yes

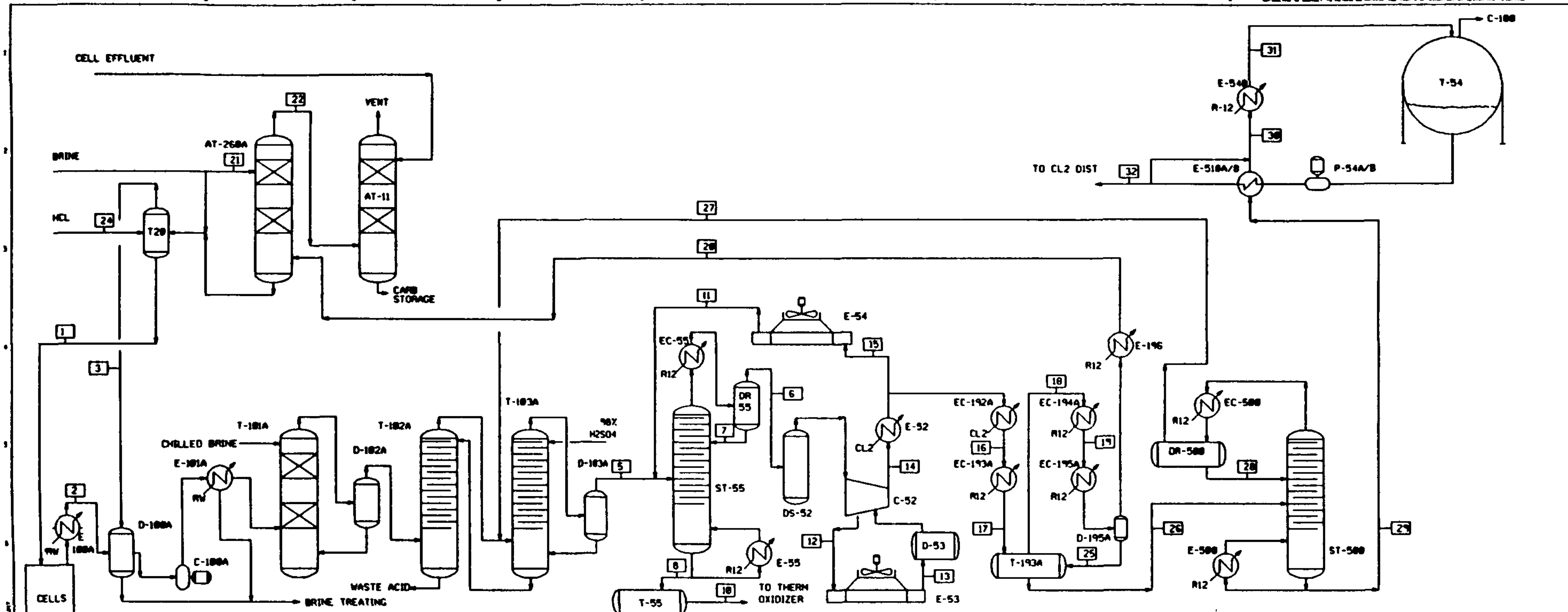
c. Is this equipment inspected or checked periodically?
Yes

d. Do you train your plant personnel on how to respond when exposed to a gas released from an adjacent plant?
Yes, Monthly shift emergency training.

How often?
September 91, one time event.

e. Do you participate in emergency drills when hypothetical releases originate in plants other than your own?
Yes

7/10/91
PEY/daa



STREAM NUMBER →	M.W.	1	2	3	4	5	6	7	8	9	10
TEMP DEGC / PRES PSIA						30.7 / 30.7	-0.5 / 30.7		-73.6 / 28.7		
1 SIM STRM ID						FEED	CSZOUT		BOTTOMS		
2											
3 HYDROGEN (LB/HR)	2.02					9.3	9.4		0.0		
4 NITROGEN	28.01					1027.7	1090.2		0.0		
5 OXYGEN	32.00					653.0	718.0		0.0		
6 CARBON DIOXIDE	44.01					4807.0	6734.3		0.7		
7 CHLORINE	70.91					123702.3	124908.1		7100.5		
8 WATER	18.02					0	0		0		
9 METHYL CHLORIDE	50.49					7.0	6.4		6.7		
10 METHYLENE CHLORIDE	84.93					2.9	0.0		2.9		
11 CHLOROFORM	119.38					30.0	0.0		30.0		
12 CARBON TETRACHLORIDE	153.82					21.5	0.0		21.5		
13 BROMOCHLORINE	115.36					55.6	41.3		14.0		
14 FREON-12	120.91					0	0		0		
15											
16 TOTAL						130498.1	134308.7		7179.5		
17											
18											
19											
20											
21											
22											

STREAM NUMBER →	11	12	13	14	15	16	17	18	19	20
TEMP DEGC / PRES PSIA	40.0 / 118.4	60.0 / 11.9	40.0 / 70.9	101.2 / 117.2	36.2 / 115.4	17.3 / 114.0	5.0 / 114.2	4.5 / 113.2	-30.0 / 112.4	-90.1 / 110.0
1 SIM STRM ID	RHOT	CS201S1	ES3OUT	CS201SCH	TOL10	192OUT	193OUT	193ABOTTY	194OUT	195BOTTY
2										
3 HYDROGEN (LB/HR)	0.0	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.3	9.3
4 NITROGEN	0.1	1090.2	1090.2	1090.2	1090.0	1090.0	1090.0	1047.1	1047.1	1027.7
5 OXYGEN	0.1	718.0	718.0	718.0	717.9	717.9	717.9	677.0	677.0	653.0
6 CARBON DIOXIDE	0.3	6734.3	6734.3	6734.3	6733.8	6733.8	6733.8	3300.4	3300.4	1049.7
7 CHLORINE	9.3	124908.1	124908.1	124908.1	124950.9	124950.9	124950.9	14403.0	14403.0	473.8
8 WATER	0	0	0	0	0	0	0	0	0	0
9 METHYL CHLORIDE	0.0	6.4	6.4	6.4	6.4	6.4	6.4	0.0	0.0	0.0
10 METHYLENE CHLORIDE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
11 CHLOROFORM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
12 CARBON TETRACHLORIDE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
13 BROMOCHLORINE	0.0	41.3	41.3	41.3	41.3	41.3	41.3	1.3	1.3	0.0
14 FREON-12	0	0	0	0	0	0	0	0	0	0
15										
16 TOTAL	19.8	134308.7	134308.7	134308.7	134298.7	134333.7	134333.7	20302.3	20302.3	4008.9
17										
18										
19										
20										
21										
22										

STREAM NUMBER →	21	22	23	24	25	26	27	28	29	30	31	32	
TEMP DEGC / PRES PSIA					-40.0 / 111.0	-2.0 / 110.0	-93.1 / 77.7		9.2 / 93.7	-81.1 / 82.7	-34.5 / 81.7	-0.0 / 104.0	
1 SIM STRM ID					190OUT	TBT500	T0T103		LIBCL2	FRE510	TOT54	CL2DIST	1
2													2
3 HYDROGEN (LB/HR)					9.3	0.1	0.1		0.0	0.0	0.0	0	3
4 NITROGEN					1047.1	82.3	82.3		0.0	0.0	0.0	0	4
5 OXYGEN					677.0	64.9	64.9		0.0	0.0	0.0	0	5
6 CARBON DIOXIDE					3300.4	3680.1	2040.3		3640.8	3640.8	3640.8	0	6
7 CHLORINE					14403.0	124403.0	55.6		124427.4	124427.4	124427.4	127499.9	7
8 WATER					0	0	0		0	0	0	0	8
9 METHYL CHLORIDE					0.0	6.4	0.0		6.4	6.4	6.4	0	9
10 METHYLENE CHLORIDE					0.0	0.0	0		0.0	0.0	0.0	0	10
11 CHLOROFORM					0	0.0	0		0.0	0.0	0.0	0	11
12 CARBON TETRACHLORIDE					0	0	0		0	0	0	0	12
13 BROMOCHLORINE					1.3	41.3	0.0		41.3	41.3	41.3	0	13
14 FREON-12					0	0	0		0	0	0	0	14
15													15
16 TOTAL					20302.3	130047.2	2323.3		128123.0	128123.0	128123.0	127499.9	16
17													17
18													18
19													19
20													20
21													21
22													22

NOTES:

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GUILLORY 10/90

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CHLORINE TRAIN MATERIAL BALANCE

NOT TO SCALE

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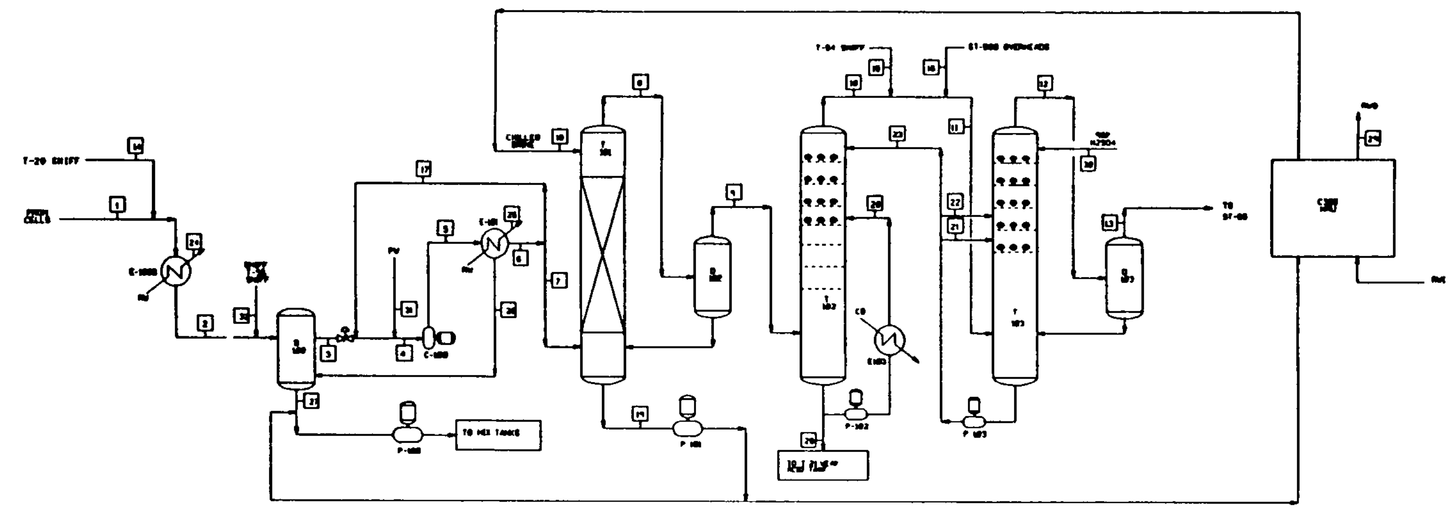

STREAM NUMBER →		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
DEG C / PSIA		52.3 / 14.9	30.1 / 14.9	30.3 / 14.1	37.0 / 12.2	97.5 / 27.5	36.0 / 20.7	36.9 / 20.7	11.0 / 20.0	11.0 / 20.9	23.6 / 24.0	23.6 / 24.0	23.9 / 24.2	23.9 / 24.0	-9.0 / 23.7	-15.0 / 30.0	13.0 / 61.0	30.0 / 20.1	0.0 / 94.7	24.0 / 20.1	21.7 / 29.5		21.4 / 24.7	23.6 / 24.7	29.0 / 57.7	32.3 / 57.1	36.0 / 20.7	30.2 / 14.1	21.7 / 28.5		25.0 / 50.0	25.0 / 57.7	-20.0 / 20.0	
COMPONENTS	M W																																	
1 CL2 LB/HR	70.91	117536.0	117536.0	117880.0	134189.6	134189.6	134132.4	117848.8	117380.8	117380.8	117380.8	117380.8	119080.3	119080.3	0.0	350.0	1350.0	16302.8	0	491.1	0.2		2.3	0.0	0	0	31.3	30.5	0.0		0	0	350.0	1
2 H2O	18.01	2944.0	2944.0	1055.7	6409.2	6409.2	1551.1	1362.6	239.6	239.6	4.0	4.0	0.2	0.2	0	0	0	106.5	92314.4	53437.4	21734.4		4736.9	26.6	2090990.0	499999.5	4050.0	6947.2	223.9		9.2	4365.0	0	2
3 H2	2.02	2.6	2.6	2.6	2.9	2.9	2.9	2.6	2.6	2.6	2.6	2.6	2.6	2.6	0	0	0	0.4	0	0.0	0.0		0.0	0.0	0	0	0.0	0.0	0.0		0	0	0	3
4 N2	28.01	1349.3	1349.3	1349.3	1931.4	1931.4	1931.4	1349.3	1349.3	1349.3	1349.3	1349.3	1420.3	1420.3	0	0	75.0	104.1	0	0.0	0.2		0.2	0.0	0	0	0.0	0.0	0.0		0	0	0	4
5 O2	32.00	1044.1	1044.1	1044.1	1180.6	1180.6	1180.6	1044.1	1044.1	1044.1	1044.1	1044.1	1181.1	1181.1	0	0	37.0	164.4	0	0.1	0.3		0.3	0.0	0	0	0.0	0.0	0.0		0	0	0	5
6 CO2	44.01	898.0	898.0	898.0	1813.1	1813.1	1813.0	898.3	898.3	898.3	898.1	898.1	2549.1	2549.1	0	0	1657.0	123.1	0	1.6	2.4		30.0	0.2	0	0	0.1	0.1	0.1		0	0	0	6
7 H2SO4	98.07	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0	0	0	0	0	0	0	46225.4		70020.2	431.5	0	0	0	0	470.2		491.6	0	0	7
8 NACL	58.44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13403.3	13403.3	0		0	0	0	0	0	0	0		0	0	0	8
9 TOTAL LB/HR		124782.9	124782.9	123024.6	144334.9	144334.9	139430.4	122494.2	120800.3	120800.3	120864.9	120864.9	124150.0	124150.0	0.0	350.0	3139.0	18345.3	87739.3	68293.8	67987.5		82789.8	461.3	2090990.0	499999.5	4095.4	6903.1	700.2		490.8	4365.0	350.0	9
10																																		10
11 VOLUME (CFM/GPM)		14230.2	12473.2	12760.9	10772.1	8098.0	7775.9	6030.9	6222.8	6339.6	6772.6	6772.6	7204.4	7254.8	0.0	13.7	67.9	949.0	(110.6)	(121.0)	(122.1)		(115.7)	(0.8)	(14200.7)	(1003.8)	(19.8)	(14.8)	(1.9)		(0.6)	(0.7)	20.1	11
12 MOLE WEIGHT		63.051	63.051	65.960	61.041	61.041	66.579	66.579	68.273	68.273	68.617	68.617	68.070	68.070	70.906	70.906	51.334	66.579	21.395	21.432	40.506		18.164	18.164	18.015	18.015	18.118	18.086	40.506		90.068	18.015	70.906	12
13 ENTHALPY MBTU/HR		-25299292	-20658296	-14373901	-40697744	-42363188	-12799086	-41204963	-8198764.	-8198801.	-3479678	-3479619.	-9821309.	-9821376.	-.0511344	-2842.952	-6385008.	-1550043.	-4,033669	-4,114458	-3,237668		-3,160368	-1110092	-1,430610	-3.403769	-330266332	-47224940	-3339094.		-1698291.	-28773798	-3240.613	13
14																																		14
15 LB MOLE/HR		1979.0	1979.0	1867.1	2364.5	2364.5	2094.1	1839.8	1770.0	1770.0	1757.0	1757.0	1823.6	1823.6	0.0	4.9	61.1	274.3	3168.3	3237.3	1678.0		1059.3	5.3	116512.3	27754.6	270.2	386.1	17.3		5.1	242.3	4.9	15
16 VAPOR FRAC		1.0000	0.9297	0.9991	0.9990	0.9799	0.9932	0.9932	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9932	0	0	0		0	0	0	0	0	0	0		0	0	1.0000	16
17 DENSITY LB/CF		0.1401	0.1874	0.1806	0.1434	0.2778	0.2909	0.2909	0.3236	0.3178	0.2969	0.2969	0.2812	0.2852	0.3241	0.4296	0.1706	0.2909	71.2611	71.0821	65.4806		90.8163	90.8163	62.1163	62.1209	62.2153	62.3018	90.4006		101.4152	62.2583	0.2909	17
18																																		18
19																																		19
20																																		20
21 STREAM NAME		NEICL2	FME100	TOVAL24	SUCT	DISCH	TOPCH	TOBAY	TOB102	TOT102	TOT103	TOT103	TOB103	TOL10	SNIFF	FNT54	FNS7500	TOVALVZ	CDIN	CDOUT	SA65PCY		SA99PCY	SA99FD	RHO	E101RHO	E101L	B1000TN	WASTE		SA90	PWINJ	FNT56	21
22																																		22

NOTES:

CHLORINE PLANT A TRAIN SIMULATION
STREAM DATA IS THE RESULT OF AN ASPEN SIMULATION MATCHING 7/10/98 PLANT DATA

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GUILLORY	7/98
GOODNER	7/98

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LOUISIANA DIVISION PLAQUEMINE, LOUISIANA

MATERIAL & HEAT BALANCE

CHLORINE WET COMPRESSION AND DRYING

NOT TO SCALE

B10-100-C50-001

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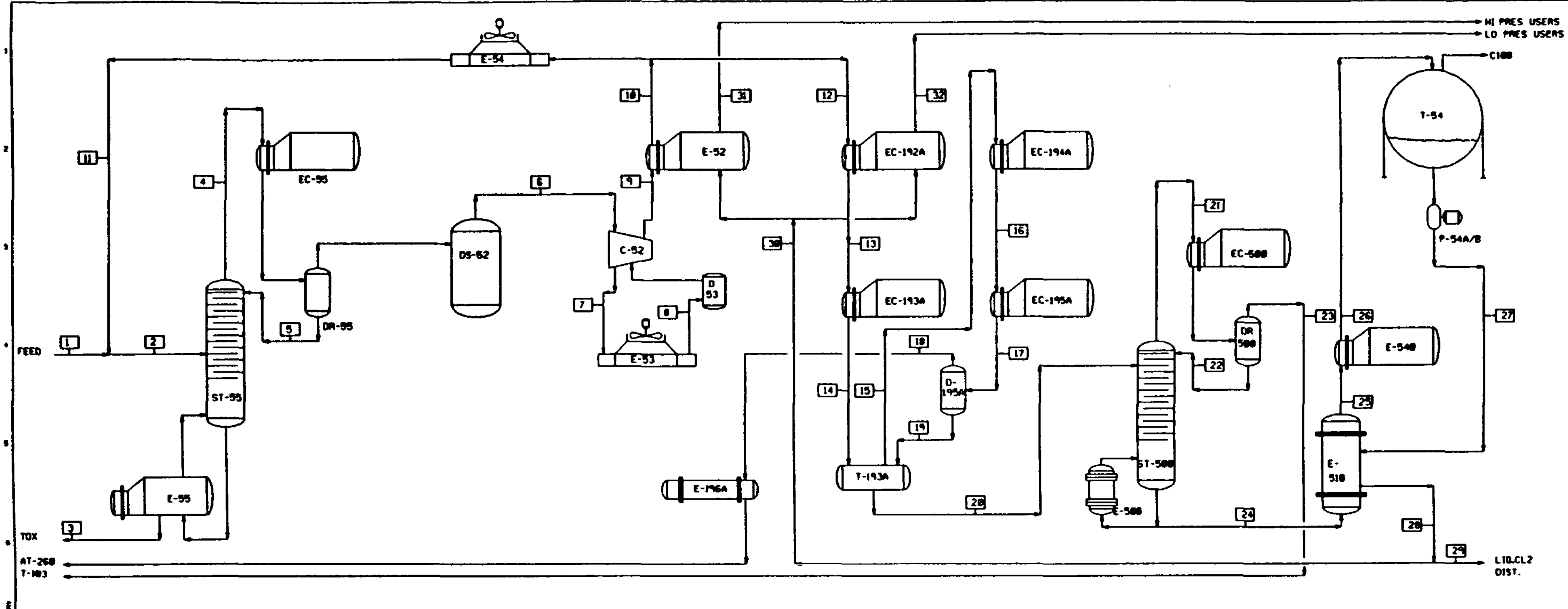

STREAM NUMBER →	M.W.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TEMP DEGC / PRES PSIA		30.7 / 30.7	33.2 / 30.7	-12.3 / 27.9			-65.3 / 30.7	84.3 / 82.7	40.0 / 80.0	101.6 / 130.1	30.0 / 133.2	30.0 / 133.2	34.0 / 133.2	34.6 / 132.0	9.0 / 132.0	4.9 / 131.0	-19.9 / 130.7
COMPONENTS	M.W.																
1 ASPEN STREAM NAME		FEED	ST95IN	BOTTOMS			C52INLET	C52D1S1	E53OUT	C52D1SCH	E52D1SCH	BROT	TOL1A	192OUT	193OUT	193ABVTY	194OUT
2																	
3 HYDROGEN	2.02	0.1	0.1	0			0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
4 NITROGEN	28.01	1000.9	1740.6	0			1740.6	1740.6	1740.6	1740.6	1740.6	0.1	1740.4	1740.4	1740.4	1674.0	1674.0
5 OXYGEN	32.00	396.2	657.4	0.0			657.3	657.3	657.3	657.3	657.3	0.0	657.3	657.3	657.3	600.9	600.9
6 CARBON DIOXIDE	44.01	1041.6	3747.0	0.0			3726.0	3726.0	3726.0	3726.0	3726.0	0.3	3725.7	3725.7	3725.7	1363.3	1363.3
7 CHLORINE	70.91	125737.4	131560.0	115.9			131335.1	131335.1	131335.1	131335.1	131335.1	9.5	131325.5	131325.5	131325.5	8049.2	8049.2
8 WATER	18.02	0	0	0			0	0	0	0	0	0	0	0	0	0	0
9 METHYL CHLORIDE	50.49	6.5	7.0	0.1			1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	0.3	0.3
10 METHYLENE CHLORIDE	84.93	2.0	2.0	2.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
11 CHLOROFORM	119.38	30.2	30.2	30.2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
12 CARBON TETRACHLORIDE	153.82	21.1	21.1	21.1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
13 BROMOCHLORINE	115.36	84.5	80.1	3.2			81.9	81.9	81.9	81.9	81.9	0.0	81.9	81.9	81.9	1.1	1.1
14																	
15																	
16 TOTAL		128999.9	137750.0	170.3			137530.0	137530.0	137530.0	137530.0	137530.0	10.0	137525.0	137525.0	137525.0	12290.0	12290.0
17																	
18 MOLE WT.		68.4	67.9	83.7			67.9	67.9	67.9	67.9	67.9	67.9	67.9	67.9	67.9	51.0	51.0
19 VOLUME FLOW CFM/GPM		3.7	3.8	0.0			3.2	1.4	1.2	0.9	0.7	0.0	0.7	0.3	0.1	0.1	0.0
20 VAPOR FRACTION		1.0	1.0	0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.3	0.1	1.0	0.7
21																	
22																	

STREAM NUMBER →	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
TEMP DEGC / PRES PSIA	-29.9 / 129.9	-29.1 / 129.9	-29.1 / 129.9	3.4 / 129.9			-21.3 / 77.7	13.9 / 89.1	-10.6 / 82.1	-25.8 / 81.1	-26.1 / 300.0	11.3 / 104.0		-30.1 / 14.7	10.2 / 79.7	34.9 / 139.7	
COMPONENTS																	
ASPEN STREAM NAME	195OUT	195ABVTY	195OUTL	T05T300			TOT103	LIQCL2	FME510	TOT54	FMP54	CL2DIST		FMT54	EC192OUT	E52OUT	1
																	2
HYDROGEN	0.1	0.1	0.0	0.0			0.0	0	0	0	0	0		0	0	0	3
NITROGEN	1674.0	1690.5	6.2	19.0			73.6	0.0	0.0	0.0	0	0		0	0	0	4
OXYGEN	600.9	596.2	4.7	61.1			61.1	0.0	0.0	0.0	0	0		0	0	0	5
CARBON DIOXIDE	1363.3	1825.0	137.5	1000.0			1022.0	11.0	11.0	11.0	0.0	0.0		0.0	0.0	0.0	6
CHLORINE	8049.2	1699.5	6349.1	129626.0			1401.3	128144.1	128144.1	128144.1	89957.0	89957.0		89957.0	73514.7	18443.1	7
WATER	0	0	0	0			0	0	0	0	0	0		0	0	0	8
METHYL CHLORIDE	0.3	0.1	0.3	5.5			0.0	4.5	4.5	4.5	4.5	4.5		4.5	4.0	0.0	9
METHYLENE CHLORIDE	0	0	0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	10
CHLOROFORM	0	0	0	0			0	0	0	0	0	0		0	0	0	11
CARBON TETRACHLORIDE	0	0	0	0			0	0	0	0	0	0		0	0	0	12
BROMOCHLORINE	1.1	0.1	1.0	81.0			0.0	81.1	81.1	81.1	37.2	37.2		37.2	30.4	6.0	13
																	14
																	15
TOTAL	12290.0	5790.5	6499.9	131725.0			3444.0	128279.0	128279.0	128279.0	89999.9	89999.9		89999.9	73549.2	16450.0	16
																	17
MOLE WT.	51.0	39.1	60.0	70.2			51.4	70.9	70.9	70.9	70.9	70.9		70.9	70.9	70.9	18
VOLUME FLOW CFM/GPM	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.1	0.1	19
VAPOR FRACTION	0.6	1.0	0	0.0			1.0	0	0.0	0	0	0		0	1.0	1.0	20
																	21
																	22

NOTES:

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PREVIOUS REVIEW STATUS

Listed Below are the Recommendations From The Previous CEI Audit Review. The Comments And Suggestions From Review Along With The Plant's Responses Are Attached.

1. **Gas from the sump is evacuated to an undersized scrubber. Plans are to replace the scrubber.**

   Scrubbers Replaced

7. **A decision still needs to be made to either eliminate the one inch nipples or install the overpressure PSV's.**

   Nipples Removed

8. **Recommend that the electrical tracing be investigated to see if it can cause an over temperature problem.**

   Electric heat tracing wiring would fault before the over temperature problem

9. **Recommend that some method be found to test the EBV's on the bottom of the sphere on a periodic basis.**

   Method Found. Will make modifications with next sphere outage.

10. **The idea of reducing sphere pressure is still being evaluated.**

    The idea of reducing sphere pressure is a major concern of the Chlorine Plant. This project will involve CATC help and capital expense to resolve.

Paul Yonts
July 18, 1991
CEI:AA8

DOW CHEMICAL U.S.A.

LOUISIANA DIVISION
P. O. BOX 150
PLAQUEMINE, LOUISIANA 70765-0150
504 389-8000

July 12, 1989

Jim Heaslip B4701T
Joe Muller B2601

cc: W. T. Austin B3701
J. G. Barksdale B3701
H. M. Bell B4701
J. Oldner B202 WHDC

Listed below is the Chlorine I Plant's responses to HMTI-CEI Audit which was held on June 21, 1989:

CEI REVIEW

5. What is the Chlorine Tech Center's recommendation on the frequency of internal inspection of chlorine spheres?

See attachment.

7. A decision still needs to be made to either eliminate the one inch nipples or install the overpressure PSV's.

The decision has been made to eliminate the one inch nipples on the distribution manifold during the 1990 first quarter "A" Train outage.

8. Recommend that the elec. tracing be investigated to see if it can cause an overtemperature problem.

Due to materials of construction, electric heat tracing wiring would actually fault before reaching the overtemperature situation of a Chlorine-Iron fire.

9. Recommend that some method be found to test the EBV's on the bottom of the sphere on a periodic basis.

A method of testing the EBV's on the bottom of the chlorine spheres on a periodic basis is being investigated. Plans are to devise a method of testing or partially testing the EBV's by 1990.

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10. **The idea of reducing sphere pressure is still being evaluated.**

    The idea of reducing sphere pressure is a major concern of the Chlorine Plant. This project will involve CAIC help and capital expense to resolve this situation. This situation will be approached with the goal to determine the best way to reduce our sphere pressure to near atmospheric pressure.

HMTI REVIEW

4. **Loading and unloading procedures are out of date but are being reviewed presently.**

    The first draft of our loading and unloading procedures has been written and is awaiting review.

5. **Recommend that the number of loaded tank cars be reviewed and a maximum number be decided on.**

    See Attachment

Sincerely,

Steve Landers
Chlorine I

Attachments

gsh

Building B-2402, Phone 3481

TEXAS DIVISION
FREEP RT. TEXAS 77541

August 6, 1984

J. J. Leddy
Chlor-Alkali Tech Center
OCD

LIQUID CHLORINE STORAGE SPHERE INSPECTION

We recommend that the time between out of service inspections for chlorine spheres should be increased from five to at least ten years. We believe that the time between inspections could be increased to fifteen to twenty years or longer if corrosion monitors are located on either side (inlet and outlet) of the sphere. The reason for this recommendation is that the heat up and cool down cycles introduce periods of high thermal stress which could cause cracking, and also because of the corrosion that takes place during the wash cycle.

The corrosion monitors could be either electric resistance corrosion probes or coupons installed as shown on the attached drawing. Corrosion probes and the instrument needed to read them can be purchased from either:

Petrolite Instruments	or	Rohrback Instruments
P.O. Box 2546		11861 East Telegraph Road
Houston, TX 77001		Santa Fe Springs, CA 90670
Phone 713-926-7431		Phone 213-949-0123

The corrosion probes should be all metal tubular without glass to metal seals. Pigtails can be run to an accessible location for taking readings. Readings should be taken after any upset which could cause corrosion and at a regular interval in between to insure that the instrument is working and people know how to use it.

If weight loss coupons are used, I feel that four coupons should be placed on the end of a retractable (through a packing gland) probe so that one could be removed and replaced after any upset that could cause corrosion. Two of the coupons should be removed and replaced after 5 years of operation to determine the corrosion rate of the sphere.

The results of all corrosion monitoring should be retained as part of the pressure vessel file.

C. G. Arnold

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sh

CHLORINE I
LOUISIANA DIVISION

LIQUID CHLORINE INVENTORY CONTROL

PROCESS STORAGE :

T-54 - MAX. CAPACITY 5.2 MM lbs.
T-56 - MAX. CAPACITY 4.0 MM lbs.

EMERGENCY SUMP STORAGE (located below the storage area) - 9.0 MM lbs.

PROCESS STORAGE POLICY :

THE TOTAL AMOUNT OF LIQUID INVENTORY WILL BE CONTROLLED AT 3.5 MM lbs. (1.0 MM lbs. of liquid chlorine inventory is necessary to maintain the proper net positive suction head on the liquid chlorine pumps.) AT NO TIME WILL EITHER STORAGE SPHERE EXCEED A 80% LEVEL WITH THE TOTAL COMBINED INVENTORY NEVER EXCEEDING 7.0 MM lbs.

RAILROAD TANK CAR STORAGE :

CHLORINE TANK CAR CAPACITIES - 90, 85, & 55 TONS

RAILROAD TANK CAR STORAGE POLICY :

RAILROAD TANK CAR INVENTORY IS A FUNCTION OF THE QUANTITY OF BUSINESS THAT IS ORIGINATED FROM THE CHLORINE I PLANT. A MINIMUM NUMBER OF LOADED TANK CARS, AS INVENTORY, IS ALWAYS DESIRED. AT NO TIME WILL MORE THAN SEVENTY TANK CARS BE ALLOWED, AS INVENTORY, WITHOUT MAJOR MANAGER APPROVAL.

LIQUID CHLORINE INVENTORY GOAL

IT IS THE ON GOING GOAL OF CHLORINE I TO MINIMIZE THE TOTAL AMOUNT OF WORKING INVENTORY. THIS WILL BE ACCOMPLISHED BE CONTINUED IMPROVEMENTS IN PRODUCTION PLANNING AND ENGINEERING. THIS GOAL WILL BE ACCOMPLISHED WITHOUT COMPROMISING THE PLANT'S CUSTOMERS.

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DPM 7/29/87

DOW CHEMICAL U.S.A.

LOUISIANA DIVISION
P. O. BOX 150
PLAQUEMINE, LOUISIANA 70765-0150
504 389-8000

June 28, 1989

Steve Landers, B-2601
Joe Muller, B-2901

cc: J.G. Barksdale, B-3701
H.M. Bell, B-4701
J. Oldner, 2020 WHDC

HMTI-CEI AUDIT AT CHLORINE
June 21, 1989

COMMENTS AND SUGGESTIONS

CEI Review

1. A large spill from the sphere will drain into a collection sump capable of holding the entire contents of the sphere. Gas from the sump is evacuated to an undersized scrubber. Plans are to replace the scrubber.

2. Inspection internally on the sphere is no longer done. Damage done to it during inspection was greater than through normal use. External inspections are still done on a regular basis.

3. Maximum capacity is administratively held to 2 1/2 million pounds.

4. Procedures are in place to prevent titanium from contacting dry chlorine.

5. What is the Chlorine Tech Center's recommendation on the frequency of internal inspection of chlorine spheres.

6. Replacement of corroded bolts and the installation of bellows seal valves has been done on the chlorine distribution lines to improve their condition. This is now audited on a regular basis from C-9.

7. A decision still needs to be made to either eliminate the one inch nipples or install the overpressure PSV's.

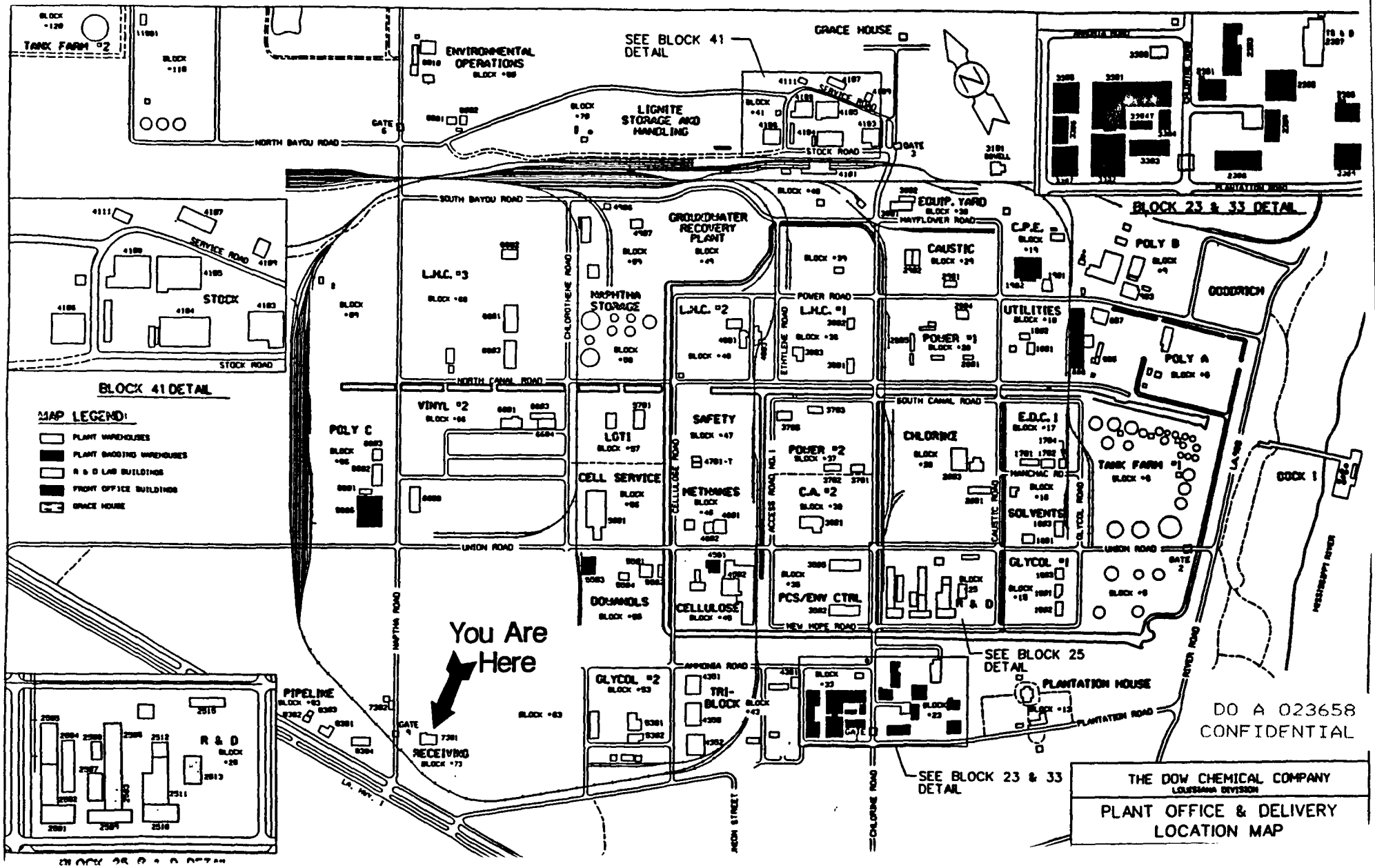
8. Recommend that the elec. tracing be investigated to see if it can cause an overtemperature problem.

9. Recommend that some method be found to test the EBV's on the

MAXIMUM LINE CONTENTS: 5100 LBS.

THEREFORE, ALL CHLORINE IN LINE CAN BE SPILLED IN 15 MINUTES.

CONCLUSION: 5100 LBS CHLORINE WILL BE MAXIMUM SPILL QUANTITY.


TANK FARM #2
ENVIRONMENTAL OPERATIONS
SEE BLOCK 41 DETAIL
GRACE HOUSE
LIGNITE STORAGE AND HANDLING
NORTH BAYOU ROAD
SOUTH BAYOU ROAD
STOCK ROAD
SERVICE ROAD
STOCK
BLOCK 41 DETAIL
MAP LEGEND:
PLANT WAREHOUSES
PLANT SHIPPING WAREHOUSES
R & D LAB BUILDINGS
FRONT OFFICE BUILDINGS
GRACE HOUSE
L.H.C. #3
GROUNDWATER RECOVERY PLANT
NAPHTHA STORAGE
L.H.C. #2
L.H.C. #1
EQUIP. YARD
HAYFLOWER ROAD
C.P.E.
CAUSTIC
POLY B
ODDRICH
BLOCK 23 & 33 DETAIL
POWER ROAD
POWER #1
UTILITIES
POLY A
POLY C
VINYL #2
LOTI
SAFETY
CELL SERVICE
METHANES
NORTH CANAL ROAD
SOUTH CANAL ROAD
CHLORINE
POWER #2
C.A. #2
E.D.C. I
TANK FARM #1
SOLVENTS
GLYCOL #1
DOWANOLS
CELLULOSE
PCS/ENV CTRL
R & D
NEW HOPE ROAD
UNION ROAD
You Are Here
GLYCOL #2
TRI-BLOCK
APPENSA ROAD
SEE BLOCK 25 DETAIL
PLANTATION HOUSE
PLANTATION ROAD
PIPELINE
RECEIVING
GATE 4
GATE 6
GATE 3
GATE 2
LA. HWY. 1
NAPHTHA ROAD
CELLULOSE ROAD
ACCESS ROAD NO. 1
ETHYLENE ROAD
CHLOROTHENE ROAD
CAUSTIC ROAD
GLYCOL ROAD
CHLORINE ROAD
AKOIN STREET
RIVER ROAD
DOCK 1
MISSISSIPPI RIVER
SEE BLOCK 23 & 33 DETAIL
R & D
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THE DOW CHEMICAL COMPANY
LOUISIANA DIVISION
PLANT OFFICE & DELIVERY
LOCATION MAP

ERP-1

***** DOW CONFIDENTIAL ****** DOW CONFIDENTIAL ****** DOW CONFIDENTIAL *****

CHEMICAL EXPOSURE INDEX

PLANT: CHLORINE I
LOCATION: LAD
CHEMICAL: CHLORINE

TOTAL QUANTITY IN PLANT: 7000000.00 lb
LARGEST SINGLE CONTAINMENT: 4200000.00 lb
STORAGE TEMPERATURE: -22.00 deg F
STORAGE PRESSURE: 180.00 psia
BOILING POINT: -30.00 deg F
FLASH POINT: 0.00 deg F
MOLECULAR WEIGHT: 70.90
~~ERPG~~ CONCENTRATION: 1.0 ppm
ERPG-1

EXPOSURE RISK POTENTIAL SUMMARY

ACUTE HEALTH HAZARD FACTOR: 4 (1.0 - 9.9)
VAPOR QUANTITY FACTOR: 3 (1,000 lbs - 10,000 lbs)
MOLECULAR WEIGHT FACTOR: 4 (> 45)
PROCESS PENALTIES: 2 (overpressure or run-away reaction potential)

DISTANCE	DISTANCE FACTOR	E.R.P. VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	288
TO DOW PLANTS	4 (< 1000 ft)	384
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	288

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 288

BIANNUAL REVIEW - SITE, SUPERINTENDENT AND MAJOR MANAGER

THE CHEMICAL EXPOSURE INDEX IS A SIMPLE, EMPIRICAL AND RELATIVE METHOD FOR RATING THE TOXIC HAZARDS OF CHEMICALS IN A QUANTITATIVE MANNER.
** FOR INTERNAL DOW USE ONLY **

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D. 'ERSION SUMMARY

TOTAL DISCHARGED =	5100.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	8.70 MIN	SOURCE DIAMETER =	0.00 FT
MOLECULAR WEIGHT =	70.90	EXIT VELOCITY =	0.00 FT/S
SOURCE TEMPERATURE =	-22.00 DEG F	PERCENT DILUTION =	0.00
EEPG CONCENTRATION =	1.0 ppm	AMBIENT TEMPERATURE =	86.00 DEG F

THE RELEASE IS A GAS RELEASE

THE RELEASE IS CONTINUOUS

THE RADII OF EXPOSURE ARE BASED ON PEAK CONCENTRATIONS

RADII OF EXPOSURE (miles)
@ ground level - @ plume centerline

CONC (ppm)	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
1.0	1.500	8.945	66.937
10.0	0.494	2.076	10.071
100.0	0.178	0.532	2.034

* APPROXIMATE % OF TIME IN THIS WEATHER CONDITION

UNSTABLE ATMOSPHERIC CONDITION - SLIGHT SOLAR RADIATION WITH LOW WIND SPEEDS (<10 mph) OR STRONG RADIATION WITH HIGH WIND SPEEDS (>10 mph).

NEUTRAL ATMOSPHERIC CONDITION - WELL MIXED ATMOSPHERE DUE TO MODERATE/STRONG WIND SPEEDS (>7 mph) AND SLIGHT/MODERATE SOLAR RADIATION. ANY OVERCAST CONDITION.

STABLE ATMOSPHERIC CONDITION - LOW WIND SPEEDS (<10 mph) AT NIGHT.

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CH. .CAL EXPOSURE INDEX

PLANT: CHLORINE I
LOCATION: LAD
CHEMICAL: HYDROCHLORIC ACID

TOTAL QUANTITY IN PLANT: 53000.00 lb
LARGEST SINGLE CONTAINMENT: 53000.00 lb
STORAGE TEMPERATURE: 86.00 deg F
STORAGE PRESSURE: 14.70 psia
BOILING POINT: 178.00 deg F
FLASH POINT: 0.00 deg F
MOLECULAR WEIGHT: 36.00
~~EERG~~ CONCENTRATION: 3.0 ppm
ERPG-1

EXPOSURE RISK POTENTIAL SUMMARY

ACUTE HEALTH HAZARD FACTOR: 3 (10 - 99)
VAPOR QUANTITY FACTOR: 2 (100 lbs - 999 lbs)
MOLECULAR WEIGHT FACTOR: 3 (34 - 45)
PROCESS PENALTIES: 1 (no process penalties)

DISTANCE	DISTANCE FACTOR	E.R.P. VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	54
TO DOW PLANTS	4 (< 1000 ft)	72
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	54

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 54

NO REVIEW - SUPERINTENDENT AND MAJOR MANAGER APPROVAL

THE CHEMICAL EXPOSURE INDEX IS A SIMPLE, EMPIRICAL AND RELATIVE METHOD FOR RATING THE TOXIC HAZARDS OF CHEMICALS IN A QUANTITATIVE MANNER.
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DOW

The Dow Chemical Company

Midland Michigan 48674

1803 BUILDING
August 27, 1991

LOUISIANA DIVISION		R. B. Speed	901	V. T. May	1803
L.D. Adcock	2306	R. L. Stevens	807	G. W. Olsen	1803
W. T. Austin	3701	M. J. Sticklen	8601	C. N. Park	1803
E. D. Crochet	3601	M. J. Torres Jr.	2601	L. W. Rampy	1803
M. Currier	2303	MIDLAND		J. Saunders	1803
K. L. Johnson	3601	G. G. Bond	1803	A. W. Schaffer	1803
G. D. Kusch	2303	R. R. Cook	1803	M. G. Swank	1803
G. L. Meier	3502-E	R. D. Egedahl	1803	OTHER	
J. J. Muller Jr.	2601	G. W. Engdahl	1803	J. S. Biggs	Torrence
A. L. Royals III	3502-W	R. H. Fike	1803	D. E. Crager	Freeport
M. D. Ryland	807	J. M. Lanham	1803	J. McKirdy	Hong Kong

CORRECTION TO INDUSTRIAL HYGIENE REPORT NUMBER LAD-IH-91.01 ENTITLED "CHLORINE EXPOSURES AND WORK HISTORIES FOR PARTICIPANTS IN THE 'PROSPECTIVE STUDY OF THE EFFECTS OF CHRONIC CHLORINE EXPOSURE IN MANUFACTURING ON RESPIRATORY HEALTH' ", FINAL REPORT

An error was detected in the compiling of the exposure files involving the length of time over which a sample was collected. A different more accurate measure of the time length was used and the tables corrected. Clarification of several footnotes was also made. These corrections involved Tables 1-4, Tables 11-28, and Table 33. The changes resulted in only minor alterations in exposure numbers, a slight increase in most cases, and should not alter any of the preliminary findings.

Please destroy the previous copy of the report and replace it with the current version (LAD-IH-91.01 (R)).

If you have any questions regarding the revisions, please call.

Bryce D. Landenberger
Senior Research Statistician
Health & Environmental Sciences
(517) 636-9005

DO A 023662
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Louisiana Division Industrial Hygiene Report
An Operating Unit of the Dow Chemical Company

Department	File Number	Date
Industrial Hygiene	LAD-IH-91.01 (R)	8-27-91

Title:

Chlorine Exposures and Work Histories for Participants in the "Prospective Study of the Effects of Chronic Chlorine Exposure in Manufacturing on Respiratory Health", Final Report

Authors Signatures

B. D. Landenberger 8-27-91 | J. S. Paul 8-27-91 | S. K. Norwood 8-27-91

Reviewer's Signature

R. M. A. Hahne 8-27-91

Summary/Recommendations

This final report summarizes the 1984-88 chlorine exposures and work histories for participants in The Dow Chemical Company-Tulane University collaborative chlorine study described in the protocol, "Prospective Study of the Effects of Chronic Chlorine Exposure in Manufacturing on Respiratory Health."

The exposure data collected during the study were subjectively compared for large changes that might preclude the combination of these data sets. No evidence was found to indicate that major differences existed. Thus, the data were combined into a single data set.

The exposure group data were transformed into three separate data sets based on the assumed effectiveness of respirators during use. These categories were: completely effective (100%), partially effective (90%), and ineffective (0%). Categorization in this manner allows for examination of the potential exposure as well as a better estimate of actual exposure. Transformation of the control group was not required since respirators were not used. The data were tabled as time weighted averages (TWA's) with thresholds used to segment the data into peak exposures. The maximum potential TWA exposures ranged from 0.01 ppm to 0.30 ppm across all job assignments (based on respirator usage being 90% effective).

Quality assurance procedures in the protocol were followed throughout the study. Laboratory validation studies indicated that field comparisons between the sulfamic acid collection method and the electrochemical chlorine monitors were not required after the first sampling cycle. It was also determined after the first cycle of data collection that no modifications in the original sampling strategy were required or useful. Thus, the same sampling scheme outlined in the original protocol was followed throughout the study.

Distribution

LOUISIANA DIVISION					
*L.D. Adcock	2306	*R. B. Speed	901	*V. T. May	1803
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		*J. M. Lanham	1803	*J. McKirdy	Hong Kong

*Cover sheet only

LOUISIANA DIVISION INDUSTRIAL HYGIENE REPORT
AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

CHLORINE 1 PLANT	LAD-CHLORINE 91.01	7/16/1991
Department	File Number	Date

Title: Evaluation of employees' exposure to noise, asbestos, chlorine, and lead and associated Industrial Hygiene Activities at the Louisiana Division Chlorine 1 Plant, Plaquemine, Louisiana during 1990.

Author's Signature 7/23/91

Author's Signature 7/23/91

Reviewer's Signature

SUMMARY:

During 1990, personal time weighted average (TWA) exposures to noise and chlorine were evaluated. Excursion or short term exposures to asbestos during specific tasks were evaluated and area monitoring for lead exposures during non-routine maintenance was performed. A sound level survey was conducted throughout the plant.

Employee exposures to asbestos during task related activities ranged from <0.01 to 0.09 fibers per cc of air. Task involving glove bag asbestos removal ranged between 0.01 to 0.09 fibers per cc of air and were potential exposures because personnel wore North 7700 half-face respirators equipped with high efficiency filters during the job. The job task of treating chlorine cells with wetted asbestos ranged from <0.01 to 0.04 fibers per cc of air. The job of treating cells is handled in a closed system. This data is well within the OSHA short term excursion limit of 1.0 fibers per cc of air for a 30 minute duration. All results were reported based on the limit of detection of 7 fibers/mm2.

(Continued on Page 2)

DISTRIBUTION:

Plaquemine:

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A. Schaffer	*	B-1803
M. Swank		B-1803

* Cover Sheets Only

Chlorine 1

EDUCATION and TRAINING

SUMMARY

Employees receive Hazard Communication (HazCom) Training in plant indoctrination and in annual HazCom meeting. The written Hazard Communication Manual is current and kept in the Industrial Hygiene Contact's office in B-2601. The manual is for everyone's use. Material Safety Data (MSD) Sheets are current and are kept in the Hazard Communication Manual.

STRENGTHS

Hazard Communication is emphasized through the HazCom Manual, the plant's indoctrination film, in the annual HazCom meeting and per job through the safe work permit.

OPPORTUNITIES for IMPROVEMENT

Improve indoctrination training for technical and clerical new hires.

Include review of CPAI for Indoctrination Training.

Train Dow and non-Dow personnel on the proper method to label containers.

Provide an efficient and effective method to communicate and document new health effects communications.

KGJ
07/91

RESPIRATORY PROTECTION PROGRAM

SUMMARY

Respirator program is current and addresses the elements contained in S & LP Standard S-206. The I.H. contact is responsible for implementing the program and performing training and fit testing. All personnel are required to carry a mouthbit, escape respirator. Respirators are inspected as part of the C-9 safety checklist and in accordance with the Chlorine Respirator Block Policy.

STRENGTHS

Respirators are inspected regularly.

Respiratory program is incorporated into In Plant Training(IPT).

All personnel required to use a SCBA must demonstrate proficiency on an annual basis.

OPPORTUNITIES for IMPROVEMENT

Enforce proper cleaning of mouthbit respirators as defined in the Block Respiratory Policy.

Continue pursuit and investigation of alternate methods to obtain sulfuric acid conditions other than a manual grab sample.

Complete respirator fit testing by end of 1992.

KGJ
07/91

VENTILATION PROGRAM

SUMMARY

Jobs such as lab chemical testing and cell operations sampling are provided with fume ventilation hoods. Vent hoods are inspected and tested annually for performance.

STRENGTHS

Ongoing testing/inspection/maintenance program for ventilation hoods.

Flow sensing devices are permanently installed on lab fume ventilation hoods.

The main laboratory hood has a cell effluent scrubber to neutralize chlorine.

OPPORTUNITIES for IMPROVEMENT

Evaluate the effectiveness of general shop ventilation during welding operations.

KGJ
07/91

HEARING CONSERVATION

SUMMARY

All Personnel are included in the hearing conservation program and are given annual audiograms. Also, periodic personal audio dosimeter monitoring is performed as well as an annual area noise survey. High noise warning signs are posted in appropriate areas.

STRENGTHS

Jobs with potential exposure to greater than 85 db(A) have been identified.

Audiograms are performed on every employee annually.

Have a written Block Hearing Conservation Program.

Annual training is given on LAD Hearing Conservation Program.

OPPORTUNITIES for IMPROVEMENT

Update Hearing Conservation Training to include the block program and hearing attenuation effectiveness.

Have Division noise expert perform octave band analysis of the plant and make recommendations for engineering improvements to reduce noise in areas above 90 decibels.

KGJ
07/91

Chlorine 1

PERSONAL PROTECTIVE EQUIPMENT

SUMMARY

Personal protective equipment is required by job procedure and by safe work multi permit. All PPE used is approved by the Division PPE committee.

STRENGTHS

Proper PPE is available and sufficient for all jobs.

Verification of dielectric effectiveness of rubber boots is required and documented before entrance into the cell area.

OPPORTUNITIES for IMPROVEMENT

Promote Contractors to train their own employees on proper use of PPE.

KGJ
07/91

DATA GENERATION and MONITORING

SUMMARY

The I.H. contact performs exposure monitoring for the block. All jobs of concern are monitored. Sampling devices are calibrated before and after each sample. There are 22 continuous Chlorine monitoring probes strategically located in the Chlorine Block.

STRENGTHS

An extensive database for potential chlorine exposure has been built through the Dow-Tulane Epidemiology Study.

Chlorine probes continually monitor the Chlorine Plant and display concentration readings along with the wind direction at the control board.

OPPORTUNITIES for IMPROVEMENT

Continue development of database for noise.

Continue hazard evaluation and develop monitoring strategy based upon the evaluation.

KGJ
07/91

ASBESTOS

SUMMARY

Chlorine's strategy for removal of asbestos is to use a non-asbestos replacement when the material is damaged or needs to be replaced. All asbestos work is handled by non-Dow employees who have received the required asbestos training. A program is currently in progress to eventually replace all asbestos gaskets with non-asbestos gaskets.

STRENGTHS

The Plant has an Asbestos Abatement Team that oversees the handling and containment of asbestos in the block.

An extensive survey of asbestos used in the Chlorine block has been completed and is documented.

The hazards of asbestos are communicated annually in the HazCom Training.

Asbestos gasket evaluation project has been started.

OPPORTUNITIES for IMPROVEMENT

Continue asbestos gasket evaluation project.

Investigate alternative asbestos gasket storage practices.

KGJ
07/91

RADIATION

SUMMARY

There are four sealed radiation sources located in the Chlorine Block. One source is an Ohmart level detector for the Chlorine Storage sphere (T-56). Another source is an Ohmart density device for Hydrochloric Acid. The last two sources are for Texas Nuclear lab analyzers. The required warning signs are posted and the Division Radiation Officer handles any removal of the sources when required.

STRENGTHS

Radiation sources are handled according to Division requirements and are wipe tested by the Division Radiation Officer regularly.

Proper postings are maintained.

OPPORTUNITIES for IMPROVEMENT

Include the effects of radiation as part of the Hazard Communication Training.

Remove the Ohmart from T-56 the next time the vessel is scheduled for a vessel inspection. This job is to be done with the planning and supervision of the Division Radiation Officer.

KGJ
07/91

Chlorine 1

GENERAL - INDUSTRIAL HYGIENE

SUMMARY

Asbestos is the only OSHA regulated chemical used in the block. It is only handled in a wet, closed system to do maintenance on chlorine cells. Accidental ingestion of chemicals due to lunch room location or washing practices has not been a problem. Dermatitis has not been a problem in the block.

STRENGTHS

Designated areas are used for storing food and eating lunch.

Washrooms are strategically located next to lunchrooms to promote proper hygiene before ingesting food.

OPPORTUNITIES for IMPROVEMENT

Encourage washing hands and face before eating and smoking by adherence to the Block Industrial Hygiene Policy.

KGJ
07/91

Chlorine 1

MEDICAL

SUMMARY

The block adheres to the Division Medical Department's requirements for medical surveillance and testing. Results of medical tests are communicated to employees in a timely manner.

STRENGTHS

Medical Department requirements for surveillance/testing are followed.

OPPORTUNITIES for IMPROVEMENT

KGJ
07/91

NON-DOW EMPLOYEES

SUMMARY

All non-Dow employees receive indoctrination training which includes required PPE, emergency response, and hazard communication. Hearing protection, gloves, respirators, monogoggles, and other PPE is supplied to the permanent in-block contractors. In-block contractors receive the same medical surveillance as Dow employees. Lunch room and change/shower facilities are provided for contractor use.

STRENGTHS

All non-Dow employees receive hazard communication training.

MSD sheets are available for use.

Non-Dow employees are included in I.H. monitoring program.

Results of monitoring data are communicated annually.

OPPORTUNITIES for IMPROVEMENT

Communicate and document monitoring results in a more timely manner.

KGJ
07/91