

MICHIGAN DIVISION INDUSTRIAL HYGIENE REPORT

DOW CHEMICAL U.S.A. 10602

AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

LABORATORY REPORT CODE
HEH2.1-1-201(10)

DATE ISSUED
August 27, 1981

DEPARTMENT
Industrial Hygiene Services

ACCOUNT NO PROBLEM NUMBER

TITLE

EVALUATION OF AIRBORNE CONCENTRATIONS OF VINYL CHLORIDE DURING SARAN AND
CONVERTED PRODUCT RESEARCH OPERATIONS IN THE MICHIGAN DIVISION DESIGN
LATEX AND RESINS RESEARCH 10-GALLON REACTOR, 1604 BUILDING

REV
R/E

AUTHOR(S) SIGNATURE(S)

C. Vaughn, Jr and J. I. Rodammer

REVIEWER'S SIGNATURE

G. S. Dickson

Gregory S. Dickson 8/31/81

DESCRIPTIVE SUMMARY WITH CONCLUSIONS

An industrial hygiene survey was conducted on June 12-19, 1981, to evaluate employees' exposures to vinyl chloride during Saran and Converted Product Research operations in the Michigan Division Design Latex and Resins Research 10-gallon reactor, 1604 Building. Personal, area and excursion samples indicated that exposures encountered by operating personnel were well within current acceptable guidelines.

1f

R&S 039724

Received by the Western District of New York pursuant to
the provisions of the Freedom of Information Act
Case No. 88-4337
The Company
Dow Chemical Company
Western District of New York

DISTRIBUTION

A. M. Hart, 566 Building
A. T. Graham, 1603 Building
M. J. Mintz, 1604 Building
*R. R. Langner, 2030 Building
*P. J. Brownson, 607 Building
*Technology Center Admin., 2030 Building
U.S. Area Industrial Hygiene:
Bohl/Branson/Cook/Dombrowski/Rampy/Schneider

P. T. Delassus, 1603 Building
B. E. Burgert, 1603 Building
R. A. Olson, 322 Building
*R. L. Dostal, 1803 Building
*Industrial Hygiene Contacts
U. S. Area Industrial Hygiene Files

*Cover sheet only.

RESTRICTED: for use within the Dow Chemical Company only.

PURPOSE

As part of the Michigan Division Research and Development's industrial hygiene program, a survey was conducted to determine employees' exposures to vinyl chloride at the Saran and Converted Product Research Section, 1604 Building, while using the Design Latex and Resins Research 10-gallon reactor.

CONCLUSIONS AND RECOMMENDATIONS

1. Employees' eight-hour time-weighted average exposures to vinylchloride were well within current industrial hygiene guidelines.
2. Work area concentrations and excursion (short-term task) exposures to vinyl chloride were within current acceptable guidelines.
3. Small concentrations of vinyl chloride were found in the area outside the hood, therefore, it is recommended that a complete hood evaluation be made.
4. It is recommended that a new pipeline route to transport the vinyl chloride to the reactor be explored to eliminate unnecessary joints in the system which are susceptible to leaks.

EVALUATION CRITERIA

Dow Industrial Hygiene Guides (IHGs) are concentrations of airborne substances to which nearly all employees may be repeatedly exposed throughout a working lifetime without adverse effect. IHGs are established by the health professionals of the Dow Industrial Health Board for chemicals (raw materials, intermediates, by-products, wastes, and products) handled within the Dow Chemical Company. Published exposure criteria are available for many industrial chemicals; examples include the Threshold Limit Values (TLVs) of the ACGIH (American Conference of American National Standards Institute, and the OSHA standards of the Occupational Safety and Health Administration of the United States Department of Labor. For most of these chemicals, the Industrial Health Board has adopted the published exposure criteria as the Dow IHGs. In a few instances the IHG set by the Industrial Health Board differs from the published exposure criteria. In establishing IHGs for chemicals which lack published exposure criteria, the Industrial Health Board considers toxicological information, occupational exposure data, and medical experience.

Dow Chemical Company Material Produced Pursuant
To Product Data Sheet
R&S 039726
JAN 30 1977
AL 81-50335

Industrial Hygiene Guides do not represent fine lines between safe and dangerous exposures. As the name indicates, IHGs are properly used as guides for plant design and for evaluating occupational exposures. IHGs for gases and vapors are usually expressed in parts per million (ppm, volume/volume); for dusts, fumes, aerosols, and mists, IHGs are usually expressed in milligrams of contaminant per cubic meter of air (mg/m³).

Most IHGs are time weighted average (TWA) concentrations for an 8-12 hour workday and a 40 hour workweek. Limited excursion exposures to concentrations exceeding the IHG are permitted, provided that the TWA exposure for the entire workday is acceptable and the consequences of exposure, within the excursion limit, are minimal and reversible. For most chemicals, excursion limits are calculated from the IHGs and the excursion factors recommended by the ACGIH. Ceiling IHGs are assigned to those materials which cause significant or irreversible effects at concentrations exceeding the IHG. For these chemicals, no excursion exposures are allowed. The following exposure criteria currently apply to the airborne contaminants measured during this survey:

<u>Compound or Material</u>	<u>IHG</u>	<u>Excursion Limit</u>
Vinyl Chloride	1	5

When the results of an industrial hygiene survey indicate a need to reduce exposure, control measures should be implemented. Traditional engineering control methods include containment, isolation, substitution, local exhaust ventilation, general ventilation, and change of operating procedures. Administrative control, limiting exposure time through remote control or job rotation, may also be effective. Personal protective equipment may be used to protect employees only as a last alternative when none of the preceding control methods is feasible or until control measures can be effected.

SAMPLING AND ANALYTICAL METHODS

Vinyl chloride samples were obtained by pulling a known amount of air through glass tubes containing one gram of Pittsburgh Coconut Base (PCB) charcoal, using battery-operated pumps. The chemical was adsorbed by the charcoal. Air flow rates ranging from 96 cc/minute to 102 cc/minute were used for the personal and area TWA samples. The excursion (short-term task) sample was collected at an air flow rate of 2.6 liters per minute. The analytical evaluation was done by A. Hawkins and reported in AL 81-50335. The samples were desorbed using dry ice chilled carbon disulfide and analyzed by gas chromatography with flame ionization detection.

DISCUSSION

Airborne concentrations of vinyl chloride were measured on June 12-19, 1981, during Saran and Converted Product Research operations in the Designed Latex and Resins Research 10-gallon reactor.

The 10-gallon reactor is surrounded by a large walk-in hood, which has not been given a complete evaluation. This unit is computerized allowing operating personnel to greatly minimize their exposure to any chemicals being used inside the hood. Vinyl chloride was piped into the reactor through a pipeline which leads to an outside vinyl chloride cylinder. This pipeline contains three pipe joints. Prior to actual reactor operations the pipe joints of the vinyl chloride pipeline were checked and found to be leaking small amounts of vinyl chloride. These joints were retightened and no other leaks were detected, at that time.

The operator wore monogoggles, rubber gloves and a laboratory coat while operating inside the hood. No respiratory protection was used and only one hood door was opened at a time.

Personal, excursion and area exposures to vinyl chloride were within acceptable guidelines. (Tables 1 and 2).

Small amounts of vinyl chloride were detected during reactor operations in the work area around the 10-gallon reactor hood. (See table 2). Since this was the only operation in 1604 Building's development area which used vinyl chloride, these small concentrations of vinyl chloride could have been generated by the following:

1. The 10-gallon reactor's hood doors could have not been correctly closed by operating personnel.
2. A small vinyl chloride leak could have developed in the pipe joints of the vinyl chloride pipeline.
3. The 10-gallon reactor hood does not have the ability to contain the the vapors of vinyl chloride.

As a result of this suvey, both of these systems require some reevaluation.

Material Produced Pursuant
to the
Contract No. 10-4837
Shaw-Walker Company
Western District of New York

R&S 039727

Table 1. RESULTS OF PERSONAL AND EXCURSION MONITORING FOR VINYL CHLORIDE DURING SARAN AND CONVERTED PRODUCTS RESEARCH OPERATIONS IN THE MICHIGAN DIVISION DESIGN LATEX AND RESINS RESEARCH 10-GALLON REACTOR, 1604 BUILDING, JUNE 1981

PERSONAL SAMPLES

<u>Job Classification, Activity, Employee Master Number and Date</u>	<u>Sample Duration (Minutes)</u>	<u>Respirator Worn</u>	<u>Concentration, ppm (Volume/Volume Air) Vinyl Chloride</u>
<u>Laboratory Technician:</u>			
Process operating normally, #22860, 6/12/81	316	No	ND(0.07)
Process operating normally, #22860, 6/17/81	453	No	ND(0.05)
Process operating normally, #22860, 6/19/81	469	No	ND(0.05)

EXCURSION SAMPLE*

<u>Sample Description Employee Master Number and Date</u>	<u>Sample Duration (Minutes)</u>	<u>Respirator Worn</u>	<u>Concentration, ppm (Volume/Volume Air) Vinyl Chloride</u>
Breathing zone sample unloading reactor, #73106, 6/17/81	8.96	No	0.14

INDUSTRIAL HYGIENE GUIDE

EXCURSION LIMIT

ND = Not detected at analytical sensitivity indicated in parenthesis.

*Excursion sample of vinyl chloride not averaged over a 15 minute period.

R&S 039728

Dow Chemical Company
 1604 Building
 Detroit, Michigan 48201
 Phone: 313-486-3337
 Telex: 250000
 Western District of New York

Table 2. RESULTS OF WORK AREA MONITORING FOR VINYL CHLORIDE DURING SARAN AND CONVERTED PRODUCTS RESEARCH OPERATIONS IN THE MICHIGAN DIVISION DESIGN LATEX AND RESINS RESEARCH 10-GALLON REACTOR, 1604 BUILDING, JUNE 1981

<u>Sample Description</u>	<u>Date</u>	<u>Sample Time (Minutes)</u>	<u>Concentration, ppm (Volume/Volume) Vinyl Chloride</u>
North end of hood	06/12/81	301	0.18
South end of hood	06/12/81	264	ND(0.10)
North end of hood	06/17/81	443	0.37
South end of hood	06/17/81	443	0.39
North end of hood	06/19/81	468	ND(0.06)
South end of hood	06/19/81	468	0.22
INDUSTRIAL HYGIENE GUIDE			1
EXCURSION LIMIT			5

ND = Not detected at analytical sensitivity indicated in parenthesis.

Dow Chemical Company
 1700 East 10th Ave.
 Detroit, MI 48201-1000
 313/487-1000
 313/487-1001
 313/487-1002
 313/487-1003
 313/487-1004
 313/487-1005
 313/487-1006
 313/487-1007
 313/487-1008
 313/487-1009
 313/487-1010
 313/487-1011
 313/487-1012
 313/487-1013
 313/487-1014
 313/487-1015
 313/487-1016
 313/487-1017
 313/487-1018
 313/487-1019
 313/487-1020
 313/487-1021
 313/487-1022
 313/487-1023
 313/487-1024
 313/487-1025
 313/487-1026
 313/487-1027
 313/487-1028
 313/487-1029
 313/487-1030
 313/487-1031
 313/487-1032
 313/487-1033
 313/487-1034
 313/487-1035
 313/487-1036
 313/487-1037
 313/487-1038
 313/487-1039
 313/487-1040
 313/487-1041
 313/487-1042
 313/487-1043
 313/487-1044
 313/487-1045
 313/487-1046
 313/487-1047
 313/487-1048
 313/487-1049
 313/487-1050
 313/487-1051
 313/487-1052
 313/487-1053
 313/487-1054
 313/487-1055
 313/487-1056
 313/487-1057
 313/487-1058
 313/487-1059
 313/487-1060
 313/487-1061
 313/487-1062
 313/487-1063
 313/487-1064
 313/487-1065
 313/487-1066
 313/487-1067
 313/487-1068
 313/487-1069
 313/487-1070
 313/487-1071
 313/487-1072
 313/487-1073
 313/487-1074
 313/487-1075
 313/487-1076
 313/487-1077
 313/487-1078
 313/487-1079
 313/487-1080
 313/487-1081
 313/487-1082
 313/487-1083
 313/487-1084
 313/487-1085
 313/487-1086
 313/487-1087
 313/487-1088
 313/487-1089
 313/487-1090
 313/487-1091
 313/487-1092
 313/487-1093
 313/487-1094
 313/487-1095
 313/487-1096
 313/487-1097
 313/487-1098
 313/487-1099
 313/487-1100
 313/487-1101
 313/487-1102
 313/487-1103
 313/487-1104
 313/487-1105
 313/487-1106
 313/487-1107
 313/487-1108
 313/487-1109
 313/487-1110
 313/487-1111
 313/487-1112
 313/487-1113
 313/487-1114
 313/487-1115
 313/487-1116
 313/487-1117
 313/487-1118
 313/487-1119
 313/487-1120
 313/487-1121
 313/487-1122
 313/487-1123
 313/487-1124
 313/487-1125
 313/487-1126
 313/487-1127
 313/487-1128
 313/487-1129
 313/487-1130
 313/487-1131
 313/487-1132
 313/487-1133
 313/487-1134
 313/487-1135
 313/487-1136
 313/487-1137
 313/487-1138
 313/487-1139
 313/487-1140
 313/487-1141
 313/487-1142
 313/487-1143
 313/487-1144
 313/487-1145
 313/487-1146
 313/487-1147
 313/487-1148
 313/487-1149
 313/487-1150
 313/487-1151
 313/487-1152
 313/487-1153
 313/487-1154
 313/487-1155
 313/487-1156
 313/487-1157
 313/487-1158
 313/487-1159
 313/487-1160
 313/487-1161
 313/487-1162
 313/487-1163
 313/487-1164
 313/487-1165
 313/487-1166
 313/487-1167
 313/487-1168
 313/487-1169
 313/487-1170
 313/487-1171
 313/487-1172
 313/487-1173
 313/487-1174
 313/487-1175
 313/487-1176
 313/487-1177
 313/487-1178
 313/487-1179
 313/487-1180
 313/487-1181
 313/487-1182
 313/487-1183
 313/487-1184
 313/487-1185
 313/487-1186
 313/487-1187
 313/487-1188
 313/487-1189
 313/487-1190
 313/487-1191
 313/487-1192
 313/487-1193
 313/487-1194
 313/487-1195
 313/487-1196
 313/487-1197
 313/487-1198
 313/487-1199
 313/487-1200
 313/487-1201
 313/487-1202
 313/487-1203
 313/487-1204
 313/487-1205
 313/487-1206
 313/487-1207
 313/487-1208
 313/487-1209
 313/487-1210
 313/487-1211
 313/487-1212
 313/487-1213
 313/487-1214
 313/487-1215
 313/487-1216
 313/487-1217
 313/487-1218
 313/487-1219
 313/487-1220
 313/487-1221
 313/487-1222
 313/487-1223
 313/487-1224
 313/487-1225
 313/487-1226
 313/487-1227
 313/487-1228
 313/487-1229
 313/487-1230
 313/487-1231
 313/487-1232
 313/487-1233
 313/487-1234
 313/487-1235
 313/487-1236
 313/487-1237
 313/487-1238
 313/487-1239
 313/487-1240
 313/487-1241
 313/487-1242
 313/487-1243
 313/487-1244
 313/487-1245
 313/487-1246
 313/487-1247
 313/487-1248
 313/487-1249
 313/487-1250
 313/487-1251
 313/487-1252
 313/487-1253
 313/487-1254
 313/487-1255
 313/487-1256
 313/487-1257
 313/487-1258
 313/487-1259
 313/487-1260
 313/487-1261
 313/487-1262
 313/487-1263
 313/487-1264
 313/487-1265
 313/487-1266
 313/487-1267
 313/487-1268
 313/487-1269
 313/487-1270
 313/487-1271
 313/487-1272
 313/487-1273
 313/487-1274
 313/487-1275
 313/487-1276
 313/487-1277
 313/487-1278
 313/487-1279
 313/487-1280
 313/487-1281
 313/487-1282
 313/487-1283
 313/487-1284
 313/487-1285
 313/487-1286
 313/487-1287
 313/487-1288
 313/487-1289
 313/487-1290
 313/487-1291
 313/487-1292
 313/487-1293
 313/487-1294
 313/487-1295
 313/487-1296
 313/487-1297
 313/487-1298
 313/487-1299
 313/487-1300
 313/487-1301
 313/487-1302
 313/487-1303
 313/487-1304
 313/487-1305
 313/487-1306
 313/487-1307
 313/487-1308
 313/487-1309
 313/487-1310
 313/487-1311
 313/487-1312
 313/487-1313
 313/487-1314
 313/487-1315
 313/487-1316
 313/487-1317
 313/487-1318
 313/487-1319
 313/487-1320
 313/487-1321
 313/487-1322
 313/487-1323
 313/487-1324
 313/487-1325
 313/487-1326
 313/487-1327
 313/487-1328
 313/487-1329
 313/487-1330
 313/487-1331
 313/487-1332
 313/487-1333
 313/487-1334
 313/487-1335
 313/487-1336
 313/487-1337
 313/487-1338
 313/487-1339
 313/487-1340
 313/487-1341
 313/487-1342
 313/487-1343
 313/487-1344
 313/487-1345
 313/487-1346
 313/487-1347
 313/487-1348
 313/487-1349
 313/487-1350
 313/487-1351
 313/487-1352
 313/487-1353
 313/487-1354
 313/487-1355
 313/487-1356
 313/487-1357
 313/487-1358
 313/487-1359
 313/487-1360
 313/487-1361
 313/487-1362
 313/487-1363
 313/487-1364
 313/487-1365
 313/487-1366
 313/487-1367
 313/487-1368
 313/487-1369
 313/487-1370
 313/487-1371
 313/487-1372
 313/487-1373
 313/487-1374
 313/487-1375
 313/487-1376
 313/487-1377
 313/487-1378
 313/487-1379
 313/487-1380
 313/487-1381
 313/487-1382
 313/487-1383
 313/487-1384
 313/487-1385
 313/487-1386
 313/487-1387
 313/487-1388
 313/487-1389
 313/487-1390
 313/487-1391
 313/487-1392
 313/487-1393
 313/487-1394
 313/487-1395
 313/487-1396
 313/487-1397
 313/487-1398
 313/487-1399
 313/487-1400
 313/487-1401
 313/487-1402
 313/487-1403
 313/487-1404
 313/487-1405
 313/487-1406
 313/487-1407
 313/487-1408
 313/487-1409
 313/487-1410
 313/487-1411
 313/487-1412
 313/487-1413
 313/487-1414
 313/487-1415
 313/487-1416
 313/487-1417
 313/487-1418
 313/487-1419
 313/487-1420
 313/487-1421
 313/487-1422
 313/487-1423
 313/487-1424
 313/487-1425
 313/487-1426
 313/487-1427
 313/487-1428
 313/487-1429
 313/487-1430
 313/487-1431
 313/487-1432
 313/487-1433
 313/487-1434
 313/487-1435
 313/487-1436
 313/487-1437
 313/487-1438
 313/487-1439
 313/487-1440
 313/487-1441
 313/487-1442
 313/487-1443
 313/487-1444
 313/487-1445
 313/487-1446
 313/487-1447
 313/487-1448
 313/487-1449
 313/487-1450
 313/487-1451
 313/487-1452
 313/487-1453
 313/487-1454
 313/487-1455
 313/487-1456
 313/487-1457
 313/487-1458
 313/487-1459
 313/487-1460
 313/487-1461
 313/487-1462
 313/487-1463
 313/487-1464
 313/487-1465
 313/487-1466
 313/487-1467
 313/487-1468
 313/487-1469
 313/487-1470
 313/487-1471
 313/487-1472
 313/487-1473
 313/487-1474
 313/487-1475
 313/487-1476
 313/487-1477
 313/487-1478
 313/487-1479
 313/487-1480
 313/487-1481
 313/487-1482
 313/487-1483
 313/487-1484
 313/487-1485
 313/487-1486
 313/487-1487
 313/487-1488
 313/487-1489
 313/487-1490
 313/487-1491
 313/487-1492
 313/487-1493
 313/487-1494
 313/487-1495
 313/487-1496
 313/487-1497
 313/487-1498
 313/487-1499
 313/487-1500
 313/487-1501
 313/487-1502
 313/487-1503
 313/487-1504
 313/487-1505
 313/487-1506
 313/487-1507
 313/487-1508
 313/487-1509
 313/487-1510
 313/487-1511
 313/487-1512
 313/487-1513
 313/487-1514
 313/487-1515
 313/487-1516
 313/487-1517
 313/487-1518
 313/487-1519
 313/487-1520
 313/487-1521
 313/487-1522
 313/487-1523
 313/487-1524
 313/487-1525
 313/487-1526
 313/487-1527
 313/487-1528
 313/487-1529
 313/487-1530
 313/487-1531
 313/487-1532
 313/487-1533
 313/487-1534
 313/487-1535
 313/487-1536
 313/487-1537
 313/487-1538
 313/487-1539
 313/487-1540
 313/487-1541
 313/487-1542
 313/487-1543
 313/487-1544
 313/487-1545
 313/487-1546
 313/487-1547
 313/487-1548
 313/487-1549
 313/487-1550
 313/487-1551
 313/487-1552
 313/487-1553
 313/487-1554
 313/487-1555
 313/487-1556
 313/487-1557
 313/487-1558
 313/487-1559
 313/487-1560
 313/487-1561
 313/487-1562
 313/487-1563
 313/487-1564
 313/487-1565
 313/487-1566
 313/487-1567
 313/487-1568
 313/487-1569
 313/487-1570
 313/487-1571
 313/487-1572
 313/487-1573
 313/487-1574
 313/487-1575
 313/487-1576
 313/487-1577
 313/487-1578
 313/487-1579
 313/487-1580
 313/487-1581
 313/487-1582
 313/487-1583
 313/487-1584
 313/487-1585
 313/487-1586
 313/487-1587
 313/487-1588
 313/487-1589
 313/487-1590
 313/487-1591
 313/487-1592
 313/487-1593
 313/487-1594
 313/487-1595
 313/487-1596
 313/487-1597
 313/487-1598
 313/487-1599
 313/487-1600
 313/487-1601
 313/487-1602
 313/487-1603
 313/487-1604
 313/487-1605
 313/487-1606
 313/487-1607
 313/487-1608
 313/487-1609
 313/487-1610
 313/487-1611
 313/487-1612
 313/487-1613
 313/487-1614
 313/487-1615
 313/487-1616
 313/487-1617
 313/487-1618
 313/487-1619
 313/487-1620
 313/487-1621
 313/487-1622
 313/487-1623
 313/487-1624
 313/487-1625
 313/487-1626
 313/487-1627
 313/487-1628
 313/487-1629
 313/487-1630
 313/487-1631
 313/487-1632
 313/487-1633
 313/487-1634
 313/487-1635
 313/487-1636
 313/487-1637
 313/487-1638
 313/487-1639
 313/487-1640
 313/487-1641
 313/487-1642
 313/487-1643
 313/487-1644
 313/487-1645
 313/487-1646
 313/487-1647
 313/487-1648
 313/487-1649
 313/487-1650
 313/487-1651
 313/487-1652
 313/487-1653
 313/487-1654
 313/487-1655
 313/487-1656
 313/487-1657
 313/487-1658
 313/487-1659
 313/487-1660
 313/487-1661
 313/487-1662
 313/487-1663
 313/487-1664
 313/487-1665
 313/487-1666
 313/487-1667
 313/487-1668
 313/487-1669
 313/487-1670
 313/487-1671
 313/487-1672
 313/487-1673
 313/487-1674
 313/487-1675
 313/487-1676
 313/487-1677
 313/487-1678
 313/487-1679
 313/487-1680
 313/487-1681
 313/487-1682
 313/487-1683
 313/487-1684
 313/487-1685