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

APR 12 1996

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM:

SUBJECT: Review Revised Worker Exposure Assessment for Suttocide A (50% solution) and Germall II (50% solution).

FROM: George Tompkins, Ph.D, Entomologist
Special Review and Registration Section II

TO: Marion Johnson, PM #31
Registration Division (7505C)

THRU: Mark Dow, Ph.D., Section Head
Special Review and Registration Section II

Larry C. Dorsey, Chief
Occupational and Residential Exposure Branch
Health Effects Division (7509C)

The Occupational and Residential Exposure Branch (OREB) has been requested to review a revised PHED exposure assessment (MRID No. 43921201) for Suttocide A (50% solution) and Germall II (50% solution).

DP Baracode: D223894, D223895

Pesticide Chemical Code: 128971 (Germall II); 128972 (Suttocide A)

EPA Reg. No.: 57978-A and 57978-L; 57978-G and 57978-U

MRID No.: 43921201

PHED: Yes, Version 1.1

128972

I. INTRODUCTION:

A. Background:

Sutton Laboratories has submitted a revised worker exposure to Suttocide A (50% solution) and Germall II (50% solution). The active ingredient of Germall II (N-(hydroxymethyl)-N-(1,3-dihydromethyl-2,5-dioxo-4-imidazolidinyl)-N'-(hydroxymethyl)urea) is diazolidinyl urea. The active ingredient of Suttocide A is sodium hydroxymethylglycinate. Both Suttocide A and Germall II are currently used in a variety of products as bacterial, mold, or yeast inhibitors.

Information from the submitted revised exposure assessment by the registrant indicated a NOAEL for Germall II from a 90-day rat study to be 300 mg/kg bw/day and for Suttocide A from a 90-day rat study to be 160 mg/kg bw/day. Since no official Agency NOELs have been established because of limited studies, for purposes of this review the calculated MOE's will only be tentative.

B. Purpose:

OREB has been requested to review a revised PHED exposure assessment submitted by Sutton Laboratories, Inc. In the submitted assessment it was concluded that the MOEs calculated indicated that the referenced products could be expected to produce minimal exposure when handled according to label instructions.

II. DETAILED CONSIDERATIONS:

A. Comments on Submitted PHED analysis (provided by Tracey Keigwin of OREB) and OREB's Assessment:

1. The specifications should be included for each PHED run.

2. The PHED runs should be based on a minimum number of 15 replicates per body part and "A" or "B" grades. The EPA PHED reviewer may also choose to use "C" grade in their evaluation in certain cases.

3. The use of Grade "C" data for handrinse is no longer acceptable for PHED version 1.1. The handrinse data in PHED V1.1 have been regraded based on the substitution of travel spikes or storage stability for field data.

4. The clothing scenarios for the PHED runs should be based on a long sleeve shirt, long pants and gloves scenario. These clothing parameters were based on the labels provided in the documents: Krieger, R., C. Sandusky, and F. Hawk. 1993."Worker Exposure Assessment for Germall II 50% Solution", MRID No. 42728601, and Krieger, R. 1992. "Worker Exposure Assessment for Suttocide A 50% Solution", MRID No. 42610101. It should be noted that EPA has on file two different labels for Germall 50% solution and also two different labels for Suttocide A 50% (same year). The protective

clothing requirements on the labels are not consistent for the same product.

5. These OREB runs were subsetted according to the projected use patterns specified in the above worker exposure studies. The studies that were chosen from PHED to estimate exposure reflect as closely as possible the projected lbs ai of product handled by the mixer/loader. See PHED attachment for further details.

6. PHED selects the appropriate median, mean or geometric mean value based on the distribution type of the observations. It is inappropriate to select the median for all calculations.

B. OREB's tentative MOE calculations are based on the following assumptions (TABLE ONE).

The 50% solutions are provided in 20 kg and 250 kg containers. These products are then mixed with the consumer product to reach a final concentration of 0.5% ai. It was assumed that no more than three 20 kg containers or more than one 250 kg container are used each day.

TABLE ONE ASSUMPTIONS	
Mixer/loader weight	70 kg
PHED Mixer/loader combined dermal and inhalation unit of exposure in open system when 66 lb ai are handled[1]	54.9837 ug/lb ai
PHED Mixer/loader combined dermal and inhalation unit of exposure in open system when 275 lb ai are handled[1]	47.0245 ug/lb ai
PHED Mixer/loader combined dermal and inhalation unit of exposure in closed system[1]	15.5764 ug/lb ai

[1] PHED run with protective clothing consisting of long pants, long sleeve shirt, and glove scenario.

III. CONCLUSIONS:

Based on the NOEL values provided by the registrant of 300 mg/kg/day for Germall II and 160 mg/kg/day for Suttocide A the MOE values calculated, using the OREB PHED exposure values, were somewhat lower than those proposed by the registrant. In TABLE TWO a comparison is made between the registrants calculated MOE values using a protective clothing scenario consisting of long pants and long sleeves (from Table 1B) to that calculated in OREB using the PHED units of exposure, which utilized a clothing scenario

consisting of long pants, long sleeve shirt, and gloves.

TABLE TWO COMPARISON OF MOE VALUES				
	Open Mixing/loading		Closed M/L	
	Proposed	OREB	Proposed	OREB
Germall MOE (for 66 lb ai)	10000	5786.8	38000	20427
Germall MOE (for 275 lb ai)	2400	1623.9	9090	4902.5
Suttocide MOE (for 66 lb ai)	5300	3086	20250	10894
Suttocide MOE (for 275 lb ai)	1280	866	4848	2614.7

The resulting calculated MOE values ranged from 866 for Suttocide A in an open mixing system to 20427 for Germall II in a closed system. These MOEs indicate that if the products are used according to label instructions that they might produce acceptable risk. **However, these MOE values are only considered tentative since no official NOEL values have been established and all calculations were based on the registrants proposed NOEL values.** A copy of this review is forwarded to RCAB/HED. RD should consult with RCAB for approval of the NOEL's and subsequent MOE's.

The protective clothing requirements on the labels were noted not to be consistent for the same product (See II. 4- Detailed considerations).

Attachment (1)

CC: RCAB
G. Tompkins
Chemical File : 128971 (Germall II) and 128972 Suttocide A)

APPENDIX I. Exposure Calculations

Total ai handled per day:

a. When three 20 kg containers are used = 66 lb ai/day
b. When one 250 kg container is used = 275 lb ai/day

Daily Exposure:

a. Open mixing/loading for 66 lb ai/day:
54.9837 ug/lb ai x 66 lb ai/day ÷ 70 kg = 51.842 ug/kg bw/day
(51.842 ug/kg/day = 0.051842 mg/kg/day)

b. Open mixing/loading for 275 lb ai/day:
47.0245 ug/lb ai x 275 lb ai/day ÷ 70 kg = 184.739 ug/kg bw/day

c. Closed mixing/loading for 66 lb ai/day:
15.576 ug/lb ai x 66 lb ai/day ÷ 70 kg = 14.686 ug/kg bw/day

d. Closed mixing/loading for 275 lb ai/day:
15.576 ug/lb ai x 275 lb ai/day ÷ 70 kg = 61.193 ug/kg bw/day

An official EPA NOEL for Germall II or Suttocide A has not been established. For purposes of comparison in this review the NOEL provided by the registrant of 300 mg/kg/day for Germall II and 160 mg/kg/day for Suttocide A will be used as cited on p.6 of MRID No. 43921201. These values may have to be recalculated when an official NOEL has been established for Germall II and/or Suttocide A if they differ significantly from the provided NOEL values.

$$MOE = \frac{NOEL}{Dose}$$

Open mixing/loading:

a) 66 lbs ai/day:

$$\text{Germall II} = \frac{300 \text{ mg/kg bw/day}}{0.051842 \text{ mg/kg/day}} = 5786.8$$

$$\text{Suttocide A} = \frac{160 \text{ mg/kg bw/day}}{0.051842 \text{ mg/kg/day}} = 3086.42$$

b) 275 lbs ai/day

$$\text{Germall II} = \frac{300 \text{ mg/kg bw/day}}{0.184739 \text{ mg/kg/day}} = 1623.91$$

$$\text{Suttocide A} = \frac{160 \text{ mg/kg bw/day}}{0.184739 \text{ mg/kg/day}} = 866.08$$

Closed mixing/loading:

a) 66 lbs ai/day:

Germall II = $\frac{300 \text{ mg/kg bw/day}}{0.014686 \text{ mg/kg/day}}$ = 20427.62

Suttocide A = $\frac{160 \text{ mg/kg bw/day}}{0.014686 \text{ mg/kg/day}}$ = 10894.73

b) 275 lbs ai/day

Germall 11 = $\frac{300 \text{ mg/kg bw/day}}{0.061193 \text{ mg/kg/day}}$ = 4902.52

Suttocide A = $\frac{160 \text{ mg/kg bw/day}}{0.061193 \text{ mg/kg/day}}$ = 2614.68

DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR CALCULATED DERMAL EXPOSURES

SCENARIO: Long pants, long sleeves, gloves **LIQUID/OPEN MIXING**

PATCH LOCATION	DISTRIB. TYPE	MICROGRAMS PER LB AI MIXED Median	Mean	Coef of Var	Geo. Mean	Obs.
HEAD (ALL)	Other	3.835	155.504	467.4075	4.6099	92
NECK.FRONT	Lognormal	1.6125	26.9211	361.4399	1.6753	74
NECK.BACK	Lognormal	.341	17.9427	383.7878	.633	80
UPPER ARMS	Other	1.746	230.4815	750.4237	2.3492	61
CHEST	Lognormal	5.68	23.1916	241.7888	5.5004	67
BACK	Other	1.9525	12.3013	198.453	2.4974	66
FOREARMS	Lognormal	1.936	5.6672	179.1925	1.5512	55
THIGHS	Lognormal	3.82	18.809	184.2315	4.8394	63
LOWER LEGS	Other	1.309	4.0424	309.2371	1.1682	66
FEET	Lognormal	5.371	346.998	180.1404	19.5296	25
HANDS	Lognormal	8.0943	51.0123	264.6377	5.0791	51
TOTAL DERM:	47.6505	35.6973	892.8711		49.4327	

95% C.I. on Mean: Dermal: [-15626.5548, 17412.297]

Data File: MIXER/LOADER
Number of Records: 108
Subset Name: LIQ1.OPN.66.MLOD

ADD INHALATION | CHANGE HEAD | LB AI TO KG AI | EXIT

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Subset Specifications for LIQ1.OPN.66.MLOD

With Dermal Grade Uncovered Equal to "A" "B"
Subset originated from LIQ.OPN.66.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 1 and
With Total lb ai Mixed Less than or Equal to 66
Subset originated from MLOD.FILE

DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR CALCULATED DERMAL EXPOSURES

SCENARIO: Long pants, long sleeves, gloves

PATCH LOCATION	DISTRIB. TYPE	MICROGRAMS PER LB AI MIXED Median	Mean	Coef of Var	Geo. Mean	Obs.
HEAD (ALL)	Lognormal	2.73	170.8184	452.6671	4.5845	81
NECK.FRONT	Lognormal	1.56	27.3226	373.3693	1.4611	67
NECK.BACK	Lognormal	.517	19.3664	381.1581	.6335	69
UPPER ARMS	Other	1.6005	270.283	693.0078	2.5555	52
CHEST	Lognormal	7.2775	24.6909	240.4943	6.1262	58
BACK	Other	2.13	16.3861	193.8851	2.7896	57
FOREARMS	Lognormal	2.6015	6.8444	158.1906	1.9054	46
THIGHS	Lognormal	3.82	19.1066	182.5443	4.9354	58
LOWER LEGS	Other	.952	4.3871	300	1.1117	60
FEET	Lognormal	5.371	346.998	180.1404	19.5296	25
HANDS	Lognormal	23.8917	76.7485	195.6665	11.3706	44
TOTAL DERM:	55.2288	52.4512	982.952		57.0031	

95% C.I. on Mean: Dermal: [-17748.3686, 19714.2726]

Data File: MIXER/LOADER

Number of Records: 97
Subset Name: LIQ2.OPN.66.MLOD

ADD INHALATION | CHANGE HEAD | LB AI TO KG AI | EXIT

<< Specifications >>

Subset Specifications for LIQ2.OPN.66.MLOD

With Hand Grade Equal to "A" "B"
Subset originated from LIQ.OPN.66.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 1 and
With Total lb ai Mixed Less than or Equal to 66
Subset originated from MLOD.FILE

DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR INHALATION EXPOSURES

	DISTRIB. TYPE	NANOGRAMS PER LB AI MIXED Median	Mean	Coef of Var	Geo. Mean	Obs.
EXPOSURE	Other	1041.6667	4738.2844	204.241	1133.248	58

95% C.I. on Geo. Mean: [27.1605, 47283.7658]
Number of Records: 63
Data File: MIXER/LOADER Subset Name: LIQ3.OPN.66.MLOD

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Subset Specifications for LIQ3.OPN.66.MLOD

With Airborne Grade Equal to "A" "B"
Subset originated from LIQ.OPN.66.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 1 and
With Total lb ai Mixed Less than or Equal to 66
Subset originated from MLOD.FILE

EXPOSURE
Based on a long sleeve shirt, long pants and glove clothing scenario

Dermal Exposure = 53.9420 µg/lb ai M/L

Inhalation Exposure = 1.0417 µg/lb ai M/L

PHED VERSION 1.1

DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR CALCULATED DERMAL EXPOSURES

SCENARIO: Long pants, long sleeves, gloves **LIQUID/OPEN MIXING**

PATCH LOCATION	DISTRIB. TYPE	MICROGRAMS PER LB AI MIXED Median	Mean	Coef of Var	Geo. Mean	Obs.
HEAD (ALL)	Other	3.25	133.3356	485.444	4.4123	117
NECK.FRONT	Lognormal	1.83	24.1098	354.3136	1.8201	99
NECK.BACK	Lognormal	.341	16.3085	374.2226	.6231	105
UPPER ARMS	Other	.873	164.9902	882.9723	1.5975	86
CHEST	Other	4.97	19.6556	259.492	3.6176	87
BACK	Other	1.065	11.2568	218.881	1.964	86
FOREARMS	Other	.726	4.6298	206.7541	.9496	80
THIGHS	Lognormal	3.82	17.2897	193.5135	4.3079	69
LOWER LEGS	Other	.952	3.5638	326.1042	1.0556	77
FEET	Lognormal	5.371	346.998	180.1404	19.5296	25
HANDS	Lognormal	3.842	36.5075	308.3503	3.8853	76
TOTAL DERM:	42.002	27.04	778.6453		43.7626	

95% C.I. on Mean: Dermal: [-12255.0074, 13812.298]

Data File: MIXER/LOADER

Number of Records: 133
Subset Name: LIQ1.OPN.275.MLOD

ADD INHALATION | CHANGE HEAD | LB AI TO KG AI | EXIT

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Subset Specifications for LIQ1.OPN.275.MLOD

With Dermal Grade Uncovered Equal to "A" "B"
Subset originated from LIQ.OPN.275.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 1 and
With Total lb ai Mixed Less than or Equal to 275
Subset originated from MLOD.FILE

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DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR CALCULATED DERMAL EXPOSURES

SCENARIO: Long pants, long sleeves, gloves

PATCH LOCATION	DISTRIB. TYPE	MICROGRAMS PER LB AI MIXED Median	Mean	Coef of Var	Geo. Mean	Obs.
HEAD (ALL)	Lognormal	2.08	150.5103	483.0993	3.5888	92
NECK.FRONT	Lognormal	1.2675	23.73	399.8567	1.1183	78
NECK.BACK	Loghormal	.3465	16.8757	407.6021	.453	80
UPPER ARMS	Other	.873	224.6381	757.5719	2.0064	63
CHEST	Lognormal	6.035	22.8035	247.7742	4.5771	68
BACK	Other	1.065	15.7101	204.6174	2.3337	67
FOREARMS	Lognormal	1.21	6.2347	175.6251	1.3029	57
THIGHS	Other	3.82	17.1782	194.3615	4.1861	65
LOWER LEGS	Other	.714	3.955	313.7421	1.0415	68
FEET	Lognormal	5.371	346.998	180.1404	19.5296	25
HANDS	Lognormal	11.5385	62.3235	220.0719	7.8661	55
TOTAL DERM:	44.9078	34.3205	890.9571		48.0035	

95% C.I. on Mean: Dermal: [-15265.2358, 17047.15]

Data File: MIXER/LOADER
Number of Records: 108
Subset Name: LIQ2.OPN.275.MLOD

ADD INHALATION | CHANGE HEAD | LB AI TO KG AI | EXIT

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Subset Specifications for LIQ2.OPN.275.MLOD

With Hand Grade Equal to "A" "B"
Subset originated from LIQ.OPN.275.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 1 and
With Total lb ai Mixed Less than or Equal to 275
Subset originated from MLOD.FILE

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DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR INHALATION EXPOSURES

	DISTRIB. TYPE	NANOGRAMS PER LB AI MIXED Median	Mean	Coef of Var	Geo. Mean	Obs.
EXPOSURE	Other	1041.6667	3691.8663	226.8	696.3788	81

95% C.I. on Geo. Mean: [10.4711, 46312.7739]
Number of Records: 88
Data File: MIXER/LOADER Subset Name: LIQ3.OPN.275.MLOD

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Subset Specifications for LIQ3.OPN.275.MLOD

With Airborne Grade Equal to "A" "B"
Subset originated from LIQ.OPN.275.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 1 and
With Total lb ai Mixed Less than or Equal to 275
Subset originated from MLOD.FILE

EXPOSURE
Based on a long sleeve shirt, long pants and glove clothing scenario

Dermal Exposure = 45.9828 µg/lb ai M/L

Inhalation Exposure = 1.0417 µg/lb ai M/L

47.025

PHED VERSION 1.1

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DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR CALCULATED DERMAL EXPOSURES

SCENARIO: Long pants, long sleeves, gloves **LIQUID/Closed Mixing**

PATCH LOCATION	DISTRIB. TYPE	MICROGRAMS PER LB AI MIXED Median	Mean	Coef of Var	Geo. Mean	Obs.
HEAD (ALL)	Lognormal	.65	1.69	125.1657	.9613	22
NECK.FRONT	Lognormal	.3075	1.5484	273.4371	.2747	22
NECK.BACK	Other	.055	.4515	283.9646	.0755	22
UPPER ARMS	Lognormal	1.455	1.6906	63.3917	1.3606	21
CHEST	Lognormal	1.9525	2.3963	52.3056	2.1279	16
BACK	Lognormal	1.9525	2.3963	52.3056	2.1279	16
FOREARMS	Lognormal	.605	.6914	64.8105	.5461	21
THIGHS	Lognormal	2.101	2.7218	58.4025	2.3682	16
LOWER LEGS	Lognormal	1.19	1.4733	66.7278	1.1963	21
FEET						0
HANDS	Lognormal	4.7606	8.575	126.021	3.3916	22
TOTAL DERM:	14.4096	15.0291	23.6346		14.4301	

95% C.I. on Mean: Dermal: [-138.4484, 185.7176]

Number of Records: 22
Data File: MIXER/LOADER Subset Name: LIQ1.CLSD.275.MLOD

ADD INHALATION CHANGE HEAD LB AI TO KG AI EXIT

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Subset Specifications for LIQ1.CLSD.275.MLOD

With Dermal Grade Uncovered Equal to "A" "B" "C"
Subset originated from LIQ.CLSD.275.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 2 3 and
With Total lb ai Mixed Less than or Equal to 275
Subset originated from MLOD.FILE

DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR CALCULATED DERMAL EXPOSURES

SCENARIO: Long pants, long sleeves, gloves.

PATCH LOCATION	DISTRIB. TYPE	MICROGRAMS PER LB AI MIXED Median	Mean	Coef of Var	Geo. Mean	Obs.
HEAD (ALL)	Lognormal	.65	1.1547	95.9383	.8397	17
NECK.FRONT	Lognormal	.36	1.7303	276.374	.2987	17
NECK.BACK	Other	.055	.3818	352.2001	.0679	17
UPPER ARMS	Lognormal	1.455	1.8829	55.7544	1.6352	17
CHEST	Lognormal	1.9525	2.3963	52.3056	2.1279	16
BACK	Lognormal	1.9525	2.3963	52.3056	2.1279	16
FOREARMS	Lognormal	.605	.7758	57.5922	.6528	17
THIGHS	Lognormal	2.101	2.7218	58.4025	2.3682	16
LOWER LEGS	Lognormal	1.19	1.652	59.0678	1.4379	17
FEET						0
HANDS	Lognormal	5.0679	9.7901	121.3777	4.4365	17
TOTAL DERM:		15.9798	15.3889	24.882	15.9927	

95% C.I. on Mean: Dermal: [-173.9632, 223.7272]

Number of Records: 17
Data File: MIXER/LOADER Subset Name: LIQ2.CLSD.275.MLOD

ADD INHALATION | CHANGE HEAD | LB AI TO KG AI | EXIT

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Subset Specifications for LIQ2.CLSD.275.MLOD

With Hand Grade Equal to "A" "B"
Subset originated from LIQ.CLSD.275.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 2 3 and
With Total lb ai Mixed Less than or Equal to 275
Subset originated from MLOD.FILE

DP Barcode: D223894 and D223895
Case : 023638 and 030645
Submission: S501197 and S501619

SUMMARY STATISTICS FOR INHALATION EXPOSURES

	DISTRIB. TYPE	Median	NANOGRAMS PER LB AI MIXED Mean	Coef of Var	Geo. Mean	Obs.
EXPOSURE	Lognormal	75	243.5892	108.4457	121.8726	21

95% C.I. on Geo. Mean: [9.2873, 1599.2791]
Number of Records: 21
Data File: MIXER/LOADER Subset Name: LIQ3.CLSD.275.MLOD

<< Specifications >> Page 1 of 1
Subset Specifications for LIQ3.CLSD.275.MLOD

With Airborne Grade Equal to "A" "B" "C"
Subset originated from LIQ.CLSD.275.MLOD
With Liquid Type Equal to 1 2 3 4 5 and
With Mixing Procedures Equal to 2 3 and
With Total lb ai Mixed Less than or Equal to 275
Subset originated from MLOD.FILE

EXPOSURE
Based on a long sleeve shirt, long pants and glove clothing scenario

Dermal Exposure = 15.4545 µg/lb ai M/L

Inhalation Exposure = 0.1219 µg/lb ai M/L

15.576

PHED VERSION 1.1

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DP Barcode: D223894 and D223895
Case : 023638 and 030645
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Sorted by TOT.AI (A) << LIQ1.CLSD.275.MLOD >> (H)Page 1 (V)Page 1

Record I.D.	Total AI Applied (lb)
0517*ML*03	3.0000
0413*F*8	11.0000
0413*B*1	11.0000
0413*B*3	11.0000
0413*B*4	14.4000
0413*F*6	15.0000
0413*F*7	15.0000
0413*B*2	15.0000
0413*F*5	16.0000
0426*C*02	80.0000
0422*C*02	80.0000
0422*C*03	80.0000
1001*I*04	95.8000
0422*D*02	108.0000
0422*D*03	108.0000
1001*I*01	114.6000
1001*K*01	116.5000
1001*K*04	118.4000
1001*K*02	122.1000
1001*I*03	131.5000
1001*I*02	148.2000
1001*K*03	150.3000

Calculations

Combined dermal and inhalation unit exposure for Mixer/Loaders where 66 lb/ai and under will be handled in open M/L systems: = 54.9837 μg/lb ai M/L

Combined dermal and inhalation unit exposure for Mixer/Loaders where 275 lb/ai and under will be handled in open M/L systems: = 47.0245 μg/lb ai M/L

Combined dermal and inhalation unit exposure for Mixer/Loaders for closed M/L systems: = 15.5764 μg/lb ai M/L

Estimated Daily exposure and MOE's based on a long sleeve shirt, long pants and glove clothing scenario (and using the registrants NOEL)

	Open Mixing/Loading	**Closed Mixing/Loading**
Daily Exposure when 66 lb/ai product are handled : (3-20 kg containers)	0.052 mg/kg BW/day	0.0147 mg/kg BW/day
Daily exposure when 275 lb/ai product are handled: (1-250 kg container)	0.185 mg/kg BW/day	0.0612 mg/kg BW/day