

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

REV
(1E)

DEPARTMENT

LIGHT HYDROCARBONS II

FILE NUMBER

LAD-LHC2 - 86.01

DATE

02-01-87

TITLE

LHC II INDUSTRIAL HYGIENE ACTIVITY REPORT FOR 1986

AUTHOR(S) SIGNATURE(S)

Paul Laughlin

Paul D. Laughlin

Rock Gustin

Rock Gustin

REVIEWER'S SIGNATURE

LC Hollis

SUMMARY

The employees that had a likelihood for exposure in their jobs to benzene, toluene, xylene, and/or 1,3-butadiene were monitored using approved sampling and analytical methods. Results of the monitoring showed no exposure problems. This finding supports historical data.

Additionally, a noise survey was conducted and the results were presented to plant personnel along with some very interesting information about the effectiveness of various types of hearing protection devices.

In 1987, noise, benzene, toluene, xylene, and 1,3-butadiene surveys will be conducted following major changes that the plant is scheduled to undergo.

DISTRIBUTION

Louisiana

A. L. ROYALS
K. D. DIAMOND
* J. D. WELDON 3801
* R. W. GALLANT, 2306
* M. F. CURRIER, 2302
* M. E. NEVILL, 3502-E

Midland

* LARRY RAMPY, 1803
* G. W. ENGBAHL, 1803
* S. K. NORWOOD, 1803
* J. E. LE BEAU, 1803
* A. W. SHAFFER, 2030
* S. M. GORGACZ, 474

Other

* D. E. CRAGER, FREEPORT, B-101
* F. D. AXE, WESTERN DIV., 471
* G. L. MEIER, EASTERN DIV.,
STRONGSVILLE, OHIO

DO 081377
CONFIDENTIAL

*COVER LETTER ONLY

BENZENE EXPOSURE EVALUATION

Explanation of Guidelines and Sampling Method

The ACGIH Threshold Limit Value (TLV-TWA) for benzene is 10 (ten) ppm. Dow's Industrial Hygiene Guide calls for a 10 (ten) ppm ceiling and does not allow short term excursions above this ceiling.

The 3M organic vapor monitor badge (#3500) was used to obtain breathing zone samples of operators working in areas most likely to contain benzene. The badges, which use an active charcoal wafer as a collection medium, were desorbed with carbon disulfide and analyzed by gas chromatography.

1. Personnel Monitoring

As shown on Table 1 (Attachment 1) the personnel samples were well below the 10 ppm TLV-TWA. This agrees with historical data. See also Attachment 2.

TOLUENE EXPOSURE EVALUATION

Explanation of Guidelines and Sampling Method

The ACGIH Threshold Limit Value (TLV-TWA) for toluene is 100 ppm with a TLV-STEL of 150 ppm. The TLV-STEL is a 15 minute exposure guideline.

The 3M organic vapor monitor badge (#3500) was used to obtain breathing zone samples of operators working in areas most likely to contain toluene. The badges, which use an active charcoal wafer as a collection medium, were desorbed with carbon disulfide and analyzed by gas chromatography.

1. Personnel Monitoring

As shown on Table 2 (Attachment 3) the personnel samples were well below the 100 ppm TLV-TWA. This agrees with historical data. See also Attachment 4.

XYLENE EXPOSURE EVALUATION

Explanation of Guidelines and Sampling Method

The ACGIH Threshold Limit Value (TLV-TWA) for xylene is 100 ppm with a TLV-STEL of 150 ppm. The TLV-STEL is a 15 minute exposure guideline.

The 3M organic vapor monitor badge (#3500) was used to obtain breathing zone samples of operators working in areas most likely to contain xylene. The badges, which use an active charcoal wafer as a collection medium, were desorbed with carbon disulfide and analyzed by gas chromatography.

1. Personnel Monitoring

As shown on Table 3 (Attachment 5) the personnel samples were well below the 100 ppm TLV-TWA. This agrees with historical data. See also Attachment 6.

1,3-BUTADIENE EXPOSURE EVALUATION

Explanation of Guidelines and Sampling Method

The ACGIH Threshold Limit Value (TLV-TWA) for 1,3-butadiene is 10 (ten) ppm. No TLV-STEL value was available. The TLV-STEL is a 15 minute exposure guideline.

The 3M organic vapor monitor badge (#3500) was used to obtain breathing zone samples of operators working in areas most likely to contain 1,3-butadiene. The badges, which use an active charcoal wafer as a collection medium, were desorbed with carbon disulfide and analyzed by gas chromatography.

1. Personnel Monitoring

As shown on Table 4 (Attachment 7) the personnel samples were well below the 10 ppm TLV-TWA. This agrees with historical data. See also Attachment 8.

NOISE EXPOSURE EVALUATION

Method and Explanation of Guidelines

A DuPont MK-2 Audio Dosimeter was used as a sound level meter to measure area noise levels. The dosimeter meets or exceeds all current requirements established by government agencies in the United States for personal audio dosimeters. All noise measurements were made using an 80 and 90 db(A) threshold level and a 90 db(A) criterion level. The threshold is the level that noise must exceed to be included in the dose calculation and the criterion is the decibel level that will yield a 100 percent dose in eight hours. The 90 db(A) criterion level is an OSHA regulation, to obtain the dose percent using the Louisiana Division criterion level of 85 db(A) the results were multiplied by two (2). This is true due to the 5 db(A) doubling rate that is included in both the OSHA regulations and the Louisiana Division Standard. All of the audio dosimeters were calibrated before with an Audio Dosimeter Calibrator at sound level of 94 decibels.

1. Area Surveys

As shown in Attachments 9 & 10, most of the plant is a high noise area (>90 dbA), especially around the turbomachinery. The entire plant is considered an ear protection area. High noise areas are posted with warning signs and these areas are communicated to employees in the annual Industrial Hygiene Safety Meetings.

SAMPLING STRATEGY PLAN FOR 1987

1. Noise

Conduct area surveys following major modifications to the plant (scheduled for the later part of 1987) and while the plant is being shut-down and started-up.

2. Benzene, toluene, xylene, and 1,3-butadiene

Conduct personnel monitoring and area surveys following minor changes to existing waste water system (first half 1987). Repeat monitoring and surveys following start-up of new waste water treating system late in 1987.

No other monitoring is considered necessary as indicated by historical data.

ACCOMPLISHMENTS AND GOALS

Hearing - Rock Gustin

Accomplishment: Investigated efficiencies of various types of hearing protection used in block and communicated this information to all employees.

Block 39 Ponds - Don Taylor

Accomplishment: Cleaned and eliminated waste water ponds in Block 39.

Asbestos Removal - Paul Laughlin

DO 081380
CONFIDENTIAL

Accomplishment: Asbestos in the furnace area was removed and reinsulated with asbestos free material. This represented approximately one third of all asbestos in the block.

Goal: Remove half of remaining asbestos in the block.

Benzene Emissions - Rock Gustin

Accomplishment: Monitored 457 valves every other month with an average leaker rate of 0.5%

Goal: Reduce leaker rate to 0%.

V.O.C. Emissions - Rock Gustin

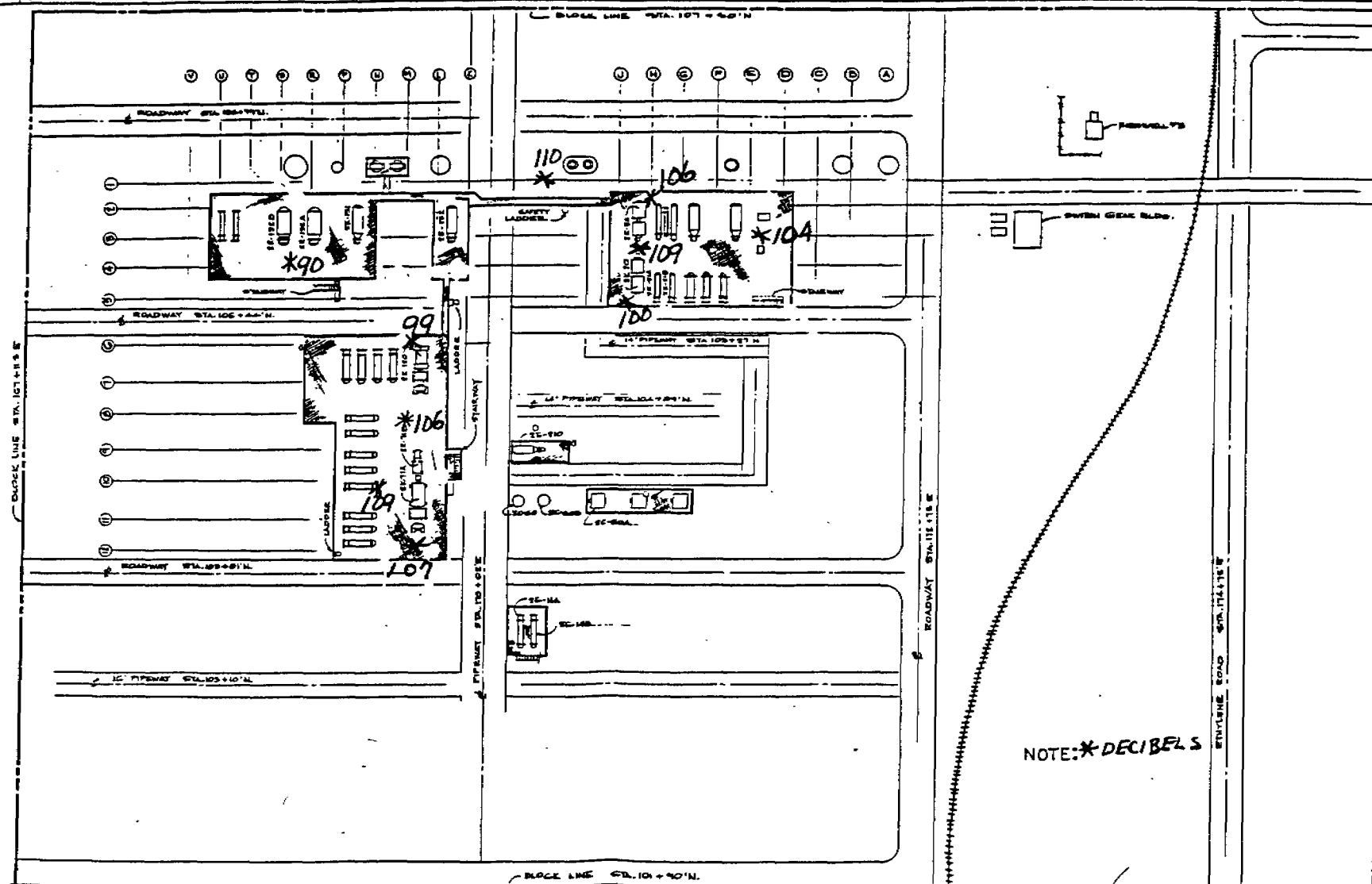
Accomplishment: Reduced leaker rate from 16% to 3.6% in 1986 of valves monitored for V.O.C. emissions.

Goal: Continue reducing leaker rate to 2% or lower.

Waste Water Vapors - Jim Kennedy, Paul Laughlin

Goal: Eliminate vapors associated with waste water system by incorporating a degassing vessel in the design of a new waste water treating system.

AREA SOUND SURVEY

DO 081382
CONFIDENTIAL

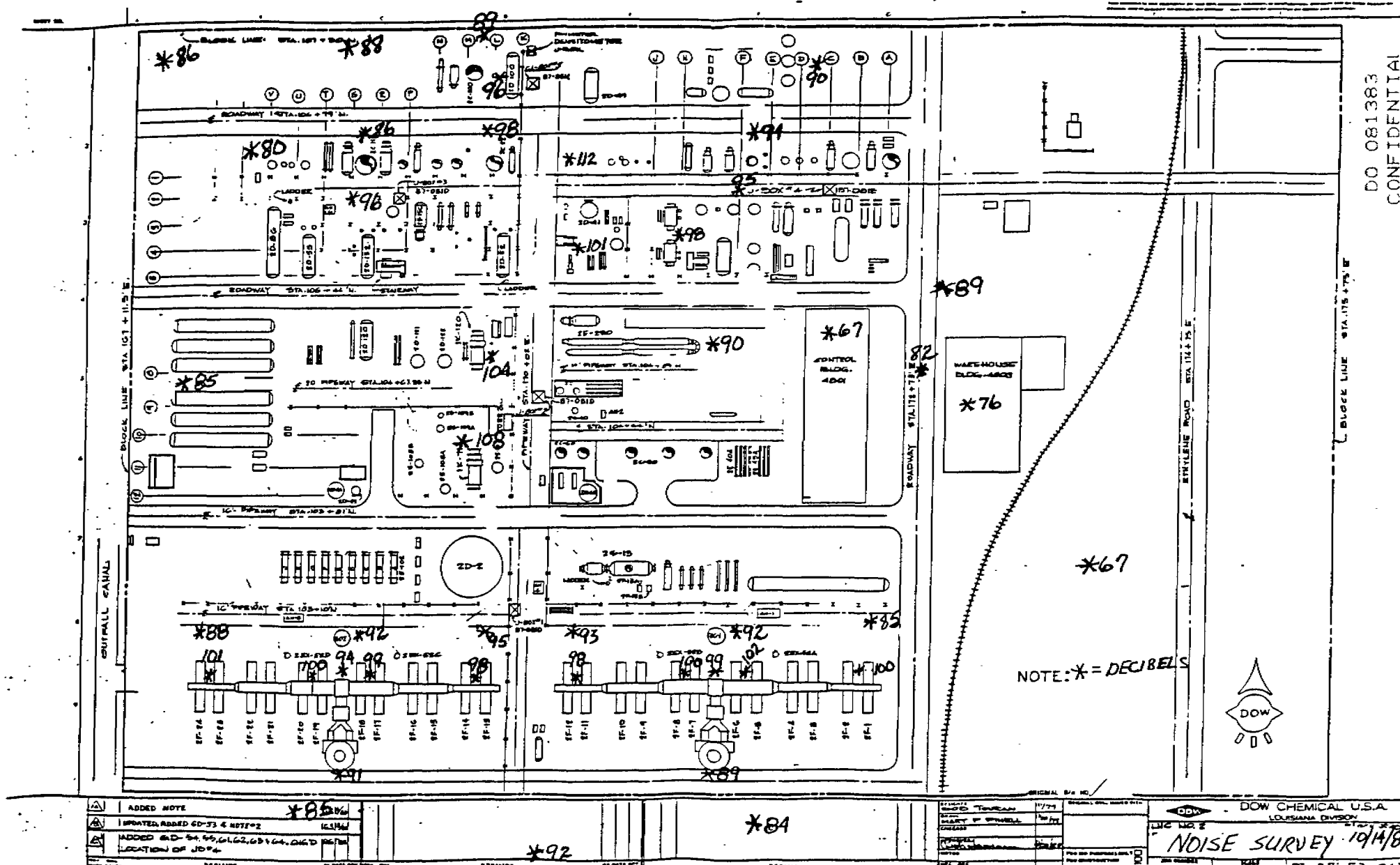
ADDED NOTE	AS/
UPDATED / ADDED GD'S	AS/
ADDED GD'S	AS/

DATE	1/7/86
BY	AS/
CHECKED	AS/
APPROVED	AS/

DOW	DOW CHEMICAL U.S.A.
LA	LOUISIANA DIVISION
PROJECT	NOISE SURVEY
DATE	1/7/86

ATTACHMENT 9
AREA SOUND SURVEY

*90



DO 081383
CONFIDENTIAL

ADDED NOTE	*85
ADDED CD-33 & NOTE 2	10/14/86
ADDED 84-34, 35, 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	

*92

*84

APPROVED	DATE
REVIEWED	DATE
DESIGNED	DATE
DRAWN	DATE
CHECKED	DATE
IN CHARGE	DATE

DOW	DOW CHEMICAL U.S.A.
LOUISIANA DIVISION	STATION 2-20
NOISE SURVEY	10/14/86

EMPLOYEE EXPOSURE SUMMARY

FILLED IN BY P. LAUGHLIN

DR# 9999-0115

QUARTER 4 YEAR 86

ING 10 PPM

PLANT	LHC #2	BLOCK 48	CHEMICAL	1.3 - BUTADIENE
-------	--------	----------	----------	-----------------

MINIMAL DETECTABLE LIMIT AND UNIT .000523 mg/ml

[illegible]

*PROTECTIVE EQUIPMENT: (1) MOUTHBIT (2) FULL FACE (3) HALF FACE OR DUST (4) AIR SUPPLY (5) HEARING PROTECTION

****COMMENTS (use reverse side)**

JH:sh TH-2 (12/26) FORM 1

DO 081384
CONFIDENTIAL

ATTACHMENT 7
EMPLOYEES TIME WEIGHTED AVERAGE POTENTIAL EXPOSURE

CHEMICAL 1,3-BUTADIENE (TLV-TWA: 10 PPM)

DATE	DURATION (MIN)	VOLUME (L)	JOB	EMPLOYEE NUMBER	RESULT (PPM)
11-07	230	11.339	LOAD EP RESID	431527	0.4392
11-10	457	22.530	O.T.	434219	< 0.0210
11-10	457	22.530	MECH S.O.T.	431743	< 0.0210
11-10	465	22.925	FURNACE S.O.T.	277606	< 0.0207
11-11	466	22.974	MECH S.O.T.	432593	< 0.0206
11-11	476	23.467	FURNACE S.O.T.	432972	< 0.0202
11-11	454	22.382	O.T.	434319	< 0.0212
11-12	484	23.861	MECH S.O.T.	432972	< 0.0198
11-12	480	23.664	FURNACE S.O.T.	433401	< 0.0200
11-12	488	24.058	O.T.	432972	< 0.0197
11-13	379	18.685	MECH S.O.T.	433844	0.1212
11-13	455	22.432	O.T.	282733	0.1009
11-13	363	17.896	FURNACE S.O.T.	433646	< 0.0265
12-08	452	22.284	CLEANING API**	432017	< 0.0815
12-08	453	22.333	CLEANING API**	432414	0.2027
12-08	451	22.234	CLEANING API**	432783	< 0.0813

AVERAGE: < 0.0773

NOTE ** COMFO II RESPIRATORS WERE WORN

ATTACHMENT 6
EMPLOYEE EXPOSURE SUMMARY

FILLED IN BY P. LAUGHLIN

DR# 0002-5081

QUARTER 4 YEAR 86

1HG 100 PPM

PLANT LHC #2 BLOCK 48 CHEMICAL XYLENE

MINIMAL DETECTABLE LIMIT AND UNIT .0021 MG/ML

[illegible]

DO 081386
CONFIDENTIAL

*PROTECTIVE EQUIPMENT: (1) MOUTHBIT (2) FULL FACE (3) HALF FACE OR DUST (4) AIR SUPPLY (5) HEARING PROTECTION

* COMMENTS (use reverse side)

ATTACHMENT 5
EMPLOYEES TIME WEIGHTED AVERAGE POTENTIAL EXPOSURE

CHEMICAL XYLENE (TLV-TWA: 100 PPM)

DATE	DURATION (MIN)	VOLUME (L)	JOB	EMPLOYEE NUMBER	RESULT (PPM)
11-07	230	11.339	LOAD EP RESID	431527	< 0.0853
11-10	457	22.530	O.T.	434219	< 0.0429
11-10	457	22.530	MECH S.O.T.	431743	< 0.0429
11-10	465	22.925	FURNACE S.O.T.	277606	0.0603
11-11	466	22.974	MECH S.O.T.	432593	< 0.0421
11-11	476	23.467	FURNACE S.O.T.	432972	< 0.0412
11-11	454	22.382	O.T.	434319	0.0823
11-12	484	23.861	MECH S.O.T.	432972	< 0.0405
11-12	480	23.664	FURNACE S.O.T.	433401	< 0.0409
11-12	488	24.058	O.T.	432972	0.0670
11-13	379	18.685	MECH S.O.T.	433844	0.0863
11-13	455	22.432	O.T.	282733	0.0719
11-13	363	17.896	FURNACE S.O.T.	433646	0.0772

AVERAGE: < 0.0601

ATTACHMENT 4

DR# 0002-5070

ING 100 PPM

MINIMAL DETECTABLE LIMIT AND UNIT 0.0021 MG/MI

DO 081388
CONFIDENTIAL

*PROTECTIVE EQUIPMENT: (1) MOUTHBIT (2) FULL FACE (3) HALF FACE OR DUST (4) AIR SUPPLY (5) HEARING PROTECTION

ATTACHMENT 3
EMPLOYEES TIME WEIGHTED AVERAGE POTENTIAL EXPOSURE

CHEMICAL TOLUENE (TLV-TWA: 100 PPM)

DATE	DURATION (MIN)	VOLUME (L)	JOB	EMPLOYEE NUMBER	RESULT (PPM)
11-07	230	11.339	LOAD EP RESID	431527	< 0.0983
11-10	457	22.530	O.T.	434219	< 0.0495
11-10	457	22.530	MECH S.O.T.	431743	< 0.0495
11-10	465	22.925	FURNACE S.O.T.	277606	< 0.0486
11-11	466	22.974	MECH S.O.T.	432593	< 0.0485
11-11	476	23.467	FURNACE S.O.T.	432972	< 0.0475
11-11	454	22.382	O.T.	434319	0.0948
11-12	484	23.861	MECH S.O.T.	432972	< 0.0467
11-12	480	23.664	FURNACE S.O.T.	433401	< 0.0471
11-12	488	24.058	O.T.	432972	< 0.0463
11-13	379	18.685	MECH S.O.T.	433844	< 0.0596
11-13	455	22.432	O.T.	282733	< 0.0497
11-13	363	17.896	FURNACE S.O.T.	433646	< 0.0623

AVERAGE: < 0.0575

DO 081389
CONFIDENTIAL

ATTACHMENT 2

FILLED IN BY P. LAUGHLIN

PLANT	LHC #2	BLOCK	48	CHEMICAL	BENZENE
-------	--------	-------	----	----------	---------

DR# 0002-5058

QUARTER 4 YEAR 86

ING 10 PPM

MINIMAL DETECTABLE LIMIT AND UNIT 0.0002MG/ML

[illegible]

*PROTECTIVE EQUIPMENT: (1) MOUTHBIT (2) FULL FACE (3) HALF FACE OR DUST (4) AIR SUPPLY (5) HEARING PROTECTION

DO 081390
CONFIDENTIAL

ATTACHMENT 1
EMPLOYEES TIME WEIGHTED AVERAGE POTENTIAL EXPOSURE

CHEMICAL BENZENE (TLV-TWA: 10 PPM)

DATE	DURATION (MIN)	VOLUME (L)	JOB	EMPLOYEE NUMBER	RESULT (PPM)
11-07	230	11.339	LOAD EP RESID	431527	0.4969
11-10	457	22.530	O.T.	434219	0.3890
11-10	457	22.530	MECH S.O.T.	431743	0.0834
11-10	465	22.925	FURNACE S.O.T.	277606	0.0956
11-11	466	22.974	MECH S.O.T.	432593	0.0954
11-11	476	23.467	FURNACE S.O.T.	432972	0.2001
11-11	454	22.382	O.T.	434319	0.7132
11-12	484	23.861	MECH S.O.T.	432972	0.0656
11-12	480	23.664	FURNACE S.O.T.	433401	0.2910
11-12	488	24.058	O.T.	432972	0.3383
11-13	379	18.685	MECH S.O.T.	433844	< 0.0670
11-13	455	22.432	O.T.	282733	0.2651
11-13	363	17.896	FURNACE S.O.T.	433646	0.2624

AVERAGE: 0.2586

DO 081391
CONFIDENTIAL