

CHEMICAL EXPOSURE INDEX SUMMARY



PLANT LHC II LOCATION Plaqu mine, La
 CHEMICAL Dimethyl Sulfide TOTAL QUANTITY IN PLANT 3420 lb
 LARGEST SINGLE CONTAINMENT 41025 lb
 PRESSURE OF CONTAIN 90 psig PERATURE OF CONTAINMENT 90 °F

1. Scenario Being Evalua Liquid Release - Pipe/Vessel/Hose : Hose To Off-load DM

2. Airborne Release Rate from Scenario - kg/sec
3153.62 lb/min

3. Chemical Exposure Index 90

4.	Concentration		Hazard Distance	
	mg/m3	PPM	meters	feet
ERPG-1/EEPG-1	-	0.5	-	32800
ERPG-2/EEPG-2	-	500	-	2946
ERPG-3/EEPG-3	-	2000	-	1473

5. Distances to:

	meters	feet
Public	-	2125
Other in-company facility	-	3750
Non-company plant or business	-	500

6. The CEI and the Hazard Distance establish the level of review needed as determin Process Risk Management Guidelines for Facilities and Distribution.

7. If further review is required, complete Containment and Mitigation Checklist (App and prepare Review Package.

8. List any sights, odors or sounds that might come from your facility and cause publ inquiries (e.g., smoke, large relief valves, odors below hazardous levels such as me etc.)

Prepared D. Rogers Date: 7/2/95
 Reviewed B. Bailey Date: 7/15/95

Date

Plant Superintendent or M N. Grissom _____
 Site Review Representative B. Bailey _____
 Additional Management Review _____
 (if required)

Form C-91720 (471-00099(Rev.9/93) - [CEI-2 System Ver-2.0 - 8/1/94]

DO A 031233
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Print Date: 7/7/95

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DO A 031234
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CHEMICAL EXPOSURE INDEX SUMMARY



PLANT LHC II LOCATION Plaquemine, La
 CHEMICAL Dimethyl Sulfide TOTAL QUANTITY IN PLANT 44460 lb
 LARGEST SINGLE CONTAINMENT 44460 lb
 PRESSURE OF CONTAIN 180 psig PERATURE OF CONTAINMENT 90 °F

1. Scenario Being Evalua Liquid Release - Pipe/Vessel/Hose : 3" Nozzle Ruptured O

2. Airborne Release Rate from Scenario - kg/sec
3402.78 lb/min

3. Chemical Exposure Index 93

4.	Concentration		Hazard Distance	
	mg/m3	PPM	meters	feet
ERPG-1/EEPG-1	-	0.5	-	32800
ERPG-2/EEPG-2	-	500	-	3060
ERPG-3/EEPG-3	-	2000	-	1530

5. Distances to:

	meters	feet
Public	-	2125
Other in-company facility	-	3750
Non-company plant or business	-	500

6. The CEI and the Hazard Distance establish the level of review needed as determin
 Process Risk Management Guidelines for Facilities and Distribution.

7. If further review is required, complete Containment and Mitigation Checklist (App
 and prepare Review Package.

8. List any sights, odors or sounds that might come from your facility and cause publ
 inquiries (e.g., smoke, large relief valves, odors below hazardous levels such as me
 etc.)

Prepared D. Rogers Date: 7/2/95
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Date

Plant Superintendent or M N. Grissom
 Site Review Representative B. Bailey
 Additional Management Review _____
 (if required)

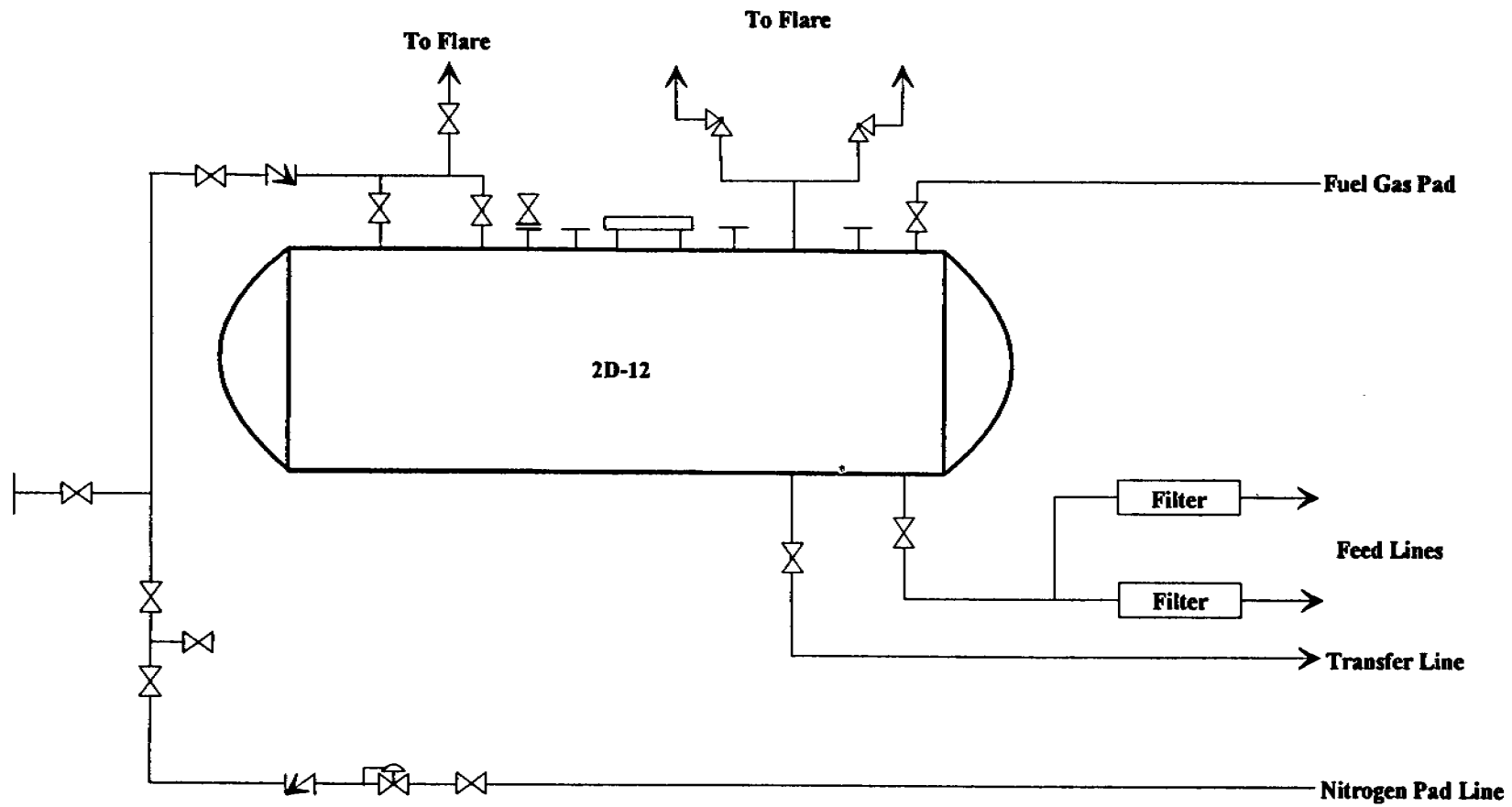
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Print Date: 7/7/95

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DO A 031236
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FIRE & EXPLOSION INDEX

Dow

AREA/COUNTRY	DIVISION	LOCATION	DATE
USA	Louisiana	Plaquemine	June 28, 1995
SITE	MANUFACTURING UNIT	PROCESS UNIT	
Louisiana Division	Light Hydrocarbon II	Charge Drums (2D-1 A/B/C)	
PREPARED BY:	APPROVED BY: (Superintendent)	BUILDING	
Holly Reed	?	B4801	
REVIEWED BY: (Management)	REVIEWED BY: (Technology Center)	REVIEWED BY: (Safety & Loss Prevention)	
?	?	?	
MATERIALS IN PROCESS UNIT			
Ethane, Propane			
STATE OF OPERATION		BASIC MATERIAL(S) FOR MATERIAL FACTOR	
☐ DESIGN ☐ START UP ☒ NORMAL OPERATION ☐ SHUTDOWN		Ethane	
MATERIAL FACTOR (See Table 1 or Appendices A or B) Note requirements when unit temperatures over 140 °F			21
1. General Process Hazards		Penalty Factor Range	Penalty Factor Used (1)
Base Factor		1.00	1.00
A. Exothermic Chemical Reactions		0.30 to 1.25	0.00
B. Endothermic Processes		0.20 to 0.40	0.00
C. Material Handling and Transfer		0.25 to 1.05	0.00
D. Enclosed or Indoor Process Units		0.25 to 0.90	0.00
E. Access		0.20 to 0.35	0.00
F. Drainage and Spill Control		45,750 gallons 0.25 to 0.50	0.50
General Process Hazards Factor (F1)			1.50
2. Special Process Hazards			
Base Factor		1.00	1.00
A. Toxic Material(s)		0.20 to 0.80	0.20
B. Sub-Atmospheric Pressure (< 500 mm Hg)		0.50	0.00
C. Operation in or Near Flammable Range ☐ INERTED ☒ NOT INERTED			
1. Tank Farms Storage Flammable Liquids		0.50	0.00
2. Process Upset or Purge Failure		0.30	0.00
3. Always in Flammable Range		0.80	0.00
D. Dust Explosion (See Table 3)		0.25 to 2.00	0.00
E. Pressure (See Figure 2)		Operating Pressure 120 psig Relief Setting 200 psig	0.31
F. Low Temperature		0.20 to 0.30	0.00
G. Quantity of Flammable/Unstable Material		Quantity 1,628 lb Hc = 20,400 BTU/lb	
1. Liquids or Gases in Process (See Figure 3)			0.01
2. Liquids or Gases in Storage (See Figure 4)			0.00
3. Combustible Solids in Storage, Dust in Process (See Figure 5)			0.00
H. Corrosion and Erosion		0.10 to 0.75	0.10
I. Leakage - Joints and Packing		0.10 to 1.50	0.00
J. Use of Fired Equipment (See Figure 6)			0.00
K. Hot Oil Heat Exchange System (See Table 5)		0.15 to 1.15	0.00
L. Rotating Equipment		0.50	0.00
Special Process Hazards Factor (F2)			1.62
Process Unit Hazards Factor (F1 x F2) = F3			2.43
Fire and Explosion Index (F3 x MF = F&EI)			51

(1) For no penalty use 0.00.

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LOSS CONTROL CREDIT FACTORS

1. Process Control Credit Factor (C1)

Feature	Credit Factor Range	Credit Factor Used (2)	Feature	Credit Factor Range	Credit Factor Used (2)
a. Emergency Power	0.98	0.98	f. Inert Gas	0.94 to 0.96	1.00
b. Cooling	0.97 to 0.99	1.00	g. Operating Instructions/Procedures	0.91 to 0.99	1.00
c. Explosion Control	0.84 to 0.88	1.00	h. Reactive Chemical Review	0.91 to 0.98	0.98
d. Emergency Shutdown	0.95 to 0.99	1.00	i. Other Process Hazard Analysis	0.91 to 0.98	0.98
e. Computer Control	0.93 to 0.99	1.00			

C1 Value (3) 0.941

2. Material Isolation Credit Factor (C2)

Feature	Credit Factor Range	Credit Factor Used (2)	Feature	Credit Factor Range	Credit Factor Used (2)
a. Remote Control Valves	0.96 to 0.98	1.00	c. Drainage	0.91 to 0.97	1.00
b. Dump/Blowdown	0.96 to 0.98	1.00	d. Interlock	0.98	1.00

C2 Value (3) 1.000

3. Fire Protection Credit Factor (C3)

Feature	Credit Factor Range	Credit Factor Used (2)	Feature	Credit Factor Range	Credit Factor Used (2)
a. Leak Detection	0.94 to 0.98	0.94	f. Water Curtains	0.97 to 0.98	1.00
b. Structural Steel	0.95 to 0.98	0.98	g. Foam	0.92 to 0.97	1.00
c. Fire Water Supply	0.94 to 0.97	0.94	h. Hand Extinguishers/Monitors	0.93 to 0.98	0.97
d. Special Systems	0.91	1.00	i. Cable Protection	0.94 to 0.98	1.00
e. Sprinkler Systems	0.74 to 0.97	0.97			

C3 Value (3) 0.815

Loss Control Credit Factor = C1 x C2 x C3 (3) = 0.767

PROCESS UNIT RISK ANALYSIS SUMMARY

1. Fire and Explosion Index (F&EI)	(See Front)	51	
2. Radius of Exposure	(Figure 7)	43	ft
3. Area of Exposure		5765	sq.ft.
4. Value of Area of Exposure (1994 Dollars).....			\$MM 18.74
5. Damage Factor	(Figure 8)	0.53	
6. Base Maximum Probable Property Damage - (Base MPPD) [4 x 5]			\$MM 9.97
7. Loss Control Credit Factor	(See Above)	0.77	
8. Actual Maximum Probable Property Damage - (Actual MPPD) [6 x 7]			\$MM 7.65
9. Maximum Probable Days Outage - (MPDO)	(Figure 9)	71	days
10. Business Interruption - (BI)			\$MM 49.40

(2) For no credit factor enter 1.00

(3) Product of all factors used

Refer to "Fire & Explosion Index Hazard Classification Guide" (Form #471-00001) for details

BACK OF FORM C-22380 Rev/01-94 (471-00038) - [FIE-7 System Ver-2.1 - 8/31/94]

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LOSS CONTROL CREDIT FACTORS - DATA AND COMMENTS

Process Control Credit Factor (C1)

- a) Emergency Power
Automatic switch to emergency power for CRITICAL SERVICES
Comme -
- b) Cooling
No credit (Factor=1.0)
Comme -
- c) Explosion Control
No credit (Factor=1.0)
Comme -
- d) Emergency Shutdown
No credit (Factor=1.0)
Comme -
- e) Computer Control
No credit (Factor=1.0)
Comme -
- f) Inert Gas
No credit (Factor=1.0)
Comme -
- g) Operating Instructions/Procedures
Comme -
- h) Reactive Chemical Review
Reactive Chemical reviews done only on an occasional basis
Comme -
- i) Other Process Hazard Analysis
Management of Change Review (Factor=0.98)
Comme -

Material Isolation Credit Factor (C2)

- a) Remote Control Valves
No credit (Factor=1.0)
Comme -
- b) Dump/Blowdown
No credit (Factor=1.0)
Comme -
- c) Drainage
No credit (Factor=1.0)
Comme -
- d) Interlock
No credit (Factor=1.0)
Comme -

Fire Protection Credit Factor (C3)

- a) Leak Detection
Gas detector alarms AND activates a protective system before
Comme -
- b) Structural Steel
A deluge water system protects the steel structure only
Comme -
- c) Fire Water Supply
Firefighting water can be supplied for 4 hours at 100 psig (7)
Comme -
- d) Special Systems
No credit (Factor=1.0)
Comme -
- e) Sprinkler Systems
Deluge system protects process (Factor=0.97)
Comme -
- f) Water Curtains
No credit (Factor=1.0)
Comme -
- g) Foam
No credit (Factor=1.0)
Comme -
- h) Hand Extinguishers/Monitors
The process is protected by monitor guns (Factor=0.97)
Comme -
- i) Cable Protection
No credit (Factor=1.0)
Comme -

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FIRE & EXPLOSION INDEX - DATA AND COMMENTS

Material Factor

Material Is From Database
Material Name - Ethane
Base Material Factor = 21
Adjusted Material Factor = 21
Heat of Combustion (BTU/lb) = 20400
Nh = 1
Nf = 4
Nr = 0
Flash Point (°F) = Gas
Boiling Point (°F) = -128
Process Unit Temperature (°F) = 200
Exotherm Temperature (°F) = 1000000
Autoignition Temperature (°F) = 682

Data For User Specified Material

General Process Hazards

- A. Exothermic Chemical Reactions
Process Unit NOT A REACTOR and/or NO EXOTHERM occurs (Penalty=0)
Comme 0
- B. Endothermic Processes
Process Unit NOT A REACTOR ==> Penalty=0
Comme 0
- C. Material Handling and Transfer
None of the following situations apply (Penalty=0)
Comme 0
- D. Enclosed or Indoor Process Units
Process is NOT ENCLOSED (Penalty=0)
Comme 0
- E. Access
Access determined adequate for emergency equipment (Penalty=0)
Comme 0
- F. Drainage and Spill Control
Flat, undiked area which allows spills to spread out (Penalty=0 50)
Comme 0

Special Process Hazards

- A. Toxic Material(s)
Equals two tenths of the Nh
Comme 0
- B. Sub-Atmospheric Pressure (< 500 mm Hg)
Greater than 500 mmHg (Penalty=0)
Comme 0
- C. Operation in or Near Flammable Range
Process will not reach the flammable range (Penalty=0)
Comme 0
- D. Dust Explosion
Process does not include dusts (Penalty=0)
Comme 0
- E. Pressure
Comme 0
- F. Low Temperature
Temperatures remain safely above the ductile/brittle
Comme 0
- G. Quantity of Flammable/Unstable Material
In Process
Comme 0
- H. Corrosion and Erosion
Corrosion rates below 0.5 mm/yr WITH risk of pitting and/or
Comme 0
- I. Leakage - Joints and Packing
Leakage of flammables/combustibles is insignificant
Comme 0
- J. Use of Fired Equipment
DOES NOT exist in the plant with the Process Unit
Comme 0
- K. Hot Oil Heat Exchange System
Process does not use a hot oil exchange system, or the hot oil
Comme 0
- L. Rotating Equipment
No rotating equipment deemed to be a hazard (No Penalty)
Comme 0