

**Louisiana Division
Consolidated Audit**

**Chemical Exposure
Index**

March 1991

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Guide for a

Chemical Exposure Index Audit



Dow U.S.A.

The Dow Chemical Company
P.O. Box 180
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**LOUISIANA DIVISION
MARCH, 1991**

TO: PLANT SUPERINTENDENT/DEPARTMENT HEAD

RE: CHEMICAL EXPOSURE INDEX AUDIT

The CEI Audit will be a part of the Louisiana Division Consolidated Audit Program. The audit will be the responsibility of the Superintendent/Department Head.

The purpose of this audit is to provide an in-depth review of our Louisiana Division plant facilities that produce or handle quantities of materials which could, if released, possibly cause injury to persons outside our fence lines. The audit will be reviewing the section(s) of the plant that have a Chemical Exposure Index (CEI) of 100 or greater.

You should start your preparations by reviewing the attached Chemical Exposure Index Guide and developing or updating the C.E.I.'s for your plant's various chemicals and potential loss of containment scenarios. You will need to complete and send a copy of the review package to the Audit Facilitator ten (10) calendar days prior to the audit.

A CEI Functional Audit Team, Major Manager and a Superintendent from another department is required for areas with a CEI of 100-300. In addition, a U.S. Area Loss Prevention Representative will be required for a CEI of 300 or greater. Also, a Corporate Representative will be required for a CEI above 400. A CEI of 100 requires a review by the Superintendent and Major Manager only.

NOTE: Prompt response to the CEI calculations is necessary. A 30 day pre-audit notification to the U.S. Area will be necessary for some areas. Contact Jim Gibson at Ext. 8163, for a U.S. Area Loss Prevention Representative required on C.E.I.'s of greater than 300. Jim should also be contacted for a Functional Audit Team if the CEI is 100 or greater.

Attached is a guide including instructions on what is needed to prepare for the audit and how the audit will be conducted. If there are any questions concerning the audit, please contact me.

Jim Gibson
CEI Functional Team Leader
Building 3305
Ext. 8163

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CHEMICAL EXPOSURE INDEX AUDIT

PURPOSE

To review potential release scenarios with a CEI greater than 100, or those that result in odor detection beyond the fence line.

The goal is to prevent these potential releases from occurring.

This goal can be accomplished by taking the following actions when possible. These actions are in priority order.

1. ELIMINATE THE POTENTIAL HAZARD WHERE POSSIBLE.
2. REDUCE THE POTENTIAL RELEASE.
 - a. Reduce the quantity of material.
 - b. Reduce the duration of the release.
 - c. Reduce the frequency of the release.
3. PROVIDE MITIGATION

Reduce the impact of the potential release.

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 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.

IV. HYPOTHETICAL EXERCISE (* Allow one hour)

Two members of the audit team will simultaneously conduct an exercise designed to evaluate the response to an emergency situation involving a major release of chemical X.

The production shift on duty the day of the audit will be given a written description of an emergency involving a major release of chemical X. The Superintendent and Safety Superintendent has previously developed an exercise based on an actual potential concern. The shift personnel will be given five minutes to develop a response to the situation (i.e., who would be notified, what actions would be taken in the field, etc.). Written materials may be utilized by the shift, i.e., operating discipline, checklists, etc. The production shift will then be asked to verbally describe their response to the audit team members.

V. INTERVIEW (* Allow one hour)

A member of the audit team will interview an operator in the plant. See the attached questions.

VI. WRAP UP (* Allow 30 minutes)

The CEI Functional Team Leader will prepare a written report to be sent to the Audit Facilitator to be included in the Consolidated Audit report to the plant.

If there are any questions on the audit procedures, please call Jim Gibson at Ext. 8163.

* Note: The documentation audit, hypothetical exercise, and interview will take place currently.

CHEMICAL EXPOSURE INDEX AUDIT

PERSONNEL INTERVIEW

Introduce yourself and explain purpose of the audit to the interviewee.

Emphasize to the interviewee that his/her information may be used in the feedback session at the end of the EOPC/CEI audit. However, names will be held in confidence.

NOTE: All questions are not applicable to all interviewees. These are only guidelines.

1. How long have you been a Dow employee and in which plants and areas have you worked?
2. Explain your current job function.
3. Is this plant a good place to work in relation to chemical exposures and their effect on the public in general, beyond the Dow fence line?
4. Do you feel that supervision is receptive to suggestions regarding emergency response practice? Do you feel that supervision takes issues related to the CAER program, emergency planning, etc., seriously? Can you give an example?
5. What type of emergency response training have you received? Do you understand the hazards and the appropriate emergency responses? Does the training program include procedures to respond to spills or releases in the environment that may affect the public at large?
6. Are you familiar with the Chemical Exposure Indices (CEI) of your plant's products and raw materials?
7. What procedure do you follow for emergencies such as gas releases, spills, fires, etc.?
8. When was the last time you were personally involved in a planned emergency drill in your plant for the release of gas or liquid of concern?
9. How are emergency response policies communicated?
10. What type of training have you received in the proper use of personnel protective equipment employed for combating spills, gas releases, and fires?
11. Do you feel that Dow overall is doing all that is necessary to prevent you, your neighboring plants, and the public from being exposed to chemicals that are handled in your plant?

CEINDEX - CHEMICAL EXPOSURE INDEX AND RADII OF EXPOSURE PROGRAM

1.0 INTRODUCTION

CEINDEX is a program to determine the Chemical Exposure Index and Radii of Exposure for possible chemical release incident. The output from this program is suitable documentation for CEI Audits.

The Chemical Exposure Index and Radii of Exposure are for internal Dow use only. The purpose of these calculations is to focus attention on the potential chemical release incidents of greatest concern. The review will provide the opportunity for recommendations, improvements and concurrences from the appropriate knowledgeable people.

CONTACTS	LOCATION	PHONE
EEPG Odor Threshold Numbers - Gary Meier	3502E	1809
CEINDEX Program - Jim Gibson	3305	8163
MIDAS Program - Delaine Rawlings	2301	8781

CHEMICAL EXPOSURE INDEX

The CEI formula takes into account the five most important factors which influence the magnitude of exposure from any potential release: toxicity, quantity, distance to area of concern, molecular weight and process variables (i.e., temperature, pressure, reactivity). For each potential release, the CEI is calculated for three areas of concern: 1) Public, 2) Other Dow facilities and 3) Other businesses. The CEI to the public is the basis for establishing both the frequency and depth of process review.

The Chemical Exposure Index is intended to be used as a simple tool for ranking potential toxic hazards in a comparable and quantitative manner.

RADII OF EXPOSURE

Simple atmospheric dispersion models are used to estimate the potential impact on the surrounding areas. The Radius of Exposure defines the maximum downwind distance which may be affected by the toxic release. There are two different values to be considered for each release. These are 1) the EEPG concentration (Emergency Exposure Planning Guidelines) and 2) the Odor Threshold. The Radii of Exposure are calculated for either of these values for three atmospheric conditions typical to the area. When EEPG concentrations are used, the program calculates the Radii of Exposure for concentrations equal to 1, 10 and 100 times the EEPG concentration. The program only calculates the Radii to the Odor Threshold when that value is used.

The Radii of Exposure for the neutral atmospheric conditions should be used to plot the 3 EEGP concentration circles required for the CEI Audit.

If the Radius of Exposure to the Odor Threshold or the EEGP concentration (1X) at neutral atmospheric conditions is greater than the distance to the public, then the scenario should be included in the CAER program (Midas System). The other radii of exposure can be used as a guide for estimating downwind impact of a particular release.

2.0 GENERAL INFORMATION

The CEINDEX program is user-friendly. The program can be run interactively, where the user is prompted for the required information or the program can be run from an input file. The user must specify keyboard entry or file entry at the beginning of the program. The program input and results are stored in the following files,

Input: Filename.dat
Output: Filename.lis

The program is set up to read and write either metric or british units. The user must specify the units desired at the beginning of the program. The default units for each piece of input data required is indicated at the end of each question, enclosed in parenthesis. The CEINDEX program can be accessed from any VAX within the Texas Division Cluster system. To run the program, type in the following line at the \$ prompt.

@1395\$ROOT:[DISP]CEINDEX

3.0 INPUT REQUIREMENTS

UNITS

Plant name	-
Plant location	-
Chemical name	-
Total quantity stored in plant	kg / lb
Largest single containment	kg / lb
Storage temperature	deg C / deg F
Storage Pressure	psia / atm
Boiling point temperature	deg C / deg F
Flash point temperature	deg C / deg F
Molecular weight	-
Concentration type (EEPG or Odor Threshold)	-
EEPG concentration	g/m ³ / ppm
Type of release (gas release or liquid spill)	-
Discharge quantity	g / lb
(Total amount discharged in 15 min.)	
Release duration	min
Source elevation	m / ft
Source diameter	m / ft
Release exit velocity	m/s / ft/s
(use if jet flow is to be considered)	
Spill area (if a liquid spill is considered)	m ² / ft ²
Acute health hazard factor	-
Distance to public	-
Distance to other Dow plants	-
Distance to other businesses	-
Process penalties	-

NOTES:

1) The discharge quantity is the amount that is released in 15 minutes regardless of the duration of the release. For example, if 1000 lbs. are released in 1 minute then the discharge quantity is 1000 lbs. If 4000 lbs. are released in one hour at a constant rate then the discharge quantity for 15 minutes is also 1000 lbs.

2) Release Duration - The program uses this time and the discharge quantity to determine a release rate. If the release lasts less than 15 minutes, input the actual minutes used to determine discharge quantity. If the release can last longer than 15 minutes, use the default value of 15 minutes NOT the actual release duration.

4.0 RESULTS

A summary of the Chemical Exposure Index calculation and the Radii of Exposure calculations will appear on the user's screen. The complete program results in a suitable documentation form will be stored in the output file specified (filename.lis). The file will contain the input data, a summary of the Chemical Exposure Index and a table of the Radii of Exposure for vapor concentrations 1, 10 and 100 times the EEPG concentration or for the Odor Threshold for the chemical released. The Radii of Exposure has been calculated for three different atmospheric conditions which typically occur in Texas Division.

PLEASE NOTE: The program has a maximum cutoff distance of 5 miles. If the predicted downwind distance exceeds 5 miles, the program will print out that the radii of exposure exceeds 5 miles and will include a message stating that: "The calculated distance exceeds the limits of dispersion model coefficients. Contact Process Engineering if the actual predicted distances are needed."

Remember: This is a simple, empirical rating system to be used for internal Dow use only.

5.0 EMERGENCY EXPOSURE PLANNING GUIDELINES (EEPG)

The Emergency Exposure Planning Guideline is the maximum airborne concentration of a material which can be tolerated by an individual for an hour, without incurring permanent health effects or symptoms which would interfere with their ability to take appropriate action. Current known EEPG concentrations are included in this manual in Section 15.0 and are also supplied with the CEI audit information. Documentation will be maintained by the H&ES Information Center.

6.0 ODOR THRESHOLD

The Odor Threshold is a value based on detection by odor. This value is important because it is the lowest concentration that can be smelled indicating a chemical release has occurred. Current known Odor Thresholds are included in this manual in Section 15.0 and are also supplied with the CEI audit information. Documentation will be maintained by the H&ES Information Center.

7.0 CHEMICAL EXPOSURE INDEX

The Chemical Exposure Index is the value obtained by multiplying the five risk factors described below. The factors are categorized into directly proportional scale numbers to maintain quick and simple calculations. Absolute measures of risk are not possible, but the CEI provides a means for ranking one potential hazard relative to another. The Chemical Exposure Index to the public determines the frequency and depth of review. Please note, for the CEI calculations, the non-linear or logarithmic functions normally associated with distance and the rate of dispersion are ignored. Absolute numbers are not the objective of the CEI.

8.0 ACUTE HEALTH HAZARD FACTOR

The Acute Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, the Industrial Hygiene department will issue toxicity data as Emergency Exposure Planning Guidelines (EEPG) in parts per million. The Health Hazard Factor may be determined by dividing the EEPG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25 deg C) divided by 760 mm Hg. For gases, the relative volatility is equal to 1.

9.0 PROCESS PENALTY FACTOR

The process penalty factor is based on process conditions which could generate large amounts of vapor in relatively short periods of time. The two largest driving forces are 1) pressure or overpressure (ie, liquids well above their boiling points or high pressure gasses) and 2) run-away reactions. Therefore, if either condition exists, a penalty is applied. If the pressure on the system is over 10 psig (1.75 atm absolute), use 2 for this factor. If the material is, or can become, thermally unstable below 100 deg C, or is reactive with common materials like air, water, or other possible contaminants, use 2 for this factor. If both factors apply, use 4. If neither apply use 1.

10.0 VAPOR QUANTITY FACTOR

The vapor quantity factor is based on the maximum weight of material which could be released as a gas, or could be vaporized during 15 minutes of the worst case situation. Please be sure to select the absolute worst form of pressure, temperature, mechanical or human failure, run-away reaction or contamination that is possible. Do not however, arbitrarily assume 100% of the contaminant will be released and vaporized in 15 minutes. Two factors to be considered when determining the vapor quantity factor are: 1) A credible scenario for a release and 2) The rate at which toxic material would be release in such a scenario. The scenario chosen should be a realistic worst case and not the absolute worst case that could conceivably happen.

Some "quick and easy" equations for determining the maximum discharge rate through a nozzle have been included in section 14.0. The vaporization rate of a liquid spill can be determined using the program EVAP, which is available on the cluster system. To obtain an instruction manual, type in the following command at the \$ prompt:

@1395\$ROOT:[DISP]EVAP_HELP.TXT

Other methods are included in the "Chemical Exposure Index" manual.

11.0 DISTANCE FACTOR

The distance factor is based on the distance between the point of release and

- 1) the public
- 2) other Dow plants
- 3) other businesses.

The public is officially defined as residences, collecting points of people (ie, schools, hotels, churches, shopping malls) or frequently used public roads.

12.0 MOLECULAR WEIGHT FACTOR

The molecular weight factor is based on the molecular weight of the chemical released. The molecular weight relates directly to the density of the vapor cloud which is inversely proportional to the rate of dispersion.

13.0 METEOROLOGICAL CONDITIONS

The meteorological conditions at the time of a toxic release will affect the transport and diffusion of the vapor cloud into the atmosphere. Atmospheric turbulence is the most common means for quantifying the meteorological conditions so that the affected area can be determined. Atmospheric turbulence can be divided into two groups, mechanical turbulence and convective turbulence. Mechanical turbulence is generated by fluctuations in wind direction and the motion of the air in response to surface roughness (ie, buildings, trees, etc.). A high wind speed with very little fluctuation in wind direction will tend to carry the release to a greater distance downwind and disperse it over a narrow crosswind distance. Fluctuations in wind direction tend to spread the release over a larger crosswind distance, thereby decreasing the concentration downwind. Likewise, surface roughness tends to spread the release over a larger volume of air, thereby decreasing the concentration downwind. Convective turbulence is caused by thermal effects ie, surface heating and cooling.

There are three main categories of atmospheric stability; unstable, neutral and stable. An atmosphere that is well mixed due to moderate to strong winds or one that is overcast, is considered to be 'neutral'. The thermal effects are negligible and the temperature decreases slightly with increasing height. When solar radiation causes the air near the surface of the earth to heat up and rise the atmosphere is considered to be 'unstable'. This condition is particularly common during periods of low wind speeds. As night falls, the cooling air near the surface of the earth tends to shrink and settle, again, especially at the lower wind speeds. There is very little turbulence in this case and this atmospheric condition is considered to be 'stable'. Texas Operations is in a 'neutral' condition approximately 49% of the time, in a stable condition approximately 29% of the time and in an unstable condition approximately 22% of the time.

14.0 MAXIMUM DISCHARGE RATE

A. LIQUID CALCULATIONS

ASSUMPTIONS:

VESSEL IS LIQUID FULL WITH THE BROKEN NOZZLE CLOSE TO THE BOTTOM.
PRESSURE REMAINS CONSTANT UNTIL TANK IS EMPTY.
NO FLASHING OCCURS UNTIL LIQUID IS OUTSIDE THE VESSEL.
MAXIMUM FLOW IS DETERMINED AND ASSUMED TO BE CONSTANT.

$$U_{max} = 0.7 \cdot (2 \cdot g \cdot dH)^{.5}$$

$$F_{max} = U_{max} \cdot A \cdot D$$

where, A = Cross-sectional area of hole, ft^2
 dH = Differential pressure in feet of head
(vessel pressure - atmospheric pressure)
 D = Density, lb/ft^3
 F_{max} = Maximum flowrate through the hole (lb/s)
 g = Gravitational constant, ft/s^2
 U_{max} = Maximum velocity, ft/s

NOTE: To determine the vaporization rate of liquid spills
See section 10.0

B. GAS CALCULATIONS

ASSUMPTIONS:

PRESSURE REMAINS CONSTANT UNTIL VESSEL/PIPELINE IS EMPTY.
MAXIMUM FLOW IS DETERMINED AND ASSUMED TO BE CONSTANT.

$$F_{max} = A \cdot (144 \cdot g \cdot k \cdot P_i \cdot D_i \cdot (2 / (k+1))^{(k+1/k-1)})^{.5}$$

$$U_{max} = 0.7 \cdot (2 \cdot g \cdot dH)^{.5}$$

where, A = Cross-sectional area of hole, ft^2
 dH = Differential pressure in feet of head
(initial pressure - atmospheric pressure) ##
 D_i = Initial density, lb/ft^3
 F_{max} = Maximum flowrate through the hole (lb/s)
 g = Gravitational constant, ft/s^2
 k = Constant, ratio of the specific heats (C_p/C_v)
(can assume 1.35 for most gasses)
 P_i = Initial pressure, lb/in^2
 U_{max} = Maximum velocity, ft/s

NOTE: If compressible fluid, and $0.5 \cdot (H \text{ upstream}) > (H \text{ downstream})$
then $dH = 0.5 \cdot (H \text{ upstream})$

EEPG AND ODOR THRESHOLD VALUES FOR THE CEI CALCULATION

EEPG VALUES

The following Emergency Exposure Planning Guidelines (EEPG) are based on the official EEPG values issued by the Corporate Occupational Health Board and the additional tentative EEPG values used in the Texas Operations' MIDAS system. These values are used for the Chemical Exposure Index (CEI) calculation. The CEI calculation can be performed with the CEINDEX computer program (described in another handout).

This EEPG list is believed to include the majority of the chemicals for which CEI calculations will be necessary. However, there are many materials which do not appear on the list. For chemicals without an EEPG, use the factor of 3 times the Dow Industrial Hygiene Guide (IHG) as the "EEPG" for the CEI calculation. IHGs consist of non-Dow sources of exposure limits such as the TLVs, PELs and WEELs as well as the Dow sources. The IHGs are listed on the Chemical and Physical Agent Inventory which is located in the plant Industrial Hygiene Manual. If an IHG is not available, contact the plant Industrial Hygienist or Tracy Parsons (x3784). The plant will need to provide a Material Safety Data Sheet when making a request for an IHG or EEPG.

Judgement should be used when deciding to do the CEI calculation; not all materials require a CEI calculation. For example, solids or materials with a very low vapor pressure and low toxicity concern do not need to be included in the plant CEI calculation.

ODOR THRESHOLD VALUES

The Odor Threshold for each of the chemicals is also provided on the attached list. This value is based on detection by odor or irritation whichever is lower. Like the EEPGs, the Odor Threshold values are primarily useful as planning tool. When the Odor Threshold values are used in place of the EEPG values in the CEINDEX computer program, they indicate the distance at which a plant release might be detected, especially by the public. This calculation is especially useful if the Odor Threshold is significantly lower than the EEPG value.



THE DOW CHEMICAL COMPANY

November 29, 1990

EMERGENCY PLANNING GUIDELINES: EEPGs AND ERPGs

Attached is a complete updated list of EEPGs and ERPGs. There have been many requests for these values for use in the Chemical Exposure Index (CEI) calculations being done globally for all chemicals at each Dow plant.

Since there are relatively few of these formally established values, we have been recommending the following approach.

1. Use an established EEPG/ERPG when available.
2. Use the CEI Health Hazard Scale Number shown on the enclosed list, when available.
3. Use the workplace exposure guideline (Dow IHG, ACGIH TLV or AIHA WEEL) as the basis for a tentative emergency planning guideline. If the chemical has a STEL or Ceiling value, use that. If it does not, use three times the TWA value.
4. If no workplace guideline exists, reconsider the need for an EEPG value or CEI calculation. Is there sufficient vapor pressure and volume for the chemical to be of concern as a potential accidental release to a neighboring community?
5. If none of the above options provides the needed information, contact me. I will try to suggest an appropriate Health Hazard Scale Number for the CEI calculation but will need to know the vapor pressure of the chemical.

Please distribute this information, as needed, within your area of responsibility. It is important that the various Dow locations use consistent emergency guideline values for the same chemicals. If you have questions about this recommended approach, let me know.

Marlene G. Swank
Health & Environmental Sciences
517/636-3976

Attachment

EMERGENCY PLANNING GUIDELINES: ERPGs AND EEPGs

<u>Chemical</u>	<u>ERPG-1</u>	<u>ERPG-2/EEPG*</u>	<u>ERPG-3</u>
Acetone cyanohydrin		10 ppm*	--
Acrolein	0.1 ppm	0.5 ppm	3 ppm
Acrylic acid	2 ppm	50 ppm	750 ppm
Acrylonitrile	--	20 ppm*	--
Allyl chloride**	300 ppm	40 ppm	3 ppm
Ammonia	25 ppm	200 ppm	1000 ppm
Bromine	0.3 ppm	1 ppm	4 ppm
Butadiene	10 ppm	50 ppm	5000 ppm
n-Butylisocyanate	--	0.2 ppm*	--
Carbon disulfide	1 ppm	50 ppm	1000 ppm
Carbon tetrachloride	--	100 ppm*	--
Chloracetyl chloride	0.1 ppm	1 ppm	20 ppm
Chlorine	1 ppm	3 ppm	20 ppm
Chloroform	--	100 ppm*	--
Chloropicrin	NA†	0.2 ppm	3 ppm
Chlorosulfonic acid	1 mg/m ³	5 mg/m ³	100 mg/m ³
Crotonaldehyde	2 ppm	10 ppm	50 ppm
Diketene	1 ppm	5 ppm	50 ppm
Dimethylamine	1 ppm	100 ppm	500 ppm
Epichlorohydrin	2 ppm	20 ppm	100 ppm
Ethyl chloride	--	5000 ppm*	--
Ethylene dichloride	--	100 ppm*	--
Ethylene oxide	--	50 ppm*	--
Formaldehyde	1 ppm	10 ppm	25 ppm
Hexachlorobutadiene	3 ppm	10 ppm	30 ppm
Hydrogen bromide	--	5 ppm*	--
Hydrogen chloride	3 ppm	20 ppm	100 ppm
Hydrogen cyanide**	NA	10 ppm	25 ppm
Hydrogen fluoride	5 ppm	20 ppm	50 ppm
Hydrogen sulfide	0.1 ppm	30 ppm	100 ppm
Isobutyronitrile	10 ppm	100 ppm	500 ppm
Methacrylonitrile	--	10 ppm*	--
Methyl iodide	25 ppm	50 ppm	125 ppm
Methyl mercaptan	0.005 ppm	25 ppm	100 ppm
Monomethylamine	10 ppm	100 ppm	500 ppm
Perfluoroisobutylene	NA	0.1 ppm	0.3 ppm
Phenol	10 ppm	50 ppm	200 ppm
Phosgene	NA	0.2 ppm	1 ppm
Phosphorus pentoxide	5 mg/m ³	25 mg/m ³	100 mg/m ³
Propylene oxide	--	500 ppm	--

SOME CHEMICAL EXPOSURE INDEX (CEI) HEALTH HAZARD SCALE
NUMBERS FOR CHEMICALS WITH NO EEPG/ERPG

<u>Chemical</u>	<u>Health Hazard Scale Number^a</u>
Acetic acid	1
Acrylamide	1
Allyl chloride	3
Benzene	2
Biphenyl	1
Butene	1
Butylene oxide	2
Chlorodifluoroethane (Isotron 142B)	1
Chloromethyl methyl ether	4
Chloroprene	2
Cyclohexane	1
Cyclohexanol	1
Cyclohexanone	1
DEPCT	1
Diaminopropane	1
Dichlorobutene	2
Dimethyl ether	2
Dimethyl sulfoxide	0
Dinoseb	1
1,4-Dioxane	1
Diphenyl oxide	1
DOWCO* 429	1
Ethyl acrylate	2
Ethyl chloroacetate	2
Ethylbenzene	1
Ethylenediamine	1
Gasoline	1
Hydroxyethyl acrylate	1
Isocyanatoethyl methacrylate	1
Isopropyl chloroformate	3
Isopropylamine	3
Methanol	1
Methyl chloride	3
Methyl chloroacetate	2
Methyl chloroform	1
Methyl methacrylate	1
Methylene chloride	1
Perchloroethylene	1

EMERGENCY RESPONSE PLANNING GUIDELINES

AMERICAN
INDUSTRIAL
HYGIENE
ASSOCIATION

The Emergency Response Planning Guideline (ERPG) values are intended to provide estimates of concentration ranges where one might reasonably anticipate observing adverse effects as described in the definitions for ERPG-1, ERPG-2, and ERPG-3 as a consequence of exposure to the specific substance.

The ERPG-1 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor.

The ERPG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.

The ERPG-3 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing or developing life-threatening health effects.

The committee recognizes (and all who make use of these values should remember) that human responses do not occur at precise exposure levels but can extend over a wide range of concentrations. The values derived for ERPGs should not be expected to protect everyone but should be applicable to most individuals in the general population. In all populations there are hypersensitive individuals who will show adverse responses at exposure concentrations far below levels where most individuals would normally respond. Furthermore, since these values have been derived as planning and emergency response guidelines, not as exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead, they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects. The estimates are based on the available data summarized in the documentation. In some cases where the data are limited, the uncertainty of these estimates is large. Users of the ERPG values are strongly encouraged to review carefully the documentation before applying these values.

In developing these ERPGs, human experience has been emphasized to the extent data are available. Since this type of information is rarely available, however, and, when available, usually is only for low level exposures, animal exposure data most frequently form the basis for these values. The most pertinent information is derived from acute inhalation toxicity studies that have included clinical observations and histopathology. The focus is on the highest levels not showing the effects described by the definitions of the ERPG levels. Next, data from repeat inhalation exposure studies with clinical observations and histopathology are considered. Following these in importance are the basic, typically acute, studies where mortality is the major focus. When inhalation toxicity data are either unavailable or limited, data from studies involving other routes of exposure will be considered. More value is given to the more rigorously conducted studies, and data from short-term studies are considered to be more useful in estimating possible effects from a single 1-hr exposure. Finally, if mechanistic or dose-response data are available, they are applied, on a case by case basis, as appropriate.

It is recognized that there is a range of times that one might consider for these guidelines; however, it was the committee's decision to focus its efforts on only one time period. This decision was based on the availability of toxicology information and a reasonable estimate for an exposure scenario. Users who may choose to extrapolate these values to other time periods are cautioned to review the documentation fully since such extrapolations tend to hold only over very limited time frames, if at all.

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16.0 SAMPLE CASE

A. EXAMPLE INPUT FILE FOR AN EEPG CONCENTRATION RUN

```

YOUR PLANT      !PLANT NAME
YOUR BLOCK      !PLANT LOCATION
CHLORINE        !CHEMICAL NAME
6000.000000     !TOTAL QUANTITY STORED IN PLANT
2000.000000     !LARGEST SINGLE CONTAINMENT
86.000000       !STORAGE TEMPERATURE
129.000000      !STORAGE PRESSURE
-29.290001      !BOILING POINT TEMPERATURE
0.000000        !FLASH POINT TEMPERATURE
71.000000       !CONTAMINANT MOLECULAR WEIGHT
3.000000        !EEPG CONCENTRATION
E               !E=EEPG, D=ODOR THRESHOLD
L               !G=GAS RELEASE, L=LIQUID SPILL
840.000000      !TOTAL DISCHARGE QUANTITY
15.000000       !RELEASE DURATION
0.000000        !SOURCE HEIGHT
200.000000      !SPILL AREA
5               !ACUTE HEALTH HAZARD FACTOR
3               !DISTANCE FACTOR - TO THE PUBLIC
4               !DISTANCE FACTOR - TO DOW PLANTS
3               !DISTANCE FACTOR - TO OTHER BUSINESSES
2               !PROCESS PENALTY

```

B. EXAMPLE INPUT FILE FOR AN ODOR THRESHOLD RUN

```

YOUR PLANT      !PLANT NAME
YOUR BLOCK      !PLANT LOCATION
CHLORINE        !CHEMICAL NAME
6000.000000     !TOTAL QUANTITY STORED IN PLANT
2000.000000     !LARGEST SINGLE CONTAINMENT
86.000000       !STORAGE TEMPERATURE
129.000000      !STORAGE PRESSURE
-29.290001      !BOILING POINT TEMPERATURE
0.000000        !FLASH POINT TEMPERATURE
71.000000       !CONTAMINANT MOLECULAR WEIGHT
1.000000        !ODOR THRESHOLD
D               !E=EEPG, D=ODOR THRESHOLD
L               !G=GAS RELEASE, L=LIQUID SPILL
840.000000      !TOTAL DISCHARGE QUANTITY
15.000000       !RELEASE DURATION
0.000000        !SOURCE HEIGHT
200.000000      !SPILL AREA
5               !ACUTE HEALTH HAZARD FACTOR
3               !DISTANCE FACTOR - TO THE PUBLIC
4               !DISTANCE FACTOR - TO DOW PLANTS
3               !DISTANCE FACTOR - TO OTHER BUSINESSES
2               !PROCESS PENALTY

```

C. EXAMPLE OUTPUT FILE FOR AN EEPG CONCENTRATION RUN

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

CHEMICAL EXPOSURE INDEX

DATE: 16-NOV-89

RELEASE SCENARIO: A RELEASE FROM A CHLORINE CYLINDER

PLANT: YOUR PLANT
LOCATION: YOUR BLOCK
CHEMICAL: CHLORINE

TOTAL QUANTITY IN PLANT: 6000.00 lb
LARGEST SINGLE CONTAINMENT: 2000.00 lb
STORAGE TEMPERATURE: 86.00 deg F
STORAGE PRESSURE: 129.00 psia
BOILING POINT: -29.29 deg F
FLASH POINT: 0.00 deg F
MOLECULAR WEIGHT: 71.00
EEPG CONCENTRATION: 3.0 ppm

CHEMICAL EXPOSURE INDEX SUMMARY

ACUTE HEALTH HAZARD FACTOR: 5 (0.0 - 0.99)
VAPOR QUANTITY FACTOR: 2 (100 lbs - 999 lbs)
MOLECULAR WEIGHT FACTOR: 4 (> .45)
PROCESS PENALTIES: 2 (overpressure or run-away reaction potential)

DISTANCE	DISTANCE FACTOR	CEI VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	240
TO DOW PLANTS	4 (< 1000 ft)	320
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	240

CHEMICAL EXPOSURE INDEX TO THE PUBLIC = 240

BIANNUAL REVIEW - SITE, SUPERINTENDENT AND MAJOR MANAGER

STHE 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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DISPERSION SUMMARY FOR EEPG CONCENTRATIONS

DATE: 16-NOV-89

RELEASE SCENARIO: A RELEASE FROM A CHLORINE CYLINDER

CHEMICAL = CHLORINE

PLANT = YOUR PLANT

TOTAL DISCHARGED = 840.00 LBS

SOURCE HEIGHT = 0.00 FT

RELEASE DURATION = 15.00 MIN

SPILL AREA = 200.00 SQ. FT

MOLECULAR WEIGHT = 71.00

SOURCE TEMPERATURE = -29.29 DEG F

EEPG CONCENTRATION = 3.0 ppm

AMBIENT TEMPERATURE = 86.00 DEG F

THE RELEASE IS A LIQUID SPILL

THE RELEASE IS CONTINUOUS

THE RADII OF EXPOSURE ARE BASED ON PEAK CONCENTRATIONS

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

EEPG (ppm)	UNSTABLE 12. mph	NEUTRAL** 12. mph	STABLE 6. mph
3.0	2194.	4300.	10180.
30.0	684.	1134.	2503.
300.0	251.	343.	685.

** THE NEUTRAL CONDITION IS TO BE PLOTTED FOR ALL AUDITS/REVIEWS

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 (>10 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 **

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D. EXAMPLE OUTPUT FILE FOR AN ODOR THRESHOLD RUN

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

DISPERSION SUMMARY FOR ODOR THRESHOLD

DATE: 16-NOV-89

RELEASE SCENARIO: A RELEASE FROM A CHLORINE CYLINDER

CHEMICAL = CHLORINE

PLANT = YOUR PLANT

TOTAL DISCHARGED = 840.00 LBS
RELEASE DURATION = 15.00 MIN
MOLECULAR WEIGHT = 71.00
ODOR THRESHOLD = 1.0000 ppm

SOURCE HEIGHT = 0.00 FT
SPILL AREA = 200.00 FT**2
SOURCE TEMPERATURE = -29.29 DEG F
AMBIENT TEMPERATURE = 86.00 DEG F

THE RELEASE IS A LIQUID SPILL

THE RELEASE IS CONTINUOUS

THE RADII OF EXPOSURE ARE BASED ON PEAK CONCENTRATIONS

ODOR THRESHOLD (ppm)	RADII OF EXPOSURE (feet) @ ground level - @ plume centerline		
	UNSTABLE 12. mph	NEUTRAL** 12. mph	STABLE 6. mph
1.0	3926.	8296.	20521.

** THE NEUTRAL CONDITION IS TO BE PLOTTED AND REVIEWED FOR THE CEI AUDIT
IF THE NEUTRAL RADIUS OF EXPOSURE EXCEEDS THE DOW FENCELINE.

THE USE OF ODOR THRESHOLDS IN THE DISPERSION MODEL PROVIDES DATA USEFUL
IN DETERMINING THE LIKELIHOOD OF OLFACTORY DETECTION IN DOWNWIND
FACILITIES AND IN THE COMMUNITY.

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

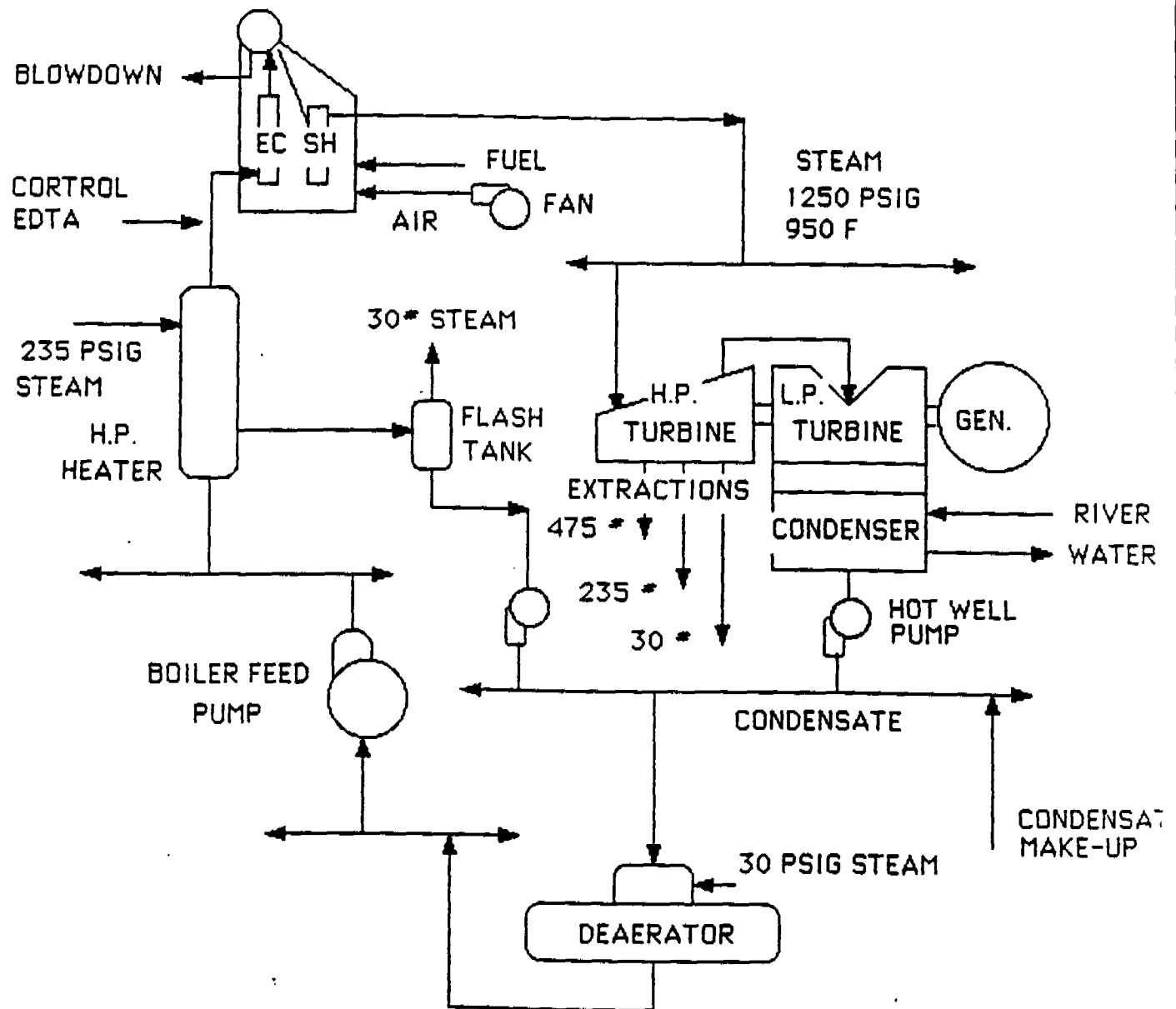
NEUTRAL ATMOSPHERIC CONDITION - WELL MIXED ATMOSPHERE DUE TO MODERATE/STRONG
WIND SPEEDS (>10 mph) AND SLIGHT/MODERATE
SOLAR RADIATION. ANY OVERCAST CONDITION.

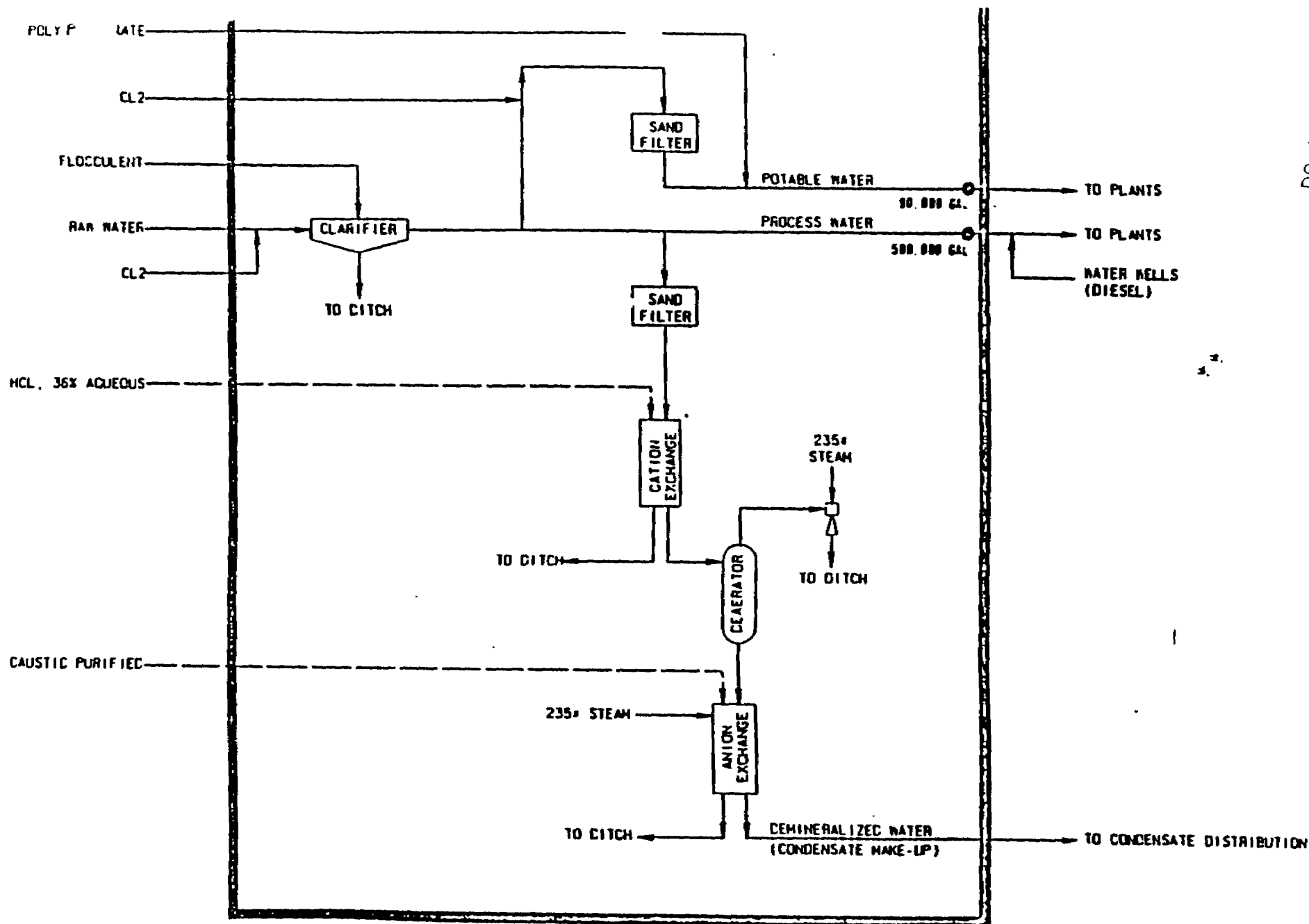
STABLE ATMOSPHERIC CONDITION - LOW WIND SPEEDS (<10 mph) AT NIGHT.

** FOR INTERNAL DOW USE ONLY **

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POWER ONE PROCESS CYCLE



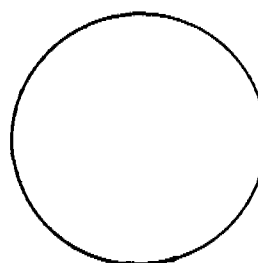
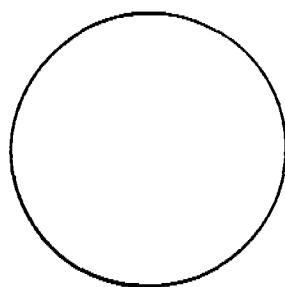


WATER TREATING

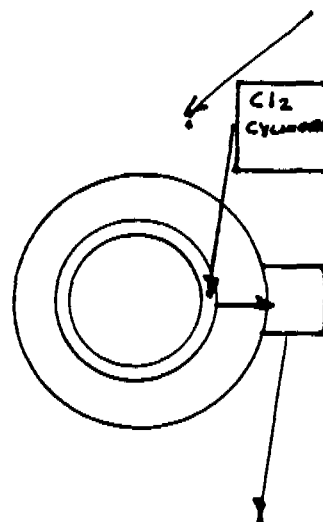
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ZMM
2/92

SEWER PLANT



PROPOSED
CL₂ MONITOR
TO BE INSTALLED
3/92

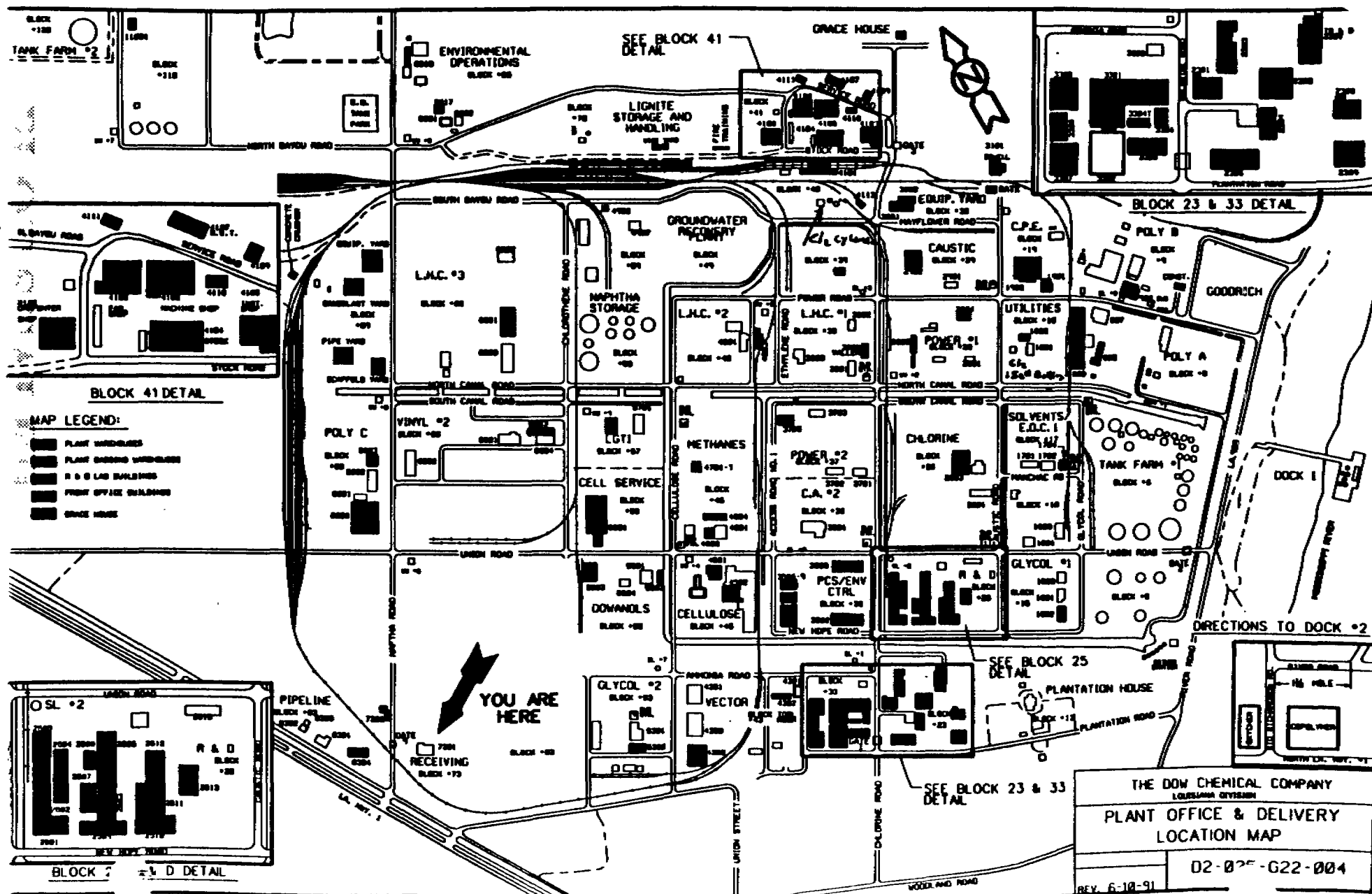


TO RETURN
CANAL

POWER 1/UTILITIES CHEMICAL LIST

CHEMICAL	CEI	AHH	TO	EEPG	EEPGX1	EEPGX10	EEPGX100	ERPG-1
Chlorine	288	4	1	3	1.762	0.46	0.137	3.441
HCl	81	3	3	25	0.662	0.181	0.616	2.37
Methane	18	1	0	1000	0.112	0.028	0	0
Hydrogen	0	1	0	1000	1.077	0.269	0.067	0

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)
 ERPG-1 = Radii of Exposure at 1 times Odor Threshold, (miles)



CHLORINE CHEMISTRY

DESIRED REACTION

Algacide and Disinfection of Water

UNDESIRE REACTIONS

$\text{Cl}_2 + \text{Organics} \rightarrow \text{Heat (Possible Fire OR Explosion)}$

Inadvertent Use of Reactive Lubricants and Solvents in Chlorine Service. Prevented by Training and Material Controller.

$\text{Cl}_2 + \text{Fe} + \text{Heat} \rightarrow \text{Fire}$

Chlorine system runs at ambient conditions. Heat tracing is self limiting to keep gas temperature at 90 degrees F.

ENM 2/92
CEICL2

PREVIOUS REVIEW STATUS

Listed Below are the Recommendations from the Previous CEI Audit Review. The Comments and Suggestions from the review along with the Plant's Responses are attached.

1. Utilize Division Chlorine for disinfection of potable water with 150# bottles for back up.

A One inch line was run and 150# bottles are employed for back up for disinfection of potable water.

2. Consider mounting pressure regulator on one ton cylinder if it is to continue supplying chlorine to the potable water filters.

On ton cylinders were discontinued to the potable water filters.

3. Find out about heat tracing.

Heat tracing is the self limiting kind with a maximum temperature off 200 F.

4. Check out analyzer shack.

Analyzer shack has been properly labeled. The chlorine monitor in the analyzer shack signal has been routed to alarm on the MOD.

5. Chlorine to block 35 is via pipeline. Consider upgrading block 35's chlorinator and supply system.

Chl rine monitors have been installed at block 35 both in the shack and around the chlorine piping. An EBV has been installed at block 35 which can be closed in block 18 if there are problems. Plans are in place to modify the chlorine piping going to block 35 to reduce the pressure to 20 psig from 140 to reduce the amount of chlorine that could be released.

6. Block 40 has chlorine cylinders - install signs indicating that chl rine is present.

A Sign has been installed.

CHEMICAL EXPOSURE INDEX

PLANT Utilities LOCATION Block 40
 CHEMICAL (One per Index) CHLORINE TOTAL QUANTITY IN PLANT 2000 lbs
 LARGEST SINGLE CONTAINMENT 2000 lbs TEMPERATURE OF CONTAINMENT AMBIENT
 PRESSURE OF CONTAINMENT 80 PSI G BOILING POINT -29 °F
 FLASH POINT, °C NONE MOLECULAR WEIGHT 70.9
 VAPOR PRESSURE 6650 mm Hg

EMERGENCY EXPOSURE PLANNING GUIDELINE (EEPG) CONCENTRATION,
 (Refer to CEI Pg. 6 & Tables I & II, Pgs. 10-11) 3.0

- I. Complete the Chemical Exposure Index Summary (on page 5)
 and show highest CEI to the Public _____

288

This CEI number determines the level of review needed:

- 0 to 100 Internal review — Superintendent and Major Manager review and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 Area Representative and the preceding group review every two years.
- Above 400 Corporate Representative and the preceding group review every two years.

- II. Complete Chemical Exposure Review Checklist (see page 7, CEI) prepare Review Package, and indicate date ready for further reviews.
 (Will be scheduled with Loss Prevention Contact) _____

- III. List any Sights, Odors, or Sounds which might come from your facility and cause public concern or inquiries (e.g., smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.)

Reviewed by:

Plant Superintendent or Manager: _____

Major or General Manager: _____

Site Review Representative: _____
 (If Public CEI is above 100)

Area Review Representative: _____
 (If Public CEI is above 300)

Corporate Review Representative: _____
 (If Public CEI is above 400)

Date

3/10/92

3-23-92

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):

$$\begin{array}{ccccccc}
 \boxed{\text{I.}} & \times & \boxed{\text{II.}} & \times & \boxed{\text{III.}} & \times & \boxed{\text{IV.}} & \times & \boxed{\text{V.}} & = & \boxed{\text{VI.}} \\
 \text{ACUTE} & & \text{VAPOR} & & \text{DISTANCE} & & \text{MOLECULAR} & & \text{PROCESS} & & \text{CHEMICAL} \\
 \text{HEALTH} & & \text{QUANTITY} & & \text{(RECIPROCAL)} & & \text{WEIGHT} & & \text{PENALTIES} & & \text{EXPOSURE} \\
 \text{HAZARD} & & \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{INDEX} \\
 \text{SCALE} & & \text{NO.} & & \text{NO.} & & \text{NO.} & & \text{NO.} & & \\
 \text{NO.} & & & & & & & & & &
 \end{array}$$

Identification of Containment Vessels being evaluated:

Name or Number (See Notes 2 & 3)

Source #1 CHLORINE 1 TEN CYLINDER BLOCK 40

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)
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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CHEMICAL EXPOSURE INDEX

PLANT: UTILITIES
LOCATION: LAD
CHEMICAL: CHLORINE

TOTAL QUANTITY IN PLANT: 2000.00 lb
LARGEST SINGLE CONTAINMENT: 2000.00 lb
STORAGE TEMPERATURE: 86.00 deg F
STORAGE PRESSURE: 80.00 psia
BOILING POINT: -29.18 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)
PI 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.
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DISPERSION SUMMARY

TOTAL DISCHARGED =	2000.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.16 FT
MOLECULAR WEIGHT =	70.90	EXIT VELOCITY =	621.04 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

CONC (ppm)	RADII OF EXPOSURE (miles) @ ground level - @ plume centerline		
	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
3.0	0.425	1.762	8.153
30.0	0.150	0.460	1.735
300.0	0.064	0.137	0.411

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.

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CHEMICAL EXPOSURE INDEX

PLANT: UTILITIES
LOCATION: LAD
CHEMICAL: CHLORINE

TOTAL QUANTITY IN PLANT: 2000.00 lb
LARGEST SINGLE CONTAINMENT: 2000.00 lb
STORAGE TEMPERATURE: 86.00 deg F
STORAGE PRESSURE: 80.00 psia
BOILING POINT: -29.18 deg F
FLASH POINT: 0.00 deg F
MOLECULAR WEIGHT: 70.90
EEPG CONCENTRATION: 1.0 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)
PF 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.
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DISPERSION SUMMARY

TOTAL DISCHARGED =	2000.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.16 FT
MOLECULAR WEIGHT =	70.90	EXIT VELOCITY =	621.04 FT/S
SOURCE TEMPERATURE =	86.00 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

CONC (ppm)	RADII OF EXPOSURE (miles) @ ground level - @ plume centerline		
	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
1.0	0.721	3.441	21.500
10.0	0.243	0.864	3.521
100.0	0.093	0.238	0.815

* 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 **

CHEMICAL EXPOSURE INDEX

PLANT Utilities LOCATION Block 18 4A0
CHEMICAL (One per Index) CHLORINE TOTAL QUANTITY IN PLANT 750 #
LARGEST SINGLE CONTAINMENT 150 # B0H1E TEMPERATURE OF CONTAINMENT AMBIENT
PRESSURE OF CONTAINMENT 80 psig BOILING POINT -29°F
FLASH POINT, °C NONE MOLECULAR WEIGHT 70.9
VAPOR PRESSURE 6650 mm Hg

EMERGENCY EXPOSURE PLANNING GUIDELINE (EEPG) CONCENTRATION,
(Refer to CEI Pg. 6 & Tables I & II, Pgs. 10-11) 3

- I. Complete the Chemical Exposure Index Summary (on page 5)
and show highest CEI to the Public 192

This CEI number determines the level of review needed:

- 0 to 100 Internal review — Superintendent and Major Manager review and sign every two years.
100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
300 to 400 Area Representative and the preceding group review every two years.
Above 400 Corporate Representative and the preceding group review every two years.

- II. Complete Chemical Exposure Review Checklist (see page 7, CEI) prepare Review Package, and indicate date ready for further reviews.
(Will be scheduled with Loss Prevention Contact) _____

- III. List any Sights, Odors, or Sounds which might come from your facility and cause public concern or inquiries (e.g., smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.)

Reviewed by:

Plant Superintendent or Manager: R. R. Joy

Major or General Manager: J. W. Masey

Site Review Representative: _____
(If Public CEI is above 100)

Area Review Representative: _____
(If Public CEI is above 300)

Corporate Review Representative: _____
(If Public CEI is above 400)

Date

3/10/92

3-23-93

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):

$$\begin{array}{ccccccccc}
 \boxed{\text{I.}} & \times & \boxed{\text{II.}} & \times & \boxed{\text{III.}} & \times & \boxed{\text{IV.}} & \times & \boxed{\text{V.}} & = & \boxed{\text{VI.}} \\
 \text{ACUTE} & & \text{VAPOR} & & \text{DISTANCE} & & \text{MOLECULAR} & & \text{PROCESS} & & \text{CHEMICAL} \\
 \text{HEALTH} & & \text{QUANTITY} & & \text{(RECIPROCAL)} & & \text{WEIGHT} & & \text{PENALTIES} & & \text{EXPOSURE} \\
 \text{HAZARD} & & \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{INDEX} \\
 \text{SCALE} & & \text{NO.} & & \text{NO.} & & \text{NO.} & & \text{NO.} & & \\
 \text{NO.} & & & & & & & & & &
 \end{array}$$

Identification of Containment Vessels being evaluated:

Name or Number (See Notes 2 & 3)

Source #1 1" CHLORINE LINE
25# RELEASED

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

Source #2 (if needed) 150 # B. H. L.

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

I.	II.	III.	IV.	V.	VI. (CEI)
4	1	3	4	2	96
4	1	4	4	2	128
4	1	3	4	2	96
4	2	3	4	2	192
4	2	4	4	2	256
4	2	3	4	2	192

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

PLANT: UTILITIES
LOCATION: LAD
CHEMICAL: CHLORINE

TOTAL QUANTITY IN PLANT: 750.00 lb
LARGEST SINGLE CONTAINMENT: 150.00 lb
STORAGE TEMPERATURE: 86.00 deg F
STORAGE PRESSURE: 6.80 psia
BOILING POINT: -29.18 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: 2 (100 lbs - 999 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)	192
TO DOW PLANTS	4 (< 1000 ft)	256
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	192

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 192

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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DISPERSION SUMMARY

TOTAL DISCHARGED =	150.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.16 FT
MOLECULAR WEIGHT =	70.90	EXIT VELOCITY =	46.58 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

CONC (ppm)	RADII OF EXPOSURE (miles) @ ground level - @ plume centerline		
	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
3.0	0.116	0.370	1.465
30.0	0.041	0.099	0.361
300.0	0.013	0.031	0.096

* 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.

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CHEMICAL EXPOSURE INDEX

PLANT Utilities LOCATION Block 18 LAD
 CHEMICAL (One per Index) Aqueous HCl TOTAL QUANTITY IN PLANT 38,700 lbs
 LARGEST SINGLE CONTAINMENT 38,700 lbs TEMPERATURE OF CONTAINMENT Ambient
 PRESSURE OF CONTAINMENT ATMOSPHERIC BOILING POINT 178 F
 FLASH POINT, °C NONE MOLECULAR WEIGHT 36

EMERGENCY EXPOSURE PLANNING GUIDELINE (EEPG) CONCENTRATION,
 (Refer to CEI Pg. 6 & Tables I & II, Pgs. 10-11) 25

- I. Complete the Chemical Exposure Index Summary (on page 5)
 and show highest CEI to the Public _____

81

This CEI number determines the level of review needed:

- 0 to 100 Internal review — Superintendent and Major Manager review and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 Area Representative and the preceding group review every two years.
- Above 400 Corporate Representative and the preceding group review every two years.

- II. Complete Chemical Exposure Review Checklist (see page 7, CEI) prepare Review Package, and indicate date ready for further reviews.
 (Will be scheduled with Loss Prevention Contact) _____

- III. List any Sights, Odors, or Sounds which might come from your facility and cause public concern or inquiries (e.g., smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.)
- _____
- _____
- _____

Reviewed by:

Plant Superintendent or Manager: _____

Major or General Manager: _____

Site Review Representative: _____
 (If Public CEI is above 100)

Area Review Representative: _____
 (If Public CEI is above 300)

Corporate Review Representative: _____
 (If Public CEI is above 400)

Date

3/10/92

3-23-93

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):

$$\begin{array}{ccccccccc}
 \boxed{\text{I.}} & \times & \boxed{\text{II.}} & \times & \boxed{\text{III.}} & \times & \boxed{\text{IV.}} & \times & \boxed{\text{V.}} & = & \boxed{\text{VI.}} \\
 \text{ACUTE} & & \text{VAPOR} & & \text{DISTANCE} & & \text{MOLECULAR} & & \text{PROCESS} & & \text{CHEMICAL} \\
 \text{HEALTH} & & \text{QUANTITY} & & \text{(RECIPROCAL)} & & \text{WEIGHT} & & \text{PENALTIES} & & \text{EXPOSURE} \\
 \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{INDEX} \\
 \text{NO.} & & \text{NO.} & & \text{NO.} & & \text{NO.} & & \text{NO.} & &
 \end{array}$$

Identification of Containment Vessels
being evaluated:

Name or Number (See Notes 2 & 3)

Source #1 Aqueous HCl From LINE

To (1) Public

(2) Other in-company Facility

(3) Non-company Plant or Business

Source #2 (if needed) HCl From TANK

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
3	3	3	3	1	81
3	3	4	3	1	108
3	3	3	3	1	81

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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EMICAL EXPOSURE INDEX

PLANT: UTILITIES
LOCATION: LAD
CHEMICAL: AQ. HCL

TOTAL QUANTITY IN PLANT: 38800.00 lb
LARGEST SINGLE CONTAINMENT: 38800.00 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
EEPG CONCENTRATION: 25.0 ppm

EXPOSURE RISK POTENTIAL SUMMARY

ACUTE HEALTH HAZARD FACTOR: 3 (10 - 99)
VAPOR QUANTITY FACTOR: 3 (1,000 lbs - 10,000 lbs)
MOLECULAR WEIGHT FACTOR: 3 (34 - 45)
PESS PENALTIES: 1 (no process penalties)

DISTANCE	DISTANCE FACTOR	E.R.P. VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	81
TO DOW PLANTS	4 (< 1000 ft)	108
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	81

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 81

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.
** FOR INTERNAL DOW USE ONLY **

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DISPERSION SUMMARY

TOTAL DISCHARGED =	1643.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.16 FT
MOLECULAR WEIGHT =	36.00	EXIT VELOCITY =	1004.78 FT/S
SOURCE TEMPERATURE =	86.00 DEG F	PERCENT DILUTION =	0.00
EEPG CONCENTRATION =	25.0 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

CONC (ppm)	RADII OF EXPOSURE (miles) @ ground level - @ plume centerline		
	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
25.0	0.207	0.662	2.646
250.0	0.086	0.181	0.616
2500.0	0.048	0.060	0.141

* 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.

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EMICAL EXPOSURE INDEX

PLANT: UTILITIES
LOCATION: LAD
CHEMICAL: AQ. HCL

TOTAL QUANTITY IN PLANT: 38800.00 lb
LARGEST SINGLE CONTAINMENT: 38800.00 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
EEPG CONCENTRATION: 3.0 ppm

EXPOSURE RISK POTENTIAL SUMMARY

ACUTE HEALTH HAZARD FACTOR: 3 (10 - 99)
VAPOR QUANTITY FACTOR: 3 (1,000 lbs - 10,000 lbs)
MOLECULAR WEIGHT FACTOR: 3 (34 - 45)
PF ESS PENALTIES: 1 (no process penalties)

DISTANCE	DISTANCE FACTOR	E.R.P. VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	81
TO DOW PLANTS	4 (< 1000 ft)	108
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	81

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 81

NO REVIEW - SUPERINTENDENT AND MAJOR MANAGER APPROVAL

THE CHEMICAL EXPOSURE INDEX IS A SIMPLE, EMPIRICAL AND RELATIVE METHOD
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DISPERSION SUMMARY

TOTAL DISCHARGED =	1655.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.16 FT
MOLECULAR WEIGHT =	36.00	EXIT VELOCITY =	1012.12 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

CONC (ppm)	RADII OF EXPOSURE (miles) @ ground level - @ plume centerline		
	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
3.0	0.543	2.357	12.023
30.0	0.192	0.598	2.363
300.0	0.081	0.165	0.552

* 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.

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EMICAL EXPOSURE INDEX

PLANT: UTILITIES
LOCATION: LAD
CHEMICAL: AQ. HCL

TOTAL QUANTITY IN PLANT: 38800.00 lb
LARGEST SINGLE CONTAINMENT: 38800.00 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
EEPG CONCENTRATION: 25.0 ppm

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
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DISPERSION SUMMARY

TOTAL DISCHARGED =	600.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.16 FT
MOLECULAR WEIGHT =	36.00	EXIT VELOCITY =	366.93 FT/S
SOURCE TEMPERATURE =	86.00 DEG F	PERCENT DILUTION =	0.00
EEPG CONCENTRATION =	25.0 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

CONC (ppm)	RADII OF EXPOSURE (miles) @ ground level - @ plume centerline		
	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
25.0	0.124	0.373	1.436
250.0	0.052	0.110	0.370
2500.0	0.025	0.045	0.114

* 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.

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CHEMICAL EXPOSURE INDEX

PLANT POWER 1 LOCATION BLOCK 28 LAO
CHEMICAL (One per Index) METHANE TOTAL QUANTITY IN PLANT _____
LARGEST SINGLE CONTAINMENT NONE TEMPERATURE OF CONTAINMENT AMBIENT
PRESSURE OF CONTAINMENT 70 PSIG BOILING POINT GAS
FLASH POINT, °C _____ MOLECULAR WEIGHT 16

EMERGENCY EXPOSURE PLANNING GUIDELINE (EEPG) CONCENTRATION, (Refer to CEI Pg. 6 & Tables I & II, Pgs. 10-11)

- I. Complete the Chemical Exposure Index Summary (on page 5)
and show highest CEI to the Public _____

18

This CEI number determines the level of review needed:

- 0 to 100 Internal review — Superintendent and Major Manager review and sign every two years.
100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
300 to 400 Area Representative and the preceding group review every two years.
Above 400 Corporate Representative and the preceding group review every two years.

- II. Complete Chemical Exposure Review Checklist (see page 7, CEI) prepare Review Package, and indicate
date ready for further reviews.
(Will be scheduled with Loss Prevention Contact) _____

- III. List any Sights, Odors, or Sounds which might come from your facility and cause public concern or in-
quiries (e.g., smoke, large relief valves, odors below hazardous levels such as mercaptans or amines,
etc.)

Reviewed by:

Plant Superintendent or Manager: _____

Major or General Manager: _____

Site Review Representative: _____
(If Public CEI is above 100)

Area Review Representative: _____
(If Public CEI is above 300)

Corporate Review Representative: _____
(If Public CEI is above 400)

Date

3/10/92

3-23-93

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):

$$\begin{array}{ccccccc}
 \boxed{\text{I.}} & \times & \boxed{\text{II.}} & \times & \boxed{\text{III.}} & \times & \boxed{\text{IV.}} & \times & \boxed{\text{V.}} & = & \boxed{\text{VI.}} \\
 \text{ACUTE} & & \text{VAPOR} & & \text{DISTANCE} & & \text{MOLECULAR} & & \text{PROCESS} & & \text{CHEMICAL} \\
 \text{HEALTH} & & \text{QUANTITY} & & \text{(RECIPROCAL)} & & \text{WEIGHT} & & \text{PENALTIES} & & \text{EXPOSURE} \\
 \text{HAZARD} & & \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{SCALE} & & \text{INDEX} \\
 \text{SCALE} & & \text{NO.} & & \text{NO.} & & \text{NO.} & & \text{NO.} & & \\
 \text{NO.} & & & & & & & & & &
 \end{array}$$

Identification of Containment Vessels being evaluated:

Name or Number (See Notes 2 & 3)

Source #1 METHANE - Block 28

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	3	3	1	2	18
1	3	4	1	2	24
1	3	3	1	2	18

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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EMICAL EXPOSURE INDEX

PLANT: POWER 1
LOCATION: LAD
CHEMICAL: METHANE

TOTAL QUANTITY IN PLANT: 0.00 lb
LARGEST SINGLE CONTAINMENT: 0.00 lb
STORAGE TEMPERATURE: 86.00 deg F
STORAGE PRESSURE: 70.00 psia
BOILING POINT: -161.00 deg F
FLASH POINT: 0.00 deg F
MOLECULAR WEIGHT: 16.00
EEPG CONCENTRATION: 1000.0 ppm

EXPOSURE RISK POTENTIAL SUMMARY

ACUTE HEALTH HAZARD FACTOR: 1 (1,000 - 100,000)
VAPOR QUANTITY FACTOR: 3 (1,000 lbs - 10,000 lbs)
MOLECULAR WEIGHT FACTOR: 1 (15 - 22)
PRESS PENALTIES: 2 (overpressure or run-away reaction potential)

DISTANCE	DISTANCE FACTOR	E.R.P. VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	18
TO DOW PLANTS	4 (< 1000 ft)	24
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	18

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 18

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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DISPERSION SUMMARY

TOTAL DISCHARGED =	1600.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.16 FT
MOLECULAR WEIGHT =	16.00	EXIT VELOCITY =	2201.59 FT/S
SOURCE TEMPERATURE =	86.00 DEG F	PERCENT DILUTION =	0.00
EEPG CONCENTRATION =	1000.0 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 %)*
1000.0	0.041	0.112	0.433
10000.0	0.010	0.028	0.105
100000.0	0.000	0.000	0.000

* 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.

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CHEMICAL EXPOSURE INDEX

PLANT Power 1 LOCATION Block 28 CAO
 CHEMICAL (One per Index) HYDROGEN TOTAL QUANTITY IN PLANT 53,000
 LARGEST SINGLE CONTAINMENT 8600 TEMPERATURE OF CONTAINMENT AMBIENT
 PRESSURE OF CONTAINMENT 1800 BOILING POINT -434
 FLASH POINT, °C 0 MOLECULAR WEIGHT 2

EMERGENCY EXPOSURE PLANNING GUIDELINE (EEPG) CONCENTRATION, (Refer to CEI Pg. 6 & Tables I & II, Pgs. 10-11)

- I. Complete the Chemical Exposure Index Summary (on page 5)
 and show highest CEI to the Public _____

0

This CEI number determines the level of review needed:

- 0 to 100 Internal review — Superintendent and Major Manager review and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 Area Representative and the preceding group review every two years.
- Above 400 Corporate Representative and the preceding group review every two years.

- II. Complete Chemical Exposure Review Checklist (see page 7, CEI) prepare Review Package, and indicate date ready for further reviews.
 (Will be scheduled with Loss Prevention Contact) _____
- III. List any Sights, Odors, or Sounds which might come from your facility and cause public concern or inquiries (e.g., smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.)
- _____
- _____
- _____

Reviewed by:

Plant Superintendent or Manager: K. R. Fox Date 3/10/92
 Major or General Manager: J. V. Mary 3-23-92
 Site Review Representative: _____
 (If Public CEI is above 100) _____
 Area Review Representative: _____
 (If Public CEI is above 300) _____
 Corporate Review Representative: _____
 (If Public CEI is above 400) _____

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):

$$\begin{array}{ccccccccc}
 \boxed{\text{I.}} & & \times & & \boxed{\text{II.}} & & \times & & \boxed{\text{III.}} & & \times & & \boxed{\text{IV.}} & & \times & & \boxed{\text{V.}} & & = & & \boxed{\text{VI.}} \\
 \text{ACUTE} & & & & \text{VAPOR} & & & & \text{DISTANCE} & & & & \text{MOLECULAR} & & & & \text{PROCESS} & & & & \text{CHEMICAL} \\
 \text{HEALTH} & & & & \text{QUANTITY} & & & & \text{(RECIPROCAL)} & & & & \text{WEIGHT} & & & & \text{PENALTIES} & & & & \text{EXPOSURE} \\
 \text{HAZARD} & & & & \text{SCALE} & & & & \text{SCALE} & & & & \text{SCALE} & & & & \text{SCALE} & & & & \text{INDEX} \\
 \text{SCALE} & & & & \text{NO.} & & & & \text{NO.} & & & & \text{NO.} & & & & \text{NO.} & & & & \\
 \text{NO.} &
 \end{array}$$

Identification of Containment Vessels
being evaluated:

Name or Number (See Notes 2 & 3)

Source #1 HYDROGEN - TRAILER

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	3	3	0	2	0
1	3	4	0	2	0
1	3	3	0	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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EMICAL EXPOSURE INDEX

PLANT: POWER 1
LOCATION: LAD
CHEMICAL: HYDROGEN

TOTAL QUANTITY IN PLANT: 53000.00 lb
LARGEST SINGLE CONTAINMENT: 8600.00 lb
STORAGE TEMPERATURE: 86.00 deg F
STORAGE PRESSURE: ***** psia
BOILING POINT: -434.00 deg F
FLASH POINT: 0.00 deg F
MOLECULAR WEIGHT: 2.00
EEPG CONCENTRATION: 1000.0 ppm

EXPOSURE RISK POTENTIAL SUMMARY

ACUTE HEALTH HAZARD FACTOR: 1 (1,000 - 100,000)
VAPOR QUANTITY FACTOR: 3 (1,000 lbs - 10,000 lbs)
MOLECULAR WEIGHT FACTOR: 0 (< 15)
PI ESS PENALTIES: 2 (overpressure or run-away reaction potential)

DISTANCE	DISTANCE FACTOR	E.R.P. VALUE
TO THE PUBLIC	3 (1000 ft - 5279 ft)	0
TO DOW PLANTS	4 (< 1000 ft)	0
TO OTHER BUSINESSES	3 (1000 ft - 5279 ft)	0

EXPOSURE RISK POTENTIAL TO THE PUBLIC = 0

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.
** FOR INTERNAL DOW USE ONLY **

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DISPERSION SUMMARY

TOTAL DISCHARGED =	8600.00 LBS	SOURCE HEIGHT =	0.00 FT
RELEASE DURATION =	15.00 MIN	SOURCE DIAMETER =	0.16 FT
MOLECULAR WEIGHT =	2.00	EXIT VELOCITY =	***** FT/S
SOURCE TEMPERATURE =	86.00 DEG F	PERCENT DILUTION =	0.00
EEPG CONCENTRATION =	1000.0 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

CONC (ppm)	RADII OF EXPOSURE (miles) @ ground level - @ plume centerline		
	UNSTABLE 12. mph (20 %)*	NEUTRAL 8. mph (40 %)*	STABLE 4. mph (40 %)*
1000.0	0.271	1.077	4.676
10000.0	0.085	0.269	1.068
100000.0	0.027	0.067	0.258

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 **

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RED TAG CHLORINE LINE
TO CHLORINATOR/CYLINDER AREA

- 1) BLOCK IN CHLORINE BLOCK TO POTABLE WATER AREA.
VALVE IS LOCATED IN THE AIR NE OF GRAVITY FILTERS.
- 2) ALLOW ENOUGH TIME FOR CHLORINATOR TO REMOVE REMAINING
CHLORINE FROM LINE. (VERIFY BY CHECKING FLOW AT
CHLORINATOR.)
- 3) BLOCK AND RED TAG BLOCK VALVE TO CHLORINATOR.
- 4) BLOCK AND RED TAG BLOCK VALVE TO CHLORINE CYLINDERS.
- 5) TAG OUT HEAT TRACING BREAKER IN MCC. (B4-3)
 - a) TURN SWITCH ON BREAKER FROM AUTO TO OFF.
 - b) TURN BREAKER HANDLE TO OFF POSITION.

REG TAGS - 1) CLORINE BLOCK VALVE (AIR)
2) BLOCK VALVE TO CHLORINATOR
3) BLOCK VALVE TO CHLORINE CYLINDERS
4) HEAT TRACING SWITCH (B4-3)
5) HEAT TRACING BREAKER (B4-3)

KP
3/10/89

DO A 121471
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SWAPPING CHLORINE FEED
FROM DIVISION SYSTEM TO BLOCK BOTTLES

- 1) BLOCK IN MAIN VALVE OVER-HEAD PIPE RACK AND
RED TAG.
(NORTH-EAST OF GRAVITY FILTERS USING A MANLIFT.)
- 2) ALLOW ENOUGH TIME FOR CHLORINATOR TO REMOVE
REMAINING CHLORINE FROM LINE. (VERIFY BY CHECKING
FLOW AT CHLORINATOR)
- 3) BLOCK IN AND RED TAG BLOCK VALVE TO CHLORINATOR.
- 4) OPEN BLOCK VALVE FROM CHLORINE BOTTLES TO CHLORINATOR.
- 5) OPEN FEED VALVE OF CHLORINE BOTTLE.

KP
2/28/89

DO A 121472
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Fire or Explosion Response

- A. Notification to Gate 1 Security personnel will be made by dialing 333. Phones will ring at Gate 1, Fire Station, Environmental Services, Medical, and Safety. The caller should give their name, location, a description of the emergency, and the assistance needed. The caller should stay on the line until all the necessary information is given to the departments answering the call. Only those departments that should respond to the scene of the emergency will talk to the caller.

Notification to Gate 1 can be made on the radio emergency frequency.

B. Action taken:

- 1) Security/Fire Protection - Gate 1 Security personnel will announce the emergency on the all area page, and the radio emergency frequency. Security and Fire Protection personnel will respond in accordance with their Department Emergency Plan.
- 2) Medical/Security Department - if there are injuries, the Medical Department will respond in accordance with their Department Emergency Plan. If the incident occurs after hours or on a weekend, the Security First Responder will respond.
- 3) Environmental Services/Industrial Hygiene - the person on call will respond according to their Department Emergency Plan, and assess any impact on the environment.
- 4) Site Emergency Manager - upon being notified by Gate 1 Security personnel, the SEM will decide what the proper response should be. For incidents that have high potential to or have already caused injury to personnel, damage to equipment, off-site impact and visibility, the SEM will activate the Emergency Operation Center, and instruct Security personnel to implement the necessary call lists to get people to the Emergency Operation Center to address the problem.
- 5) Operating Personnel - after notifying Security of the problem they will activate their Unit Emergency Plan, including:
 - a. Direct emergency responders to the incident location, and assisting in the response.

- b. Remove the sources of fuel from the fire if that is the correct approach.

Chemical Release, Spill or Leak

- A. Notification to Gate 1 Security personnel will be made by dialing 333. Phones will ring at Gate 1, Fire Station, Environmental Services, Medical, and Safety. The caller should give their name, location, a description of the release, including what is being emitted, and what category should be assigned to it. Only the Security person at Gate 1 will ask questions of the caller.

Notification to Gate 1 can be made on the radio emergency frequency.

B. Action taken:

- 1) Security/Fire Protection - Gate 1 Security personnel will activate "MIDAS", and input information received about the incident. At the same time the incident will be announced over the all area page and the radio emergency frequency. As soon as "MIDAS" has printed out the response scenario, the downwind areas along with the recommended actions will be announced on the all area page and the radio emergency frequency. Security and Fire Protection personnel will respond in accordance with their Department Emergency Plan.
- 2) Medical/Security Department - If there are injuries resulting from the release the Medical Department will respond in accordance with their Department Emergency Plan. If the incident occurs after hours or on a weekend, the Security First Responder will respond.
- 3) Environmental Services/Industrial Hygiene - The person on call will respond according to their Department Emergency Plan. The responder will determine both the size of and the concentrations in the release. This information will be given to the SEM as quickly as possible.
- 4) Site Emergency Manager - Upon being notified by Gate 1 Security personnel, the SEM will decide what the proper response should be. For releases that have high potential to or have already caused personnel to be exposed, damage to equipment, off site impact and visibility, the SEM will activate the Emergency

Operation Center, and instruct Security personnel to implement the necessary call lists to get people to the EOC to address the problem.

- 5) Operating Personnel - After notifying Security of the problem they will activate their Unit Emergency Plan, including:
 - a. Direct emergency responders to the incident location.
 - b. Take the necessary action to stop the release.

CHEMICAL EXPOSURE INDEX AUDIT
PRE-AUDIT QUESTIONNAIRE

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

When was the last CEI review? 1989

What chemicals were discussed and what were the CEI values?

Chemical

CEI

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

1. CHLORINE
2. _____
3. _____

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.

1. CHLORINE
2. _____
3. _____

YES **NO** **N/A**
 X

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

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.

1. CHLORINE, HCL
2. _____
3. _____

YES **NO** **N/A**
 X

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

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

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CHEMICAL EXPOSURE INDEX AUDIT

PRE-AUDIT QUESTIONNAIRE

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

When was the last CEI review? 1989

What chemicals were discussed and what were the CEI values?

Chemical	CEI
CHLORINE	288
HCL	81

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

1. CHLORINE
2. _____
3. _____

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.

1. CHLORINE
2. _____
3. _____

YES NO N/A
____ X ____

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

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.

1. CHLORINE
2. HCL
3. _____

YES NO N/A
____ X ____

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

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

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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

Yes No N/A

- X — — 1. Does the plant have checklists that are used to shut down and clear equipment/piping to insure that the contents are not left in the equipment, or accidentally released into the environment?

If the answer is yes:

- a. Please have documentation available for review at the audit.

If the answer is no:

- b. How is this function accomplished? _____

- c. What are the plant's plans for doing this in the future?

- X — — 2. Does the plant have checklists that are used for starting up out of service equipment/piping that insures that no raw material, process streams or product will be accidentally released into the environment?

If the answer is yes:

- a. Please give examples and documentation.

If the answer is no:

- b. How does the plant accomplish this function?

- c. What are the plant's plans for this in the future?

—
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Yes No N/A
X — —

3. Does the plant have procedures for the initial opening of lines and equipment?

If the answer is Yes:

a. Please have the documentation available for review at the audit.

— — X

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?

— — X

a. Do they include normal operations?

— — X

b. Do they include emergency operations?

c. Please have the documentation available for review at the audit.

If the answer is no:

c. What are the plant's plans for developing these procedures? _____

B. PLANT COMMUNICATIONS

X — —

5. Does the plant have an up-to-date emergency call list?

If the answer is no:

a. What are the plant's plans for developing one?

—
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6. Does the plant have written notification procedures for the following emergencies?

a. Gas Release

b. Spill

c. Fire

d. Emergency Response

e. Other _____

a. Please provide documentation at the audit for review.

f. Describe what the plant's plans are in this area?

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

If the answer is yes:

a. Please provide documentation at the audit for review.

8. Does the plant use an area monitoring system for toxic materials?

If the answer is yes:

a. How often are these monitors checked and calibrated?
ONCE PER MONTH.

b. Please have documentation available at the audit for review.

9. Are plant personnel trained to respond to the alarms from area monitors?

If the answer is yes:

a. What is the frequency of retraining? Once per year.

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Yes No N/A

No

N/A

 X

10.

If the answer is yes:

a. How is monitoring done?_____

b. Please provide the documentation at the audit for review.

X

11.

Does the plant have areas in the piping system that requires constant or repetitive repairs?

If the answer is yes:

a. Please describe what is being done to prevent recurrence.

X

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.

a. Be prepared to discuss this at the audit.

Abstract

X

13.

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

a. How is this done? _____

b. How frequently? _____

X

14.

Do the plant's toxic material distribution systems undergo pressure testing on a routine basis?

If the answer is yes:

a. How often?

b. Please provide documentation at the audit for review.

 X

15.

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

27

D. PLANT PIPING SYSTEMS HCL

Yes No N/A

— X —

10. Does the plant monitor corrosion in the piping systems of the facility?

If the answer is yes:

a. How is monitoring done? _____

b. Please provide the documentation at the audit for review.

— X —

11. Does the plant have areas in the piping system that requires constant or repetitive repairs?

If the answer is yes:

a. Please describe what is being done to prevent recurrence.

X — —

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.

a. Be prepared to discuss this at the audit.

— — N/A

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

a. How is this done? _____

b. How frequently? _____

X — —

14. Do the plant's toxic material distribution systems undergo pressure testing on a routine basis?

If the answer is yes:

a. How often? WHEN EVER REPAIRED.

b. Please provide documentation at the audit for review.

— — X

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

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E. PLANT MECHANICAL EQUIPMENT

- | Yes | No | N/A | |
|----------|----------|-----|--|
| <u>X</u> | — | — | 16. What kind of pumps does the plant use in toxic service?
<u>GOULDS FOR HCL ONLY. NO CHLORINE PUMPS.</u> |
| <u>X</u> | — | — | 17. Are these the kind of pump systems that will minimize leak potential? (i.e., tandem or dual seals, sealess pumps, etc.)

If not can they be? |
| — | <u>X</u> | — | 18. Does the plant have a preventive maintenance program in place for mechanical equipment?

If the answer is yes:

a. <u>Please have the documentation available for review at the audit.</u>

If the answer is no:

b. What are the plant's plans to develop one?
<u>The only pm done on the acid pumps are changing of oil which is already done on a routine basis. Developing a maintenance plan</u> |

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: |
| <u>X</u> | — | — | a. Plant operators/technicians? |
| <u>X</u> | — | — | b. Supervision? |
| <u>X</u> | — | — | c. Other affected employees? |
| <u>X</u> | — | — | d. Process Engineering (CEINDEX Program)? |
| <u>X</u> | — | — | e. Safety and Loss Prevention? |
| — | <u>X</u> | — | f. Environmental (data of MIDAS system)? |
| — | <u>X</u> | — | g. Adjacent plant supervision? Security |
| <u>X</u> | — | — | 20. Have your reviews included all possible scenarios that would be deemed "major releases", affecting the public beyond the Dow fence line? |

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Yes	No	N/A	
<u>X</u>	<u> </u>	<u> </u>	21. Does the plant conduct routine, periodic "what if" emergency drills on the release of toxic chemicals?
<u>X</u>	<u> </u>	<u> </u>	a. Is each shift involved?
<u>X</u>	<u> </u>	<u> </u>	b. Do supervisors participate?
			If yes, what level of supervision? <u>Everyone in the block participates.</u>
<u>X</u>	<u> </u>	<u> </u>	c. Is there a regular schedule for these exercises? Twice per year.
<u>X</u>	<u> </u>	<u> </u>	d. Is Industrial Security involved in these practice drills in any way?
			If yes, in what way? <u>They sometimes set them up and participate</u>
			e. How often are drills conducted? <u>Staff - Twice/year</u> <u>Shifts once per quarter</u>
			f. When was the last time your plant had a planned emergency drill involving the release of a toxic gas or liquid? <u>6-91 Staff; 12/91 for operations</u>
			g. What chemical was used in your last planned emergency drill? <u>Chlorine</u>
			h. Have you used different toxic or odorless chemicals in previous drills? <u>No, chlorine and HCl are the only two</u>
<u> </u>	<u> </u>	<u>X</u>	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.)
<u> </u>	<u> </u>	<u> </u>	23. How do you insure that "lessons to be learned" from incident investigations are passed on to all concerned personnel? <u>Lessons to be learned are passed on through new procedures.</u> <u>Procedures are passes around; operators sign them.</u>

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Yes	No	N/A		
<u>X</u>	<u>X</u>	—	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.) HCl - YES; CHLORINE - NO If the answer is <u>yes</u> :
—	—	<u>X</u>	a.	Does the plant periodically train operating personnel on these procedures and methods for mitigating liquid spills or gas releases from the facility? If <u>yes</u> , how often? <u>ANNUALLY FOR HCL</u> If <u>yes</u> , how is the training documented? <u>TRAINING SUPERVISOR</u> b. <u>Please provide at least one example for review at the audit.</u>
—	<u>X</u>	—	25.	Has the plant reviewed its emergency response personnel protective equipment inventory with Industrial Hygiene? (appropriateness, types, numbers, etc.)
<u>X</u>	—	—	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? If the answer is <u>yes</u> : a. Is it kept at strategic locations for ease of access in case of an emergency?
—	—	<u>X</u>	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) If the answer is <u>yes</u> : a. How often? _____ b. Who does it? _____ If the answer is <u>no</u> : c. Please discuss the plant's plans. _____ <u>SECURITY DOES THIS FOR POWER UTILITIES</u>

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Yes
X

No

N/A

- 28.

If the answer is yes:

- a.**

- b.

- 29.

- a.**

- b.

- C.

- d.**

- ## X

If the answer is yes:

- x**

- a.**

- x**

- b.

- X**

- c.

If yes, how often? SCBA'S Once Per Year: Resp. 2/year.

- x**

- d.**

If yes, how often? Annually

- X

- e.

If yes, how often? Annually

If the answer is no to #30:

Please describe what the plant does in the event of one of these emergencies, and future plans. _____

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ELECTRICAL 5PT. AUDIT

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