

I. R. : # 11

GLYCOL II

DO 138144
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PRODUCT	MODE OF SHIPMENT			
	T/C	T/T	BARGE	SHIP
ETHYLENE OXIDE	X			
ETHYLENE GLYCOL	X	X	X	X
DIETHYLENE GLYCOL	X	X	X	X
TRIETHYLENE GLYCOL	X	X		
TETRAETHYLENE GLYCOL	X	X		
DOW 1704 LTV (AIRCRAFT DEICER)	X*	X*		

RAW MATERIAL

PROPYLENE GLYCOL	X
DOWTHERM A	X
CHLORINE	X**
BETZ 5411	X
BETZ 38K	X
BETZ 40K	X

*Dansards
Vinyls*

* SHIPPED IN BULK TAINERS WHICH CAN BE THEN TRANSPORTED BY ANY MODE
 ** RECEIVED IN ONE-TON CYLINDERS

hmt1.txt

3-2-89

Alton,

This is everything 600 gal or more that is not also
 considered because of CEI, FIC, or SKIN effects.

Greg Baldwin

389-6328

DC 138145
 CONFIDENTIAL

resubmitted to
Bill Ledford
8/11/86
Greg Ballin

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
CHEMICAL (One per Index) ETHANE TOTAL QUANTITY IN PLANT 15 #
LARGEST SINGLE CONTAINMENT 15 # TEMP. OF CONTAINMENT 37C
PRESSURE OF CONTAINMENT 115 PSIG BOILING POINT -88.6 C
FLASH POINT, °C VIA MOLECULAR WEIGHT 30.069
EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

12

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
300 to 400 A Dow Area Representative and the preceeding group would review every year.
Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager:

Wayne A. Turner

8/11/86

Major or Gen. Manager:

[Signature]

8/11/86

Site Review Representative:
(If Public ERP is above 100)

Area Review Representative:
(If Public ERP is above 300)

Corporate Review Representative:
(If Public ERP is above 400)

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EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 [redacted]

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
1	1	3	2	2	12
1	1	3	2	2	12
1	1	3	2	2	12

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- ①
- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- ①
- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

E RELEASE

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- ③
- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- ②
- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

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- ②
- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) Ethylene Oxide TOTAL QUANTITY IN PLANT 1,500,000 #
 LARGEST SINGLE CONTAINMENT 330,000 # TEMP. OF CONTAINMENT 25C
 PRESSURE OF CONTAINMENT 60 PSIG BOILING POINT 50.9 F
 FLASH POINT, °C -56 C MOLECULAR WEIGHT 44.05
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

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This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: Wayne C. Turner

8/11/86

Major or Gen. Manager: A. R. [Signature]

8/11/86

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

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

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

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

$$\begin{array}{cccccc}
 \boxed{\text{I.}} & \times & \boxed{\text{II.}} & \times & \boxed{\text{III.}} & \times & \boxed{\text{IV.}} & \times & \boxed{\text{V.}} & = & \boxed{\text{VI.}} \\
 \text{ACUTE} & & \text{VAPOR} & & \text{DISTANCE} & & \text{MOLECULAR} & & \text{PROCESS} & & \text{EXPOSURE} \\
 \text{HEALTH} & & \text{QUANTITY} & & & & \text{WEIGHT} & & \text{PENALTIES} & & \text{RISK} \\
 \text{HAZARD} & & & & & & & & & & \text{POTENTIAL}
 \end{array}$$

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 7-1001-21-3-1

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) 7

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI.(ERP)
3	4	3	3	2	216
3	4	3	3	2	216
3	4	3	3	2	216
3	4	3	3	2	

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- EEG: 3

③

2 = 100 - 999 Health Hazard Fac.

1 = 1000 = 100,000

0 = >100,000

- WILLIAM GIBB
FOR NEW YORK



1 = 10 - 99 lbs.

0 = < 10 lbs.

- (3)

4 = < 1000 ft.

3 = 1000 - 5280 ft.

2 - 1 mile - 5 miles

1 = 5 miles - 15 miles

0 - > 15 miles

- ③

4 = > 45 molecular weight

3 - 34 - 45

2 - 23 - 33

1 - 15 - 22

0. = < 15

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- ②

CONTAINMENT AND COMPLETION CHECKLIST

This checklist will assist the Review Committees in evaluating Credit Factors for the good things done to Prevent, Detect, or Control "Loss of Containment". Please "check" those that are complete, operational, or in compliance with known Dow rules, guidelines, or requirements. Please be prepared to cover these and any other specific safeguards designed to reduce the related risk. Any item that cannot be checked should be marked with the percentage of completion. Mark N.A. if not applicable.

<u>Complete</u>	<u>Risk Reducing Credits</u>
<u>100</u>	1. All pressure vessel and relief device systems properly registered and inspections up to date. (No expansion joints or glass devices).
<u>100</u>	2. Adequate Emergency Block Valves in place, remotely or automatically operated, and regularly tested.
<u>100</u>	3. All operational controls and systems designed and routinely tested to "fail-safe".
<u>100</u>	4. Critical Instrument Program up to date (e.g. redundant high level and temp. alarms, shut-downs, etc.)
<u>100</u>	5. Operating Discipline complete and up to date.
<u>100</u>	6. Vapor Detectors properly placed and tested regularly.
<u>100</u>	7. Appropriate Engineering Specifications properly applied (e.g. lethal service, welded fittings, etc.)
<u>100</u>	8. Are relief vents on toxic containers designed to minimize atmospheric emissions? (e.g. Scrubber, Flare, or
<u>100</u>	9. Failure analysis and non-destructive testing carried out where needed. (e.g. X-Ray, vibration analysis or monitoring, acoustical emission, piping flexibility analysis -hot and cold.)
<u>100</u>	10. Physical barriers in place (for traffic, cranes, etc.).
<u>100</u>	11. Over-designed for excess pressure, if needed (e.g. - pipelines in certain areas, tank cars, trucks, etc.).
<u>100</u>	12. All personnel properly trained to understand hazards and emergency responses.
<u>100</u>	13. Emergency Procedures (relating to this exposure potential) in place and annual drill held.
<u>100</u>	14. Safety Rules and Safety Standards regularly reviewed and enforced.
<u>100</u>	15. Loss Prevention Principles and Minimum Requirements appropriately applied.
<u>100</u>	16. Tech Center Guidelines appropriately incorporated.
<u>100</u>	17. Reactive Chemical Review within 2 years.
<u>100</u>	18. Loss Prevention Audit within 2 years.
<u>100</u>	19. Tech Center Audit within 2 years.
<u>100</u>	20. All new operations and modifications underwent safety pre-startup audit.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) CHLORINE TOTAL QUANTITY IN PLANT 16,000 lb
 LARGEST SINGLE CONTAINMENT 2000 lbs TEMP. OF CONTAINMENT AMBIENT (20C)
 PRESSURE OF CONTAINMENT 98.3 PSIA BOILING POINT (-33.99 C)
 FLASH POINT, °C N/A MOLECULAR WEIGHT 70.906
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: 3

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

192

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Reviewed by:

Date

Plant Supt. or Manager:

Wayne C. Turner

8/11/86

Major or Gen. Manager:

[Signature]

8/11/86

Site Review Representative:
 (If Public ERP is above 100)

Area Review Representative:
 (If Public ERP is above 300)

Corporate Review Representative:
 (If Public ERP is above 400)

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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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2

DEFINITIONS OF SCALE NUMBERS

- EEG: 4

0 = >100,000

- 2
D.L. PUE
LDRS

0 = < 10 lbs.

- (3)

0 = > 15 miles

- 4

$$0 \leq 15$$

②

Cl₂

S.I. MS
6-9-86

$$W = 1891 Y d^2 \sqrt{\frac{\Delta P}{K \bar{V}_1}}$$



ASSUME

1/4"

x 3

$$K = 1.2$$

$$d = 1/4" (0.25")$$

$$\Delta P = \frac{98.3 - 14.7}{98.3}$$

$$Y = 0.612$$

$$LP = 83.6$$

$$= 0.85$$

$$\bar{V}_1 = 0.2245 \text{ } \frac{\text{ft}}{\text{sec}}$$

FOR SONIC $\Rightarrow$

$$K = 1.2$$

$$\frac{LP}{\bar{V}_1} = 0.525$$

$$Y = 0.612$$

$$W = (1891)(0.612)(0.25)^2 \sqrt{\frac{83.6}{(1.2)(0.2245)}}$$

$$= 1274 \text{ } \frac{\text{#}}{\text{HR}}$$

$$= 318.5 \text{ } \frac{\text{#}}{15 \text{ MIN}}$$

CONTAINMENT AND COMPLIANCE CHECKLIST

This checklist will assist the Review Committees in evaluating Credit Factors for the good things done to Prevent, Detect, or Control "Loss of Containment". Please "check" those that are complete, operational, or in compliance with known Dow rules, guidelines, or requirements. Please be prepared to cover these and any other specific safeguards designed to reduce the related risk. Any item that cannot be checked should be marked with the percentage of completion. Mark N.A. if not applicable.

<u>Complete</u>	<u>Risk Reducing Credits</u>
<u>100</u>	1. All pressure vessel and relief device systems properly registered and inspections up to date. (No expansion joints or glass devices).
<u>100</u>	2. Adequate Emergency Block Valves in place, remotely or automatically operated, and regularly tested.
<u>100</u>	3. All operational controls and systems designed and routinely tested to "fail-safe".
<u>100</u>	4. Critical Instrument Program up to date (e.g. redundant high level and temp. alarms, shut-downs, etc.)
<u>100</u>	5. Operating Discipline complete and up to date.
<u>100</u>	6. Vapor Detectors properly placed and tested regularly.
<u>100</u>	7. Appropriate Engineering Specifications properly applied (e.g. lethal service, welded fittings, etc.)
<u>100</u>	8. Are relief vents on toxic containers designed to minimize atmospheric emissions? (e.g. Scrubber, Flare, or <u> </u>)
<u>100</u>	9. Failure analysis and non-destructive testing carried out where needed. (e.g. X-Ray, vibration analysis or monitoring, acoustical emission, piping flexibility analysis -hot and cold.)
<u>100</u>	10. Physical barriers in place (for traffic, cranes, etc.).
<u>100</u>	11. Over-designed for excess pressure, if needed (e.g. - pipelines in certain areas, tank cars, trucks, etc.).
<u>100</u>	12. All personnel properly trained to understand hazards and emergency responses.
<u>100</u>	13. Emergency Procedures (relating to this exposure potential) in place and annual drill held.
<u>100</u>	14. Safety Rules and Safety Standards regularly reviewed and enforced.
<u>100</u>	15. Loss Prevention Principles and Minimum Requirements appropriately applied.
<u>100</u>	16. Tech Center Guidelines appropriately incorporated.
<u>100</u>	17. Reactive Chemical Review within 2 years.
<u>100</u>	18. Loss Prevention Audit within 2 years.
<u>100</u>	19. Tech Center Audit within 2 years.
<u>100</u>	20. All new operations and modifications underwent safety pre-startup audit.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION CAD
 CHEMICAL (One per Index) EDC TOTAL QUANTITY IN PLANT 1688 #
 LARGEST SINGLE CONTAINMENT 1688 # TEMP. OF CONTAINMENT 38 C
 PRESSURE OF CONTAINMENT 360 PSIG BOILING POINT 83.5 C
 FLASH POINT, °C 13.3 C MOLECULAR WEIGHT 98.966
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: 100

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

96

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.)

Reviewed by:

Date

Plant Supt. or Manager: Wayne A. Turner

8/11/86

Major or Gen. Manager: [Signature]

8/11/86

Site Review Representative:
 (If Public ERP is above 100)

Area Review Representative:
 (If Public ERP is above 300)

Corporate Review Representative:
 (If Public ERP is above 400)

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI.(ERP)
2	2	3	4	2	96
2	2	3	4	2	96
2	2	3	4	2	96

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

1. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

2. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

3. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

4. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

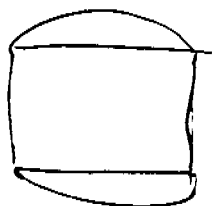
4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO 130160
CONFIDENTIAL

5. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

D-112

E. H.
6-26-86



3X 55 GALLONS

37.55 C (99.59 F)

360 PSIG

@ 100 F VAPOR PRESS. = 2.74 PSIA

SYSTEM PRESSURE IS FROM ETHYLENE

WORST CASE IS EXTERNAL FIRE

∴ PSV RATE AT FIRE

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) H₂SO₄ TOTAL QUANTITY IN PLANT 30,680 #
 LARGEST SINGLE CONTAINMENT 30,680 # TEMP. OF CONTAINMENT 20 C
 PRESSURE OF CONTAINMENT 15 PSIG BOILING POINT 327 C
 FLASH POINT, °C N/A MOLECULAR WEIGHT 98
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

24

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: Wayne C. Turner

8/11/86

Major or Gen. Manager: [Signature]

[Signature]

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

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

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

DO 138162
 CONFIDENTIAL

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:
Name or Number (See Note 2)

Source #1 1. 100-1000000

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
1	1	3	4	2	24
1	1	3	4	2	24
1	1	3	4	2	24

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO 138164
CONFIDENTIAL

- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

CHEMICAL EXPOSURE INDEX

PLANT Clayton #2 LOCATION LAD
 CHEMICAL (One per Index) ETHYLENE TOTAL QUANTITY IN PLANT 732 #
 LARGEST SINGLE CONTAINMENT PIPELINE TEMP. OF CONTAINMENT 35C
 PRESSURE OF CONTAINMENT 430 PSIG BOILING POINT NORMAL (-103.7C)
 FLASH POINT, °C (-135 C) MOLECULAR WEIGHT 28.054
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

24

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: Wayne A. Turner

8/11/86

Major or Gen. Manager: [Signature]

8/11/86

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

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

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

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 ETHYLENE PIPING

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed)

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
1	2	3	2	2	24
1	2	3	2	2	24
1	2	3	2	2	24

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO NOT
CONFIDENTIAL

- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) Dowtherm A TOTAL QUANTITY IN PLANT 150,000 GALLONS
 LARGEST SINGLE CONTAINMENT 100,000 GALLONS TEMP. OF CONTAINMENT 20 C
 PRESSURE OF CONTAINMENT ATM BOILING POINT 257.1 C
 FLASH POINT, °C 124 C MOLECULAR WEIGHT 166
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

2A

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: Wayne A. Turner

8/11/86

Major or Gen. Manager: [Signature]

8/11/86

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

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

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

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:
Name or Number (See Note 2)

Source #1 Rev. John F. Jones

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
1	1	3	4	2	24
1	1	3	4	2	24
1	1	3	4	2	24

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO NOT
CONFIDENTIAL

- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) FUEL GAS (NATURAL) TOTAL QUANTITY IN PLANT 288 #
 LARGEST SINGLE CONTAINMENT _____ TEMP. OF CONTAINMENT 37.3 C
 PRESSURE OF CONTAINMENT 50 PSIG BOILING POINT -161.5 C
 FLASH POINT, °C — MOLECULAR WEIGHT 16
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

12

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: Wayne A. Dwyer

8/11/86

Major or Gen. Manager: [Signature]

8/11/86

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

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

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

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 Aluminum Sulfide

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
1	2	3	1	2	12
1	2	3	1	2	12
1	2	3	1	2	12

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9 "	1 = 1000 - 100,000 "
3 = 10 - 99 "	0 = >100,000 "

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO NOT DISSEMINATE
CONFIDENTIAL

- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) ETHYLENE Glycol TOTAL QUANTITY IN PLANT 10,000,000 #
 LARGEST SINGLE CONTAINMENT 8,000,000 # TEMP. OF CONTAINMENT 30 C
 PRESSURE OF CONTAINMENT ATM BOILING POINT 197.4 C
 FLASH POINT, °C 115.5 C MOLECULAR WEIGHT 62.069
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

0

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: Wayne C. Turner

8/11/86

Major or Gen. Manager: [Signature]

8/11/86

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

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

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

DO NOT
 CONFIDENTIAL

DEFINITIONS OF SCALE NUMBERS

- ① I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- ① II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- ③ III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- ② IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO 138175
CONFIDENTIAL

- ① V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 CRACKING

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI.(ERP)
0	1	3	4	1	0
0	1	3	4	1	0
0	1	3	4	1	0

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

CHEMICAL EXPOSURE INDEX

*Submitted to
Bill Gedyard 7.2.86*

PLANT SCYCOL 2 LOCATION LAO

CHEMICAL (One per Index) _____ TOTAL QUANTITY IN PLANT _____

LARGEST SINGLE CONTAINMENT _____ TEMP. OF CONTAINMENT _____

PRESSURE OF CONTAINMENT _____ BOILING POINT _____

FLASH POINT, °C _____ MOLECULAR WEIGHT _____

VAPOR PRESSURE _____

EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----



This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.)

NOISE (WHEN C-1 TRIPS & RUPTURE DISCS RELIEVE)

Reviewed by:

Date

Plant Supt. or Manager: _____

Major or Gen. Manager: _____

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

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

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

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) ETHANE TOTAL QUANTITY IN PLANT 15 #
 LARGEST SINGLE CONTAINMENT 15 # TEMP. OF CONTAINMENT 37C
 PRESSURE OF CONTAINMENT 115 PSIG BOILING POINT -88.6 C
 FLASH POINT, °C N/A MOLECULAR WEIGHT 30.069
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

12

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: _____

Major or Gen. Manager: _____

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

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

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

DO 13817C
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EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:
Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
1	1	3	2	2	12
1	1	3	2	2	12
1	1	3	2	2	12

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO NOT
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- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION CAD
 CHEMICAL (One per Index) Ethylene Oxide TOTAL QUANTITY IN PLANT 1,500,000 #
 LARGEST SINGLE CONTAINMENT 330,000 # TEMP. OF CONTAINMENT 25C
 PRESSURE OF CONTAINMENT 60 PSIG BOILING POINT 50.9 F
 FLASH POINT, °C -56 C MOLECULAR WEIGHT 44.05
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

216

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: _____

Major or Gen. Manager: _____

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

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

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

DC 138181
 CONFIDENTIAL

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
3	4	3	3	2	216
3	4	3	3	2	216
3	4	3	3	2	216

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO NOT
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- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

Cl₂

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) CHLORINE TOTAL QUANTITY IN PLANT 16,000 lb
 LARGEST SINGLE CONTAINMENT 2000 lbs TEMP. OF CONTAINMENT AMBIENT (20C)
 PRESSURE OF CONTAINMENT 98.3 PSIA BOILING POINT (-33.99 C)
 FLASH POINT, °C N/A MOLECULAR WEIGHT 70.906
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: 3

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

192

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: _____

Major or Gen. Manager: _____

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

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

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

DC 138184
 CONFIDENTIAL

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
4	2	3	4	2	192
4	2	3	4	2	192
4	2	3	4	2	192

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9 "	1 = 1000 - 100,000 "
3 = 10 - 99 "	0 = >100,000 "

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

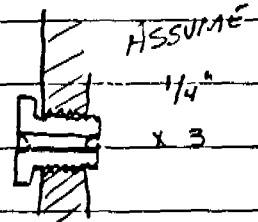
DO 138100
CONFIDENTIAL

- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

Cl₂

S. MIMS
6-9-86

$$W = 1891 Y d^2 \sqrt{\frac{\Delta P}{K \bar{V}_1}}$$



$$K = 1.2$$

$$d = 1/4" (0.25")$$

$$\Delta P = \frac{98.3 - 14.7}{98.3}$$

$$Y = 0.612$$

$$\Delta P = 83.6$$

$$= 0.85$$

$$\bar{V}_1 = 0.2245 \text{ CF/\#}$$

FOR SONIC $\Rightarrow$

$$\begin{aligned} K &= 1.2 \\ \frac{K P}{P_1} &= 0.525 \end{aligned}$$

$$Y = 0.612$$

$$W = (1891)(0.612)(0.25)^2 \sqrt{\frac{83.6}{(1.2)(0.2245)}}$$

$$= 1274 \text{ \#/\#C}$$

$$= 318.5 \text{ \#/15 MIN}$$

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION CAD
 CHEMICAL (One per Index) EDC TOTAL QUANTITY IN PLANT 1688 #
 LARGEST SINGLE CONTAINMENT 1688 # TEMP. OF CONTAINMENT 38 C
 PRESSURE OF CONTAINMENT 360 PSIG BOILING POINT 83.5 C
 FLASH POINT, °C 13.3 C MOLECULAR WEIGHT 98.966
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: 100

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

96

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: _____

Major or Gen. Manager: _____

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

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

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

DO 136180
 CONFIDENTIAL

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI.(ERP)
2	2	3	4	2	96
2	2	3	4	2	96
2	2	3	4	2	96

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- ② I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- ② II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- ③ III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

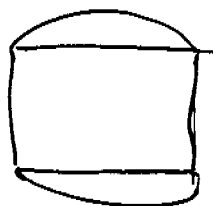
4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO 138190
CONFIDENTIAL

- ② V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

D-112

S. P. H. D.
6-26-86



3X 55 GALLONS

37.55 C (99.59 F)

360 PSIG

@ 100 F VAPOR PRESS. = 2.74 PSIA

SYSTEM PRESSURE IS FROM ETHYLENE

WORST CASE IS EXTERNAL FIRE

∴ PSV RATE AT FIRE

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) H₂SO₄ TOTAL QUANTITY IN PLANT 30,680 #
 LARGEST SINGLE CONTAINMENT 30,680 # TEMP. OF CONTAINMENT 20 C
 PRESSURE OF CONTAINMENT 15 PSIG BOILING POINT 327 C
 FLASH POINT, °C N/A MOLECULAR WEIGHT 98
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

24

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: _____

Major or Gen. Manager: _____

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

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

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

DO 138192
 CONFIDENTIAL

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI.(ERP)
1	1	3	4	2	24
1	1	3	4	2	24
1	1	3	4	2	24

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- ①

$$4 = 1 - 9.9$$

3 - 10 - 99

3 - 10 - 99

1 = 1000 - 100,000

1 = 1000 - 100,000

0 = >100,000

- ①

4 = >10,000 lbs.

3 = 1000 - 10,000 lbs.

2 = 100 - 999 lbs.

1 = 10 - 99 lbs.

0 = < 10 lbs.

- ③

4 * < 1000 ft.

3 * 1000 - 5280 ft.

2 = 1 mile - 5 miles

1 = 5 miles - 15 miles

0 = > 15 miles

- ④

4 = > 45 molecular weight

3 = 34 - 45

2 = 23 - 33

1 - 15 - 22

 $0 \leq 15$

DO 138174

CONFIDENTIAL

- 2

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) ETHYLENE TOTAL QUANTITY IN PLANT 732 #
 LARGEST SINGLE CONTAINMENT PIPELINE TEMP. OF CONTAINMENT 35c
 PRESSURE OF CONTAINMENT 430 PSIG BOILING POINT NORMAL (-103.7c)
 FLASH POINT, °C (-135 c) MOLECULAR WEIGHT 28.054
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

24

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

<u>Reviewed by:</u>	<u>Date</u>
Plant Supt. or Manager: _____	_____
Major or Gen. Manager: _____	_____
Site Review Representative: _____ (If Public ERP is above 100)	_____
Area Review Representative: _____ (If Public ERP is above 300)	_____
Corporate Review Representative: _____ (If Public ERP is above 400)	_____

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 ETHYLENE PIPING

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed)

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
1	2	3	2	2	24
1	2	3	2	2	24
1	2	3	2	2	24

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DO 138196
CONFIDENTIAL

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9	1 = 1000 - 100,000
3 = 10 - 99	0 = >100,000

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO 138107
CONFIDENTIAL

- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) Dowtherm A TOTAL QUANTITY IN PLANT 150,000 GALLONS
 LARGEST SINGLE CONTAINMENT 100,000 GALLONS TEMP. OF CONTAINMENT 20 C
 PRESSURE OF CONTAINMENT ATM BOILING POINT 257.1 C
 FLASH POINT, °C 124 C MOLECULAR WEIGHT 166
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

24

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: _____

Major or Gen. Manager: _____

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

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

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

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI. (ERP)
1	1	3	4	2	24
1	1	3	4	2	24
1	1	3	4	2	24

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- ① I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor	2 = 100 - 999 Health Hazard Fac.
4 = 1 - 9.9 "	1 = 1000 - 100,000 "
3 = 10 - 99 "	0 = >100,000 "

- ① II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.	1 = 10 - 99 lbs.
3 = 1000 - 10,000 lbs.	0 = < 10 lbs.
2 = 100 - 999 lbs.	

- ③ III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.	1 = 5 miles - 15 miles
3 = 1000 - 5280 ft.	0 = > 15 miles
2 = 1 mile - 5 miles	

- ④ IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight	1 = 15 - 22
3 = 34 - 45	0 = < 15
2 = 23 - 33	

DO 138200
CONFIDENTIAL

- ② V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) FUEL GAS (METHANE) TOTAL QUANTITY IN PLANT 288 #
 LARGEST SINGLE CONTAINMENT _____ TEMP. OF CONTAINMENT 37.3 C
 PRESSURE OF CONTAINMENT 50 PSIG BOILING POINT -161.5 C
 FLASH POINT, °C — MOLECULAR WEIGHT 16
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

12

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

Reviewed by:

Date

Plant Supt. or Manager: _____

Major or Gen. Manager: _____

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

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

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

DO 138201
 CONFIDENTIAL

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI.(ERP)
1	2	3	1	2	12
1	2	3	1	2	12
1	2	3	1	2	12

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

-

2 = 100 - 999 Health Hazard Fac.
1 = 1000 - 100,000 "
0 = >100,000 "

- 283 #

1 = 10 - 99 lbs.
0 = < 10 lbs.

- 3

1 = 5 miles - 15 miles
0 = > 15 miles

- ①

1 = 15 - 22
0 = < 15

DO 138703
CONFIDENTIAL

- ②

CHEMICAL EXPOSURE INDEX

PLANT Glycol #2 LOCATION LAD
 CHEMICAL (One per Index) ETHYLENE Glycol TOTAL QUANTITY IN PLANT 10,000,000 #
 LARGEST SINGLE CONTAINMENT 8,000,000 # TEMP. OF CONTAINMENT 30 C
 PRESSURE OF CONTAINMENT ATM BOILING POINT 197.4 C
 FLASH POINT, °C 115.5 C MOLECULAR WEIGHT 62.069
 EMERGENCY EXPOSURE GUIDELINES (EEG), SEE P.4 & APPENDIX I, P.7: _____

- I. Complete the Exposure Risk Potential Summary on page 3 and show highest E.R.P. to the Public-----

0

This E.R.P. number determines both the level and frequency of reviews needed. They are as follows:

- 0 to 100 No review needed, Superintendent and Major Manager approve and sign every two years.
- 100 to 300 Site Review Committee, Superintendent and Major Manager review every two years.
- 300 to 400 A Dow Area Representative and the preceeding group would review every year.
- Above 400 A Corporate representative and the preceeding group would review every year.

- II. Complete Chemical Exposure Review Checklist on page 6, 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 telephone inquiries (e.g. smoke, large relief valves, odors below hazardous levels such as mercaptans or amines, etc.) _____

<u>Reviewed by:</u>	<u>Date</u>
Plant Supt. or Manager: _____	_____
Major or Gen. Manager: _____	_____
Site Review Representative: (If Public ERP is above 100) _____	_____
Area Review Representative: (If Public ERP is above 300) _____	_____
Corporate Review Representative: (If Public ERP is above 400) _____	_____

DO 138204
 CONFIDENTIAL

EXPOSURE RISK POTENTIAL 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 Definition of Scale Numbers on next page):

I.	x	II.	x	III.	x	IV.	x	V.	=	VI.
ACUTE HEALTH HAZARD		VAPOR QUANTITY		DISTANCE		MOLECULAR WEIGHT		PROCESS PENALTIES		EXPOSURE RISK POTENTIAL

Identification of Containment Vessels
being evaluated:

Name or Number (See Note 2)

Source #1 _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

Source #2 (if needed) _____

To (1) Public

(2) Other Dow Facility

(3) Non-Dow Plant or Business

I.	II.	III.	IV.	V.	VI.(ERP)
0	1	3	4	1	0
0	1	3	4	1	0
0	1	3	4	1	0

NOTE 1 - The distance scale number in column III is the only factor normally expected to change, so col. III and the corresponding E.R.P. (col. VI) are all that should be filled in after 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.

DEFINITIONS OF SCALE NUMBERS

- I. Acute Health Hazard - The Health Hazard Factor combines the toxicity and the volatility properties of a substance. To assure consistency, Industrial Hygiene will issue toxicity data as Emergency Exposure Guidelines (EEG) in parts per million. The Health Hazard Factor may be determined by dividing the EEG by the relative volatility. Relative volatility equals vapor pressure (mm Hg @ 25° C) divided by 760 mm Hg. For gases, relative volatility is equal to 1.0. The EEG documentation will be maintained by the H&ES Information Center. Examples for some chemicals are given in Appendix I. If your chemical is not listed, please call your Industrial Hygienist. Health Hazard scale numbers are based on the following ranges:

5 = 0 - .99 Health Hazard Factor

4 = 1 - 9.9

3 = 10 - 99

2 = 100 - 999 Health Hazard Fac.

1 = 1000 - 100,000

0 = >100,000

- II. Vapor Quantity - Select the maximum weight of material which would be released as a gas, or would vaporize, during 15 minutes of the "worst case" situation possible. Please be sure to select the absolute worst form of pressure, temperature, mechanical failure, run-away reactions, contamination, or human failure that is possible, but do not arbitrarily assume 100% of the containment would be released and vaporized in 15 minutes.

4 = >10,000 lbs.

3 = 1000 - 10,000 lbs.

2 = 100 - 999 lbs.

1 = 10 - 99 lbs.

0 = < 10 lbs.

- III. Distance - The distance between the point of release and (1) the public, (2) other Dow plants, and (3) other businesses. Public would be defined as residences, collecting points of people (schools, churches, shopping centers, hotels), or frequently used public roads.

4 = < 1000 ft.

3 = 1000 - 5280 ft.

2 = 1 mile - 5 miles

1 = 5 miles - 15 miles

0 = > 15 miles

- IV. Molecular Weight - Relates directly to the density of the vapor which is inversely proportional to the rate of dispersion. (Please note: in both distance and dispersion ratings, non-linear or logarithmic functions have been ignored since absolute numbers are not the objective.)

4 = > 45 molecular weight

3 = 34 - 45

2 = 23 - 33

1 = 15 - 22

0 = < 15

DO 138206

CONFIDENTIAL

- V. Process Penalties - The two largest driving forces in generating large amounts of vapor in short periods of time are (1) pressure or overpressure (e.g., liquids well above their boiling points or high pressure gasses) or (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°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.