8e Initial

UNION CARBIDE

93 OCT -5 PM 2:05

UNION CARBIDE CORPORATION 39 OLD RIDGEBURY ROAD, DANBURY, CT 06817-0001

8EHQ-1093-12719

October 1, 1993

8EHQ-93-12719
INIT 10/05/93

CERTIFIED MAIL
RETURN RECEIPT
REQUESTED

A

88940000005

Document Processing Center (TS-790)
Office of Pollution Prevention & Toxics
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Attn: 8(e) Coordinator

Dear Sir or Madam:

Union Carbide Corporation ("Union Carbide") herewith supplies the following information on vinyl methyl ether (VME; CASRN 107-25-5) which the Agency may regard as being reportable under its current TSCA § 8(e) guidelines. This information concerns preliminary results from a developmental toxicology study where fetotoxic effects (a few skeletal variants) were seen in CD rats.

Study Design

Groups of 25 plug-positive female rats were exposed to vinyl methyl ether vapor at concentrations of 5000, 10000 or 19500 ppm for 6 hr a day from gestational day 6 through 15. A control group of 25 pregnant CD rats were exposed to filtered air alone. Maternal animals were sacrificed on gestational day 21 for necropsy and fetal examinations.

Monitors for maternal toxicity included clinical signs, body weights and body weight gains, food and water consumption, and necropsy to examine for general and reproductive tract pathology and status of implantations. Fetuses were weighed, sexed, and examined for external, soft tissue, and skeletal malformations.

Results

(1) Pregnancy rates were similar across all groups (Attachment 1).

mm

RECEIVED 10-25-93

epavme

(2) Gestational body weights were significantly reduced on gd 12, 15 and 18 for the 19500 ppm groups, and on gd 15 for the 5000 and 10000 ppm groups (Attachment 2).

(3) Gestational body weight gains were reduced for all vinyl methyl ether exposed groups over the treatment period, gd 6-15.

(4) Food consumption was reduced over gd 6-15 for the 10000 and 19500 ppm groups, and over gd 6-9 for the 5000 ppm group (Attachment 3).

(5) Water consumption was increased at gd 15-18 for the 5000 ppm group, and gd 12-18 for the 10000 ppm group (Attachment 4).

(6) At gd 21, corrected body weight gain was significantly reduced for the 5000 ppm and 19500 ppm groups. Although not statistically significant, corrected body weight change was lower for the 10000 ppm group compared with the controls (Attachment 5).

(7) Maternal relative (to body weight) liver weight was significantly increased for all vinyl methyl ether exposure groups (Attachment 5).

(8) There were no dose-related statistically significant effects on implantations (total, viable, nonviable). The percent live fetuses was increased for the low and mid concentration groups, although this may be a statistical artifact (Attachment 6).

(9) Fetal body weights were similar to controls (Attachment 6).

(10) External, soft tissue and skeletal informations (totals, by category, or individually) were comparable between the control and vinyl methyl ether exposed groups (Attachment 7).

(11) Variations, total or by category, were comparable across all groups (Attachment 8).

(12) External and soft tissue individual variations were comparable across all groups. However, the following skeletal variations were increased in the vinyl ether exposed groups (Attachments 9A-9D):

19500 ppm: Anterior arch of the atlas - unossified
Cervical centrum #5 - unossified
Cervical centrum #6 - unossified
Cervical centrum #7 - unossified
Sternebra #4 - poorly ossified
Caudal segment - reduced
Forelimb proximal phalanges - unossified
All hindlimb proximal phalanges - unossified
Some hindlimb metatarsals - unossified

10000 ppm: Anterior arch of the atlas - unossified
Cervical centrum #5 - unossified
Cervical centrum #6 - unossified
Cervical centrum #7 - unossified
Sternebra #4 - poorly ossified
Caudal segments - reduced
Some hindlimb proximal phalanges - poorly ossified

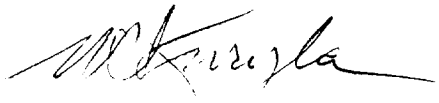
5000 ppm: Anterior arch of atlas - unossified
Sternebra #4 - poorly ossified
Some hindlimb proximal phalanges - poorly ossified

Comment: Exposure of pregnant CD rats to vinyl methyl ether vapor at concentrations of 5000 ppm and above produced evidence of maternal effects at all concentrations (body weight, body weight gain, food and water consumption, and increased relative liver weight. Fetotoxicity, present as skeletal variations, was present in an exposure concentration-related pattern at 5000 ppm and above. There was no evidence for embryotoxicity or malformations.

A copy of the final report of this study will be sent to the Agency promptly after we receive it.

Please contact the undersigned with questions, if any, at 203/794-5230.

Very truly yours,



William C. Kuryla, Ph.D.
Associate Director
Product Safety

WCK/cr
Attachments

ATTACHMENT 1

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS

SUMMARY OF DISTRIBUTION AND FATE[a]

GROUP: PPM	0	5000	10000	19500
FEMALES ON STUDY	25	25	25	25
FEMALES THAT DIED	0 0.0	0 0.0	0 0.0	0 0.0
PREGNANT	0 0.0	0 0.0	0 0.0	0 0.0
FEMALES THAT ABORTED	0 0.0	0 0.0	0 0.0	0 0.0
FEMALES THAT DELIVERED	0 0.0	0 0.0	0 0.0	0 0.0
FEMALES REMOVED FROM STUDY	0 0.0	0 0.0	0 0.0	0 0.0
FEMALES EXAMINED AT LAPAROTOMY	25 100.0	25 100.0	25 100.0	25 100.0
NONPREGNANT	0 0.0	1 4.0	1 4.0	0 0.0
PREGNANT	25 100.0	24 96.0	24 96.0	25 100.0
FEMALES WITH NON-VIABLE IMPLANTS ONLY	0 0.0	0 0.0	0 0.0	0 0.0
FEMALES WITH VIABLE FETUSES	25 100.0	24 100.0	24 100.0	25 100.0
FEMALES THAT WERE PREGNANT	25 100.0	24 96.0	24 96.0	25 100.0

[a] For all parameters, the data are presented as the number of dams on top and the percentage beneath.

ATTACHMENT 2A

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS
SUMMARY OF GESTATIONAL BODY WEIGHT AND WEIGHT CHANGE (GRAMS)

FEMALES

GROUP: PPM	0	5000	10000	19500
GESTATIONAL BODY WEIGHTS (g)				
DAY 0				
MEAN	225.54	226.04	225.96	225.39
S.D.	8.546	8.191	10.971	8.851
N	25	24	24	25
DAY 6				
MEAN	257.57	256.15	258.05	256.53
S.D.	11.642	8.346	12.702	10.589
N	25	24	24	25
DAY 9				
MEAN	264.71	261.27	262.01	257.21
S.D.	15.913	10.858	13.461	11.282
N	25	24	24	25
DAY 12				
MEAN	278.24	273.35	273.43	267.81**
S.D.	14.932	10.751	14.388	10.480
N	25	24	24	25
DAY 15				
MEAN	297.93	289.46*	288.92*	280.54**
S.D.	13.295	11.028	14.673	15.708
N	25	24	24	25
DAY 18				
MEAN	331.54	324.37	325.68	316.73**
S.D.	13.847	13.968	15.212	15.314
N	25	24	24	25
DAY 21				
MEAN	381.60	375.35	378.15	370.79
S.D.	16.842	20.724	16.606	16.463
N	25	24	24	25
GESTATIONAL BODY WEIGHT CHANGES (g)				
DAY 0 TO 6 (PRETREATMENT)				
MEAN	32.02	30.12	32.09	31.14
S.D.	6.422	5.579	4.832	5.905
N	25	24	24	25
DAY 6 TO 9				
MEAN	7.14	5.12	3.95*	0.67**
S.D.	7.458	4.772	4.131	5.423
N	25	24	24	25
DAY 9 TO 12				
MEAN	13.53	12.08	11.42	10.61
S.D.	8.112	4.040	5.221	4.482
N	25	24	24	25
DAY 12 TO 15				
MEAN	19.69	16.12	15.49	12.73**
S.D.	7.933	2.476	4.053	12.706
N	25	24	24	25
DAY 15 TO 18				
MEAN	33.61	34.91	36.76	36.19
S.D.	6.890	5.973	5.354	11.891
N	25	24	24	25
DAY 18 TO 21				
MEAN	50.06	50.98	52.47	54.06
S.D.	8.255	9.515	8.030	10.157
N	25	24	24	25
DAY 6 TO 15 (TREATMENT)				
MEAN	40.36	33.31**	30.87**	24.01**
S.D.	6.676	6.628	6.659	14.073
N	25	24	24	25

* Significantly different from control group ($p < .05$)
** Significantly different from control group ($p < .01$)

ATTACHMENT 2B

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS
SUMMARY OF GESTATIONAL BODY WEIGHT AND WEIGHT CHANGE (GRAMS)

FEMALES

GROUP: PPM	0	5000	10000	19500
DAY 15 TO 21 (POST-TREATMENT)				
MEAN	83.67	85.89	89.23	90.25
S.D.	8.824	13.016	11.330	13.211
N	25	24	24	25
DAY 0 TO 21 (GESTATION)				
MEAN	156.06	149.32	152.19	145.40
S.D.	13.845	17.808	14.186	9.717
N	25	24	24	25

None significantly different from control group

ATTACHMENT 3

DRAFT

TABLE 5

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS
SUMMARY OF GESTATIONAL FOOD CONSUMPTION (GRAMS/ANIMAL/DAY)

FEMALES

GROUP: PPM	0	5000	10000	19500
DAY 0 TO 3				
MEAN	19.69	19.84	19.71	19.18
S.D.	1.348	2.087	1.331	2.163
N	25	24	24	24
DAY 3 TO 6				
MEAN	21.20	21.47	21.51	20.81
S.D.	1.829	1.852	1.566	1.596
N	24	24	24	24
DAY 6 TO 9				
MEAN	20.36	19.11*	18.56**	16.89**
S.D.	2.355	1.560	1.799	1.831
N	25	24	23	25
DAY 9 TO 12				
MEAN	21.04	20.62	19.96	18.51**
S.D.	2.685	1.562	1.561	1.804
N	25	24	24	24
DAY 12 TO 15				
MEAN	22.45	21.99	21.35*	20.15**
S.D.	1.655	1.411	1.697	1.613
N	24	24	24	23
DAY 15 TO 18				
MEAN	24.87	25.08	25.31	25.14
S.D.	1.465	1.948	1.926	1.780
N	24	24	24	22
DAY 18 TO 21				
MEAN	25.03	25.62	25.99	25.96
S.D.	1.589	1.894	2.309	1.678
N	24	24	23	23
DAY 0 TO 6 (PRETREATMENT)				
MEAN	20.43	20.66	20.61	19.85
S.D.	1.389	1.562	1.307	1.610
N	24	24	24	23
DAY 6 TO 15 (TREATMENT)				
MEAN	21.31	20.57	19.95**	18.55**
S.D.	2.011	1.351	1.488	1.511
N	24	24	23	23
DAY 15 TO 21 (POST-TREATMENT)				
MEAN	24.95	25.35	25.63	25.57
S.D.	1.387	1.841	2.061	1.525
N	24	24	23	21

* Significantly different from control group ($p < .05$)
** Significantly different from control group ($p < .01$)
Data not included for animals with observed food spillage.

ATTACHMENT 4

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS
SUMMARY OF GESTATIONAL WATER CONSUMPTION (GRAMS/ANIMAL/DAY)

FEMALES

GROUP: PPM	0	5000	10000	19500
DAY 0 TO 3				
MEAN	34.75	34.50	37.14	34.95
S.D.	5.497	7.266	14.510	14.320
N	25	24	24	24
DAY 3 TO 6				
MEAN	35.74	34.47	35.16	33.35
S.D.	8.956	6.578	5.205	7.356
N	25	23	21	24
DAY 6 TO 9				
MEAN	35.65	35.00	35.40	36.39
S.D.	7.462	6.991	6.801	14.747
N	24	23	22	22
DAY 9 TO 12				
MEAN	38.02	40.73	42.48	40.51
S.D.	6.093	9.729	9.987	9.624
N	23	23	21	24
DAY 12 TO 15				
MEAN	43.70	50.24	52.87**	41.11
S.D.	8.717	11.463	13.963	12.441
N	25	19	21	19
DAY 15 TO 18				
MEAN	50.85	57.37*	60.94**	55.83
S.D.	8.221	10.534	11.819	12.511
N	23	21	23	18
DAY 18 TO 21				
MEAN	53.17	57.15	59.17	58.64
S.D.	12.933	11.859	14.006	16.606
N	23	20	18	22
DAY 0 TO 6 (PRETREATMENT)				
MEAN	35.24	34.49	35.17	33.68
S.D.	5.977	4.335	5.037	9.100
N	25	23	21	23
DAY 6 TO 15 (TREATMENT)				
MEAN	39.08	42.63	43.60	38.00
S.D.	6.719	9.091	8.153	7.022
N	22	18	19	18
DAY 15 TO 21 (POST-TREATMENT)				
MEAN	51.30	57.20	58.87	54.94
S.D.	9.322	10.456	11.528	11.670
N	21	18	18	16

* Significantly different from control group ($p < .05$)
** Significantly different from control group ($p < .01$)
Data not included for animals with observed water spillage.

ATTACHMENT 5

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS
SUMMARY OF MATERNAL ORGAN WEIGHTS (GRAMS)

FEMALES

GROUP: PPM	0	5000	10000	19500
INITIAL BODY WEIGHT (g)				
MEAN	225.54	226.04	225.96	225.39
S.D.	8.546	8.191	10.971	8.851
N	25	24	24	25
BODY WEIGHT AT SACRIFICE (g)				
MEAN	381.60	375.35	378.15	370.79
S.D.	16.842	20.724	16.606	16.463
N	25	24	24	25
GRAVID UTERINE WEIGHT (g)				
MEAN	102.239	105.900	104.638	102.005
S.D.	9.6089	12.6118	12.8777	10.9779
N	25	24	24	25
CORRECTED BODY WEIGHT (g)[a]				
MEAN	279.36	269.45	273.51	268.78
S.D.	14.293	13.988	18.702	15.420
N	25	24	24	25
CORRECTED WEIGHT CHANGE (g)[b]				
MEAN	53.82	43.42**	47.55	43.40**
S.D.	11.398	10.981	12.936	10.015
N	25	24	24	25
LIVER WEIGHT (g)				
MEAN	12.669	12.970	13.026	13.422
S.D.	1.1228	1.2493	1.6214	1.3948
N	25	24	24	25
LUNG WEIGHT (g)				
MEAN	1.521	1.483	1.491	1.543
S.D.	0.1707	0.1043	0.1338	0.1833
N	25	24	24	25
KIDNEY WEIGHT (g)				
MEAN	1.768	1.755	1.766	1.795
S.D.	0.1009	0.1654	0.1348	0.1429
N	25	24	24	25
RELATIVE LIVER WEIGHT (%)[c]				
MEAN	4.533	4.814*	4.756*	4.988**
S.D.	0.2941	0.4057	0.4338	0.3655
N	25	24	24	25
RELATIVE LUNG WEIGHT (%)[c]				
MEAN	0.544	0.551	0.546	0.575
S.D.	0.0540	0.0411	0.0363	0.0704
N	25	24	24	25
RELATIVE KIDNEY WEIGHT (%)[c]				
MEAN	0.634	0.651	0.647	0.668
S.D.	0.0398	0.0460	0.0476	0.0411
N	25	24	24	25

* Significantly different from control group ($p < .05$)
** Significantly different from control group ($p < .01$)
[a] Corrected body weight = body weight at sacrifice minus gravid uterine weight.
[b] Corrected weight change = corrected body weight minus initial body weight.
[c] Value is a percentage of corrected body weight.

ATTACHMENT 6

DRAFT

TABLE 9

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS
SUMMARY OF GESTATIONAL PARAMETERS

FEMALES

GROUP: PPM	0	5000	10000	19500
CORPORA LUTEA				
MEAN	16.4	15.7	16.0	15.8
S.D.	2.81	1.71	2.42	1.54
N	25	24	24	25
TOTAL IMPLANTS				
MEAN	14.7	14.9	14.9	15.0
S.D.	1.31	1.98	2.55	1.54
N	25	24	24	25
PERCENT PREIMPLANTATION LOSS[a]				
MEAN	9.7	5.1	7.3	5.7
S.D.	11.79	10.22	11.85	6.67
N	25	24	24	25
VIABLE IMPLANTS				
MEAN	13.8	14.3	14.5	13.9
S.D.	1.54	1.99	2.41	1.45
N	25	24	24	25
NON-VIABLE IMPLANTS				
MEAN	1.0	0.5	0.4**	1.1
S.D.	0.84	0.72	0.78	1.38
N	25	24	24	25
EARLY RESORPTIONS				
MEAN	0.9	0.5	0.4	1.0
S.D.	0.86	0.72	0.65	1.24
N	25	24	24	25
LATE RESORPTIONS				
MEAN	0.0	0.0	0.0	0.1
S.D.	0.00	0.00	0.20	0.33
N	25	24	24	25
DEAD FETUSES				
MEAN	0.0	0.0	0.0	0.0
S.D.	0.20	0.00	0.00	0.00
N	25	24	24	25
PERCENT LIVE FETUSES				
MEAN	93.5	96.4*	97.4**	93.1
S.D.	5.76	4.75	4.70	8.09
N	25	24	24	25
SEX RATIO (% MALE FETUSES)				
MEAN	45.8	53.8	49.5	51.1
S.D.	10.97	15.34	9.83	10.70
N	25	24	24	25
FETAL BODY WEIGHTS PER LITTER (GRAMS)				
ALL FETUSES				
MEAN	5.187	5.170	5.049	5.091
S.D.	0.2463	0.2984	0.3609	0.2674
N	25	24	24	25
MALE FETUSES				
MEAN	5.332	5.296	5.203	5.227
S.D.	0.2298	0.3178	0.3868	0.2631
N	25	24	24	25
FEMALE FETUSES				
MEAN	5.070	5.025	4.889	4.951
S.D.	0.2475	0.2987	0.3414	0.2818
N	25	24	24	25

* Significantly different from control group ($p < .05$)
** Significantly different from control group ($p < .01$)
[a] Percent preimplantation loss=[(corpora lutea - total implants)/corpora lutea] X 100.

ATTACHMENT 7

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS

SUMMARY OF MALFORMATIONS IN FETUSES AND LITTERS[a]

GROUP: PPM	FETUSES 0	5000	10000	19500	LITTERS 0	5000	10000	19500
TOTAL MALFORMATIONS								
NUMBER WITH EXTERNAL MALFORMATIONS	1	1	2	0	1	1	1	0
PERCENT WITH EXTERNAL MALFORMATIONS	0.3	0.3	0.6	0.0	4.0	4.2	4.2	0.0
NUMBER WITH SOFT TISSUE MALFORMATIONS	6	6	10	12	6	6	7	6
PERCENT WITH SOFT TISSUE MALFORMATIONS	3.4	3.4	5.6	6.7	24.0	25.0	29.2	24.0
NUMBER WITH SKELETAL MALFORMATIONS	3	1	1	1	2	1	1	1
PERCENT WITH SKELETAL MALFORMATIONS	1.0	0.6	0.6	0.6	8.0	4.2	4.2	4.0
TOTAL NUMBER WITH MALFORMATIONS	9	8	13	13	7	8	7	7
TOTAL PERCENT WITH MALFORMATIONS	2.6	2.3	3.7	3.7	28.0	33.3	29.2	28.0

None significantly different from control (0 PPM)

[a] For all findings, the number (of fetuses affected or litters with one or more affected fetuses) is presented on top and the percentage of the total (fetuses or litters) examined is presented beneath. A single fetus may be represented more than once in listing individual defects. Only live fetuses were examined.

[b] All fetuses were examined externally.

[c] Approximately 50% of each litter were examined viscerally (Staples, 1974), and for soft tissue craniofacial defects (Wilson, 1965; van Julsingha and Bennett, 1977).

[d] Approximately 50% of each litter were examined for skeletal defects after staining with Alizarin Red S.

ATTACHMENT 8

DRAFT

TABLE 11
VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS

SUMMARY OF VARIATIONS IN FETUSES AND LITTERS[a]

GROUP: PPM	FETUSES 0	5000	10000	19500	LITTERS 0	5000	10000	19500
TOTAL VARIATIONS								
NUMBER WITH EXTERNAL VARIATIONS	35	32	45	49	15	15	15	22
PERCENT WITH EXTERNAL VARIATIONS	10.2	9.3	12.9	14.1	60.0	62.5	62.5	88.0
NUMBER WITH SOFT TISSUE VARIATIONS	111	116	119	105	23	23	24	24
PERCENT WITH SOFT TISSUE VARIATIONS	62.0	65.5	66.1	50.7	92.0	95.8	100.0	96.0
NUMBER WITH SKELETAL VARIATIONS	165	167	168	168	25	24	24	25
PERCENT WITH SKELETAL VARIATIONS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL NUMBER WITH VARIATIONS	281	290	298	282	25	24	24	25
TOTAL PERCENT WITH VARIATIONS	81.7	84.3	85.6	81.3	100.0	100.0	100.0	100.0

None significantly different from control (0 PPM)

[a] For all findings, the number (of fetuses affected or litters with one or more affected fetuses) is presented on top and the percentage of the total (fetuses or litters) examined is presented beneath. A single fetus may be represented more than once in listing individual defects. Only live fetuses were examined.

[b] All fetuses were examined externally.

[c] Approximately 50% of each litter were examined viscerally (Staples, 1974), and for soft tissue craniofacial defects (Wilson, 1965; van Julsingha and Bennett, 1977).

[d] Approximately 50% of each litter were examined for skeletal defects after staining with Alizarin Red S.

ATTACHMENT 9A

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS

SUMMARY OF VARIATIONS IN FETUSES AND LITTERS[a]

GROUP: PPM	FETUSES 0	5000	10000	19500	LITTERS 0	5000	10000	19500
NUMBER EXAMINED SKELETALLY[d]	165	167	168	168	25	24	24	25
CERVICAL CENTRA #1,#2,#3 AND/OR #4 - POORLY OSSIFIED	72 43.6	61 36.5	40 23.8	50 29.8	23 92.0	22 91.7	17 70.8	20 80.0
CERVICAL CENTRA #1,#2,#3 AND/OR #4 - UNOSSIFIED	141 85.5	154 92.2	162 96.4	158 94.0	25 100.0	24 100.0	24 100.0	25 100.0
CERVICAL CENTRA #1,#2,#3 AND/OR #4 - BILOBED	23 13.9	16 9.6	4 2.4	11 6.5	14 56.0	10 41.7	4** 16.7	7 28.0
CERVICAL CENTRUM #5 - POORLY OSSIFIED	23 13.9	28 16.8	26 15.5	22 13.1	15 60.0	17 70.8	17 70.8	14 56.0
CERVICAL CENTRUM #5 - UNOSSIFIED	43 26.1	67 40.1	107 63.7	105 62.5	17 68.0	16 66.7	23* 95.8	23 92.0
CERVICAL CENTRUM #6 - POORLY OSSIFIED	28 17.0	27 16.2	33 19.6	31 18.5	18 72.0	18 75.0	21 87.5	13 52.0
CERVICAL CENTRUM #6 - UNOSSIFIED	40 24.2	68 40.7	98 58.3	104 61.9	17 68.0	19 79.2	23* 95.8	22 88.0
CERVICAL CENTRUM #7 - POORLY OSSIFIED	13 7.9	23 13.8	33 19.6	39 23.2	8 32.0	13 54.2	16* 66.7	18* 72.0
CERVICAL CENTRUM #7 - UNOSSIFIED	3 1.8	11 6.6	17 10.1	39 23.2	2 8.0	5 20.8	11** 45.8	15** 60.0
CERVICAL CENTRUM #7 - BILOBED	21 12.7	13 7.8	17 10.1	5 3.0	13 52.0	11 45.8	10 41.7	5* 20.0
ANTERIOR ARCH OF THE ATLAS - POORLY OSSIFIED	120 72.7	90 53.9	85 50.6	87 51.8	25 100.0	23 95.8	22 91.7	22 88.0
ANTERIOR ARCH OF THE ATLAS - UNOSSIFIED	29 17.6	57 34.1	69 41.1	73 43.5	11 44.0	21** 87.5	20** 83.3	21** 84.0

*= significantly different from control (0 PPM) at .05 level using two-tailed Fisher's exact test.
**= significantly different from control (0 PPM) at .01 level using two-tailed Fisher's exact test.
See footnotes on last page of table.

ATTACHMENT 9B

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS

SUMMARY OF VARIATIONS IN FETUSES AND LITTERS[a]

GROUP: PPM	FETUSES 0	5000	10000	19500	LITTERS 0	5000	10000	19500
NUMBER EXAMINED SKELETALLY[d]	165	167	160	160	25	24	24	25
LUMBAR CENTRUM #2 - SPLIT	0 0.0	0 0.0	0 0.0	1 0.6	0 0.0	0 0.0	0 0.0	1 4.0
LUMBAR ARCHES #2 - POORLY OSSIFIED	0 0.0	0 0.0	0 0.0	1 0.6	0 0.0	0 0.0	0 0.0	1 4.0
REDUCED NUMBER OF CAUDAL SEGMENTS (5 OR LESS)	9 5.5	11 6.6	21 12.5	21 12.5	4 16.0	7 29.2	12* 50.0	13* 52.0
RUDIMENTARY RIB #13 - THORACIC ARCH #13 - UNILATERAL	4 2.4	2 1.2	6 3.6	3 1.8	4 16.0	2 8.3	5 20.8	2 8.0
RUDIMENTARY RIB #14 - FIRST LUMBAR ARCH - UNILATERAL	0 0.0	0 0.0	1 0.6	0 0.0	0 0.0	0 0.0	1 4.2	0 0.0
RIB - WAVY	0 0.0	0 0.0	1 0.6	0 0.0	0 0.0	0 0.0	1 4.2	0 0.0
RIB - CALLUSED	0 0.0	0 0.0	1 0.6	0 0.0	0 0.0	0 0.0	1 4.2	0 0.0
BONE ISLAND - 1ST LUMBAR ARCH - UNILATERAL	0 0.0	1 0.6	0 0.0	0 0.0	0 0.0	1 4.2	0 0.0	0 0.0
RIB - SHORT	1 0.6	0 0.0	1 0.6	0 0.0	1 4.0	0 0.0	1 4.2	0 0.0
RUDIMENTARY RIB #13 - THORACIC ARCH #13 - BILATERAL	1 0.6	1 0.6	0 0.0	1 0.6	1 4.0	1 4.2	0 0.0	1 4.0
INTERPARIETAL - POORLY OSSIFIED	24 14.5	36 21.6	29 17.3	22 13.1	11 44.0	15 62.5	12 50.0	13 52.0
SUPRAOCCIPITAL - POORLY OSSIFIED	3 1.8	5 3.0	3 1.8	8 4.8	3 12.0	4 16.7	3 12.5	7 28.0

*= significantly different from control (0 PPM) at .05 level using two-tailed Fisher's exact test.
See footnotes on last page of table.

ATTACHMENT 9C

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS

SUMMARY OF VARIATIONS IN FETUSES AND LITTERS[a]

GROUP: PPM	FETUSES 0	5000	10000	19500	LITTERS 0	5000	10000	19500
NUMBER EXAMINED SKELETALLY[d]	165	167	168	168	25	24	24	25
PARIETAL - POORLY OSSIFIED	0 0.0	4 2.4	5 3.0	0 0.0	0 0.0	4 16.7	5* 20.8	0 0.0
ZYGOMATIC ARCH - POORLY OSSIFIED	8 4.8	11 6.6	11 6.5	5 3.0	7 28.0	8 33.3	7 29.2	5 20.0
SQUAMOSAL - POORLY OSSIFIED	4 2.4	9 5.4	5 3.0	4 2.4	4 16.0	7 29.2	5 20.8	4 16.0
HYOID - POORLY OSSIFIED	19 11.5	22 13.2	26 15.5	16 9.5	12 48.0	12 50.0	13 54.2	10 40.0
HYOID - UNOSSIFIED	4 2.4	3 1.8	4 2.4	3 1.8	2 8.0	3 12.5	2 8.3	2 8.0
FRONTAL BONE - POORLY OSSIFIED	0 0.0	1 0.6	0 0.0	1 0.6	0 0.0	1 4.2	0 0.0	1 4.0
EXOCCIPITAL - POORLY OSSIFIED	0 0.0	1 0.6	0 0.0	0 0.0	0 0.0	1 4.2	0 0.0	0 0.0
SOME PROXIMAL PHALANGES (FORELIMB) - POORLY OSSIFIED	68 41.2	72 43.1	67 39.9	82 48.8	22 88.0	23 95.8	24 100.0	24 96.0
SOME PROXIMAL PHALANGES (FORELIMB) - UNOSSIFIED	68 41.2	75 44.9	114 67.9	94 56.0	21 84.0	23 95.8	24 100.0	23 92.0
MAJORITY PROXIMAL PHALANGES (FORELIMB) - UNOSSIFIED	8 4.8	10 6.0	6 3.6	19 11.3	7 28.0	9 37.5	5 20.8	13 52.0
ALL PROXIMAL PHALANGES (FORELIMB) - UNOSSIFIED	2 1.2	10 6.0	6 3.6	13 7.7	2 8.0	7 29.2	5 20.8	9* 36.0
SOME PROXIMAL PHALANGES (HINDLIMB) - POORLY OSSIFIED	70 42.4	46 27.5	27 16.1	28 16.7	24 96.0	18* 75.0	14** 58.3	13** 52.0

*= significantly different from control (0 PPM) at .05 level using two-tailed Fisher's exact test.
**= significantly different from control (0 PPM) at .01 level using two-tailed Fisher's exact test.
See footnotes on last page of table.

ATTACHMENT 9D

DRAFT

VINYL METHYL ETHER (VME): DEVELOPMENTAL TOXICITY STUDY
OF MATERNALLY INHALED VAPOR IN CD® RATS

SUMMARY OF VARIATIONS IN FETUSES AND LITTERS[a]

GROUP: PPM	FETUSES 0	5000	10000	19500	LITTERS 0	5000	10000	19500
NUMBER EXAMINED SKELETALLY[d]	165	167	168	160	25	24	24	25
MAJORITY PROXIMAL PHALANGES (HINDLIMB) - POORLY OSSIFIED	0	2	0	2	0	2	0	2
	0.0	1.2	0.0	1.2	0.0	8.3	0.0	8.0
SOME PROXIMAL PHALANGES (HINDLIMB) - UNOSSIFIED	78	62	42	28	22	18	16	15
	47.3	37.1	25.0	16.7	88.0	75.0	66.7	60.0
MAJORITY PROXIMAL PHALANGES (HINDLIMB) - UNOSSIFIED	27	12	10	14	17	9*	9*	10
	16.4	7.2	6.0	8.3	68.0	37.5	37.5	40.0
ALL PROXIMAL PHALANGES (HINDLIMB) - UNOSSIFIED	49	88	113	124	16	21	20	24*
	29.7	52.7	67.3	73.8	64.0	87.5	83.3	96.0
SOME METATARSALS (HINDLIMB) - POORLY OSSIFIED	20	19	21	28	11	9	14	15
	12.1	11.4	12.5	16.7	44.0	37.5	58.3	60.0
SOME METATARSALS (HINDLIMB) - UNOSSIFIED	43	68	85	95	14	18	19	23**
	26.1	40.7	50.6	56.5	56.0	75.0	79.2	92.0
SOME METACARPALS (FORELIMB) - POORLY OSSIFIED	1	0	0	1	1	0	0	1
	0.6	0.0	0.0	0.6	4.0	0.0	0.0	4.0
STERNEBRA #4 - POORLY OSSIFIED	11	20	22	27	6	14*	14*	17**
	6.7	12.0	13.1	16.1	24.0	58.3	58.3	68.0
STERNEBRA #5 - POORLY OSSIFIED	90	92	87	81	25	24	24	24
	54.5	55.1	51.8	48.2	100.0	100.0	100.0	96.0
STERNEBRA #5 - BILOBED	45	37	46	57	19	19	18	21
	27.3	22.2	27.4	33.9	76.0	79.2	75.0	84.0
STERNEBRA #5 - UNOSSIFIED	4	4	5	4	4	4	4	3
	2.4	2.4	3.0	2.4	16.0	16.7	16.7	12.0
STERNEBRA #6 - POORLY OSSIFIED	3	1	8	12	3	1	3	8
	1.8	0.6	4.8	7.1	12.0	4.2	12.5	32.0

*= significantly different from control (0 PPM) at .05 level using two-tailed Fisher's exact test.
**= significantly different from control (0 PPM) at .01 level using two-tailed Fisher's exact test.
See footnotes on last page of table.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

William C. Kuryla, Ph.D.
Associate Director, Product Safety
Union Carbide Corporation
39 Old Ridgebury Road
Danbury, Connecticut 06817-0001

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

JAN 25 1994

This letter formally acknowledges EPA's receipt of information submitted by your organization under Section 8(e), the "substantial risk" information reporting provision of the Toxic Substances Control Act (TSCA). For your reference, copies of the first page(s) of your submission(s) are enclosed and display the TSCA Section 8(e) Document Control Number (i.e., 8EHQ-0000-0000 Init.) assigned by EPA to your submission(s). Please refer to this cited number when submitting follow-up or supplemental information.

Please note that all submitted correspondence will be placed in the public files unless confidentiality is claimed according to the procedures outlined in Part X of EPA's TSCA Section 8(e) policy statement (43 FR 11110, March 16, 1978).

Confidential submissions submitted pursuant to the TSCA Section 8(e) Compliance Audit Program (CAP) should already contain information supporting confidentiality claims, because substantiation of CBI claims is required at the same time the 8(e) CAP is submitted to EPA. (If not done so already, please ensure that this information is provided to the Agency). When substantiating any/all claims, answer the questions detailed in the following attachment.

For NON-CAP submissions, any confidentiality claims should be supported by submission of information as described in the attachment(s).

12719 A

Printed on Recycled Paper

CECATS\TRIAGE TRACKING DBASE ENTRY FORM

CECATS DATA:
Submission # 8EHQ- 1093-12719 SEQ A

TYPE: INT SUPP FLWP

SUBMITTER NAME: Union Carbide Corporation

INFORMATION REQUESTED: FLWP DATE:
0501 NO INFO REQUESTED
0502 INFO REQUESTED (TECH)
0503 INFO REQUESTED (VOL ACTIONS)
0504 INFO REQUESTED (REPORTING RATIONALE)

DISPOSITION:
0639 REFER TO CHEMICAL SCREENING
0678 CAP NOTICE

VOLUNTARY ACTIONS:
0401 NO ACTION REPORTED
0402 STUDIES PLANNED/UNDERWAY
0403 NOTIFICATION OF WORKER/OTHERS
0404 LABEL/MSDS CHANGES
0405 PROCESS/HANDLING CHANGES
0406 APP./USE DISCONTINUED
0407 PRODUCTION DISCONTINUED
0408 CONFIDENTIAL

SUB. DATE: 10/01/93 OTS DATE: 10/05/93 CSRAD DATE: 10/25/93

CHEMICAL NAME:

CAS#
107-25-5

INFORMATION TYPE:		P F C	INFORMATION TYPE:		P F C	INFORMATION TYPE:		P F C
0201	ONCO (HUMAN)	01 02 04	0216	EPI/CLIN	01 02 04	0241	IMMUNO (ANIMAL)	01 02 04
0202	ONCO (ANIMAL)	01 02 04	0217	HUMAN EXPOS (PROD CONTAM)	01 02 04	0242	IMMUNO (HUMAN)	01 02 04
0203	CELL TRANS (IN VITRO)	01 02 04	0218	HUMAN EXPOS (ACCIDENTAL)	01 02 04	0243	CHEM/PHYS PROP	01 02 04
0204	MUTA (IN VITRO)	01 02 04	0219	HUMAN EXPOS (MONITORING)	01 02 04	0244	CLASTO (IN VITRO)	01 02 04
0205	MUTA (IN VIVO)	01 02 04	0220	ECO/AQUA TOX	01 02 04	0245	CLASTO (ANIMAL)	01 02 04
0206	REPRO/TERATO (HUMAN)	01 02 04	0221	ENV. OCCC/REL/FATE	01 02 04	0246	CLASTO (HUMAN)	01 02 04
0207	REPRO/TERATO (ANIMAL)	01 02 04	0222	EMER INCI OF ENV CONTAM	01 02 04	0247	DNA DAM/REPAIR	01 02 04
0208	NEURO (HUMAN)	01 02 04	0223	RESPONSE REQEST DELAY	01 02 04	0248	PROD/USE/PROC	01 02 04
0209	NEURO (ANIMAL)	01 02 04	0224	PROD/COMP/CHEM ID	01 02 04	0251	MSDS	01 02 04
0210	ACUTE TOX. (HUMAN)	01 02 04	0225	REPORTING RATIONALE	01 02 04	0299	OTHER	01 02 04
0211	CHR. TOX. (HUMAN)	01 02 04	0226	CONFIDENTIAL	01 02 04			
0212	ACUTE TOX. (ANIMAL)	01 02 04	0227	ALLERG (HUMAN)	01 02 04			
0213	SUB ACUTE TOX (ANIMAL)	01 02 04	0228	ALLERG (ANIMAL)	01 02 04			
0214	SUB CHRONIC TOX (ANIMAL)	01 02 04	0239	METAB/PHARMACO (ANIMAL)	01 02 04			
0215	CHRONIC TOX (ANIMAL)	01 02 04	0240	METAB/PHARMACO (HUMAN)	01 02 04			

TRIAGE DATA:

NON-CBI INVENTORY	ONGOING REVIEW	SPECIES	TOXICOLOGICAL CONCERN:	USE:	PRODUCTION:
YES (CONTINUE)	YES (DROP/REFER)	RAT	LOW L/M - effects at 5000 ppm		
NO (DROP)	NO (CONTINUE)		MED		
DETERMINE	REFER:		HIGH		

COMMENTS: Non-Cap

CPCATS/TRIAGE TRACKING DBASE ENTRY FORM

CPCATS DATA:
Submission # 8EHQ 1093-12719 SEQ B

TYPE: INT SUPP PLWP

SUBMITTER NAME: Union Carbide Corporation

SUB. DATE: 10/07/93 OTS DATE: 10/14/93 CSRAD DATE: 01/10/94

INFORMATION REQUESTED PLWP DATE:
0501 NO INFO REQUESTED
0502 INFO REQUESTED (TECH)
0503 INFO REQUESTED (VOL ACTIONS)
0504 INFO REQUESTED (REPORTING RATIONALE)

DISPOSITION:
0639 REFER TO CHEMICAL SCREENING
0678 CAP NOTICE

VOLUNTARY ACTIONS
0401 NO ACTION REQ
0402 STUDIES PLANNED
0403 NOTIFICATION
0404 LABEL/MSDS
0405 PROCESS/HANDLING
0406 APP./USE DISCON
0407 PRODUCTION DISC
0408 CONFIDENTIAL

CHEMICAL NAME:

CAS#
107-25-5

INFORMATION TYPE:		P F C
0201	ONCO (HUMAN)	01 02 04
0202	ONCO (ANIMAL)	01 02 04
0203	CELL TRANS (IN VITRO)	01 02 04
0204	MUTA (IN VITRO)	01 02 04
0205	MUTA (IN VIVO)	01 02 04
0206	REPRO/TERATO (HUMAN)	01 02 04
0207	REPRO/TERATO (ANIMAL)	01 02 04
0208	NEURO (HUMAN)	01 02 04
0209	NEURO (ANIMAL)	01 02 04
0210	ACUTE TOX. (HUMAN)	01 02 04
0211	CHR. TOX. (HUMAN)	01 02 04
0212	ACUTE TOX. (ANIMAL)	01 02 04
0213	SUB ACUTE TOX (ANIMAL)	01 02 04
0214	SUB CHRONIC TOX (ANIMAL)	01 02 04
0215	CHRONIC TOX (ANIMAL)	01 02 04

INFORMATION TYPE:		P F C
0216	EPI/CLIN	01 02 04
0217	HUMAN EXPOS (PROD CONTAM)	01 02 04
0218	HUMAN EXPOS (ACCIDENTAL)	01 02 04
0219	HUMAN EXPOS (MONITORING)	01 02 04
0220	ECO/AQUA TOX	01 02 04
0221	ENV. OCCC/REL/FATE	01 02 04
0222	EMER INCI OF ENV CONTAM	01 02 04
0223	RESPONSE REQEST DELAY	01 02 04
0224	PROD/COMP/CHEM ID	01 02 04
0225	REPORTING RATIONALE	01 02 04
0226	CONFIDENTIAL	01 02 04
0227	ALLERG (HUMAN)	01 02 04
0228	ALLERG (ANIMAL)	01 02 04
0239	METAB/PHARMACO (ANIMAL)	01 02 04
0240	METAB/PHARMACO (HUMAN)	01 02 04

INFORMATION TYPE:	
0241	IMMUNO (ANIMAL)
0242	IMMUNO (HUMAN)
0243	CHEM/PHYS PROP
0244	CLASTO (IN VITRO)
0245	CLASTO (ANIMAL)
0246	CLASTO (HUMAN)
0247	DNA DAM/REPAIR
0248	PROD/USE/PROC
[redacted]	MSDS
0299	OTHER

TRIAGE DATA: NON-CBI INVENTORY	ONGOING REVIEW	SPECIES	TOXICOLOGICAL CONCERN:	USE:
YES (CONTINUE)	YES (DROP/REFER)	RAT	LOW	
NO (DROP)	NO (CONTINUE)		MED	
DETERMINE	REFER: Inhalation		HIGH	

COMMENTS: Non-Cap Reductions in maternal weight at 10,000 ppm

CECATS\TRI/ GE TRACKING DBASE ENTRY FORM

CECATS DATA:
Submission # 8EHQ-0394-12719 SEQ. 6

TYPE: INT. SUPP FLWP

SUBMITTER NAME: Union Carbide Corporation

INFORMATION REQUESTED: FLWP DATE:
0501 NO INFO REQUESTED
0502 INFO REQUESTED (TECH)
0503 INFO REQUESTED (VOL ACTIONS)
0504 INFO REQUESTED (REPORTING RATIONALE)

DISPOSITION:
0639 REFER TO CHEMICAL SCREENING
0678 CAP NOTICE

VOLUNTARY ACTIONS:
0401 NO ACTION REPORTED
0402 STUDIES PLANNED/UNDERWAY
0403 NOTIFICATION OF WORKERS/USERS
0404 LABEL/MSDS CHANGES
0405 PROCESS/HANDLING CHANGES
0406 APP./USE DISCONTINUED
0407 PRODUCTION DISCONTINUED
0408 CONFIDENTIAL

SUB. DATE: 02/25/94 OTS DATE: 03/04/94 CSRAD DATE: 03/15/94

CHEMICAL NAME:

CAS#
107-25-5

INFORMATION TYPE:		P F C	INFORMATION TYPE:		P F C	INFORMATION TYPE:		P F C
0201	ONCO (HUMAN)	01 02 04	0216	EPI/CLIN	01 02 04	0241	IMMUNO (ANIMAL)	01 02 04
0202	ONCO (ANIMAL)	01 02 04	0217	HUMAN EXPOS (PROD CONTAM)	01 02 04	0242	IMMUNO (HUMAN)	01 02 04
0203	CELL TRANS (IN VITRO)	01 02 04	0218	HUMAN EXPOS (ACCIDENTAL)	01 02 04	0243	CHEM/PHYS PROP	01 02 04
0204	MUTA (IN VITRO)	01 02 04	0219	HUMAN EXPOS (MONITORING)	01 02 04	0244	CLASTO (IN VITRO)	01 02 04
0205	MUTA (IN VIVO)	01 02 04	0220	ECO/AQUA TOX	01 02 04	0245	CLASTO (ANIMAL)	01 02 04
0206	REPRO/TERATO (HUMAN)	01 02 04	0221	ENV. OCCC/REL/FATE	01 02 04	0246	CLASTO (HUMAN)	01 02 04
0207	REPRO/TERATO (ANIMAL)	01 02 04	0222	EMER INCI OF ENV CONTAM	01 02 04	0247	DNA DAM/REPAIR	01 02 04
0208	NEURO (HUMAN)	01 02 04	0223	RESPONSE REQEST DELAY	01 02 04	0248	PROD/USE/PROC	01 02 04
0209	NEURO (ANIMAL)	01 02 04	0224	PROD/COMP/CHEM ID	01 02 04	0251	MSDS	01 02 04
0210	ACUTE TOX. (HUMAN)	01 02 04	0225	REPORTING RATIONALE	01 02 04	0299	OTHER	01 02 04
0211	CHR. TOX. (HUMAN)	01 02 04	0226	CONFIDENTIAL	01 02 04			
0212	ACUTE TOX. (ANIMAL)	01 02 04	0227	ALLERG (HUMAN)	01 02 04			
0213	SUB ACUTE TOX (ANIMAL)	01 02 04	0228	ALLERG (ANIMAL)	01 02 04			
0214	SUB CHRONIC TOX (ANIMAL)	01 02 04	0239	METAB/PHARMACO (ANIMAL)	01 02 04			
0215	CHRONIC TOX (ANIMAL)	01 02 04	0240	METAB/PHARMACO (HUMAN)	01 02 04			

TRIAGE DATA:	NON-CBI INVENTORY	ONGOING REVIEW	SPECIES	TOXICOLOGICAL CONCERN:	USE:	PRODUCTION:
	YES	YES (DROP/REFER)	RAT	LOW		
	NO	NO (CONTINUE)		MED		
	DETERMINE	REFER:		HIGH		

COMMENTS: Non-CAP Inhalation
Concentration-dependent toxicity at all levels (5000, 10,000, 19500ppm): reduced body wt gain, increased liver weight.
Increased incidence of delayed fetal ossification at all levels.