

Monsanto

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February 24, 1984

Dr. Myron S. Weinberg
Weinberg Consulting Group, Inc.
Suite 301
2828 Pennsylvania Avenue, N.W.
Washington, DC 20007

Dear Myron:

I have attached draft copies of Ms. Johnson's tables for her report on industrial/environmental accidents involving TCDD. There are three tables relating to industrial, laboratory, and environmental accidents. We will send the referenced articles when we complete the draft report.

Since Ms. Johnson is my only industrial hygienist, I have had to limit her assignment to process chronologies until we get them into draft form, at which time she will complete the report on accidents. I expect that she will be able to go back to work on this in mid to late March.

Sincerely,

A.M. Ford

Allan M. Ford, Ph.D.

/dkr

Attachments

cc: Mr. R. J. Barnes - Townley & Updike
Mr. T. M. Bistline/Mr. D. F. Snively - Monsanto Company
Mr. C. M. Love, III - Bowles, McDavid, Graff & Love
Dr. W. J. McCarville - Monsanto Company

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TABLE 3: Summary of Incidents Resulting in Possible Environmental Contamination with 2,3,7,8-TCDD or other Polychlorinated Dibenzo Dioxins (PCDDs)

DATE OF INCIDENT	LOCATION	INCIDENT RESULTING IN ENVIRONMENTAL CONTAMINATION	SOURCE OF CONTAMINANT	CONTAMINANT LEVELS	EXPOSURE ROUTE	# PERSONS EXPOSED # PERSONS AFFECTED
1944-present; reported in 1975-1976	New Zealand	Shrub control by spraying defoliants.	2,4,5-T	4×10^{-7} g/acre		20 cases reported
1945	Berlin/Germany	Frying of vegetables in a fat-like substance found in the bomb ruins.	Substance thought to have been hexachloronaphthalene N. A. ^a		Ingestion	6 affected
1949-1971	Australia-Union Carbide of Australia Limited	Landfilling of wastes from production of 2,4,5-TCP and 2,4,5-T	Dioxin contaminated 2,4,5-TCP and 2,4,5-T wastes.	16-30kg dioxin.	NO INCIDENT OF EXPOSURE REPORTED	
1950-present reported in 1975-1977	Yarram, Victoria/Australia	Shrub control by spraying defoliant.	2,4,5-T	N. A.		4 cases reported

a. N. A. - not available

CDDs)

# PERSONS EXPOSED	SYMPTOMS	# ANIMALS EXPOSED	SYMPTOMS	REFERENCES
# PERSONS AFFECTED		# ANIMALS AFFECTED		
20 cases reported	Alleged birth defects and malformations (anencephaly; spina bifida). Study indicated that the number of cases reported were not significantly different from expected; no correlation found with spraying of 2,4,5-T.	—	—	68,86
6 affected	Chloracne	—	—	38
POSURE	—	—	—	21
4 cases reported	Increase in perinatal death & birth defects. Study indicated the number of perinatal deaths are within normal frequency for the region; no correlation found with spraying of 2,4,5-T.	Study conducted on animals in the area.	No increase in illness.	68

TABLE 3: Summary of Incidents Resulting in Possible Environmental Contamination with 2,3,7,8-TCDD or other Polychlorinated Dibenzo Dioxins

DATE OF INCIDENT	LOCATION	INCIDENT RESULTING IN ENVIRONMENTAL CONTAMINATION	SOURCE OF CONTAMINANT	CONTAMINANT LEVELS	EXPOSURE ROUTE
1957-1960	United States	Chick Edema Disease. Adulteration of chicken feed with low cost fats to increase caloric value of feed.	Fats pooled from many sources. Upon processing they had to be heated..... residues of commercial-chlorophenols were probably converted to dioxin, the chick edema factor.	N.A.	Ingestion
1957-1972; reported in 1972	Sweden	Railway workers exposed to phenoxyacetic acid herbicides and others during use on the railroads.	2,4,5-T and 2,4-D	N. A.	Dermal, possible inhalation
1962-1970	South Vietnam	Spraying of Agent Orange defoliant to control vegetation during war.	2,4,5-T and 2,4-D contained 2,3,7,8-TCDD as contaminant	2×10^8 kg of 2,4,5-T sprayed on 1.2×10^6 ha; contained 167kg TCDD.	Possible dermal, inhalation

PCDDs

E.	# PERSONS EXPOSED	SYMPTOMS	# ANIMALS EXPOSED	SYMPTOMS	REFERENCES
	# PERSONS AFFECTED		# ANIMALS AFFECTED		
	None reported from consumption of chicken.	None reported.	Millions of chickens	Dyspnea, wobbly gait, stunting, subcutaneous edema, sudden death. At necropsy revealed ascites; hydropericardium; hemorrhages; swollen, pale, irregular livers.	2,86
ible	N. A.	Increase in mortality to certain cancers. Study showed no increase in overall mortality or cancers due to 2,4,5-T use.	—	—	3
mal, inges- ition	Many South Vietnamese and American veterans exposed.	Various maladies alledged due to "Orange" exposure including: birth defects, increased abortion rates, skin disorders, CNS disorders, cancer, liver disorder, etc.	Many exposed.	Various	2,11,21,30,68,76,86

NOTE: Many studies have been conducted on the populace of South Vietnam and American veterans. Many are conflicting in their findings and in general the validity of the conclusions reached from these epidemiologic studies maybe questionable.

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TABLE 3: Summary of Incidents Resulting in Possible Environmental Contamination with 2,3,7,8-TCDD or other Polychlorinated Dibenzo Dioxin

DATE OF INCIDENT	LOCATION	INCIDENT RESULTING IN ENVIRONMENTAL CONTAMINATION	SOURCE OF CONTAMINANT	CONTAMINANT LEVELS	EXPOSURE ROUT
1970	Visttrask, Lapland/ Sweden	Forestry management by spraying of defoliant.	2,4-D and 2,4,5-T	0.67kg/ha. 0.34kg/ha.	Ingestion
1970-1976	Sweden	Forestry workers, farmers, sawmill workers exposed to phenoxy acetic acids.	2,4,5-T and 2,4-D	N.A.	Possible der inhalation
1971	Eastern Missouri/ United States: a. Horse arena A b. Horse arena B c. Horse arena C d. Horse arena D and road	Horse arenas and roads sprayed with waste sludge containing distillate residues of hexachlorophene production to control dust.	Distillate residues of hexachlorophene production containing TCP and 2,3,7,8-TCDD (~12 lbs of TCDD total in waste residues hauled by R. Bliss)	306-356ppm TCDD in waste residue tank a. 31-33ppm TCDD in soil of arena.	a. Possible inhalation,

PCDDs)

# PERSONS EXPOSED	SYMPTOMS	# ANIMALS EXPOSED	SYMPTOMS	REFERENCES
# PERSONS AFFECTED		# ANIMALS AFFECTS		
2	Alleged congenital malformation of infants.	30 reindeer 10 reindeer	Death Abortion of fetus	86
	• Study indicated death due to starvation not exposure to 2,4,5-T or dioxin even though low level 2,4-D (≤ 0.5ppm) and 2,4,5-T (≤ 0.3ppm) found in liver and kidney samples. • Feeding study using contaminated (25 ppm 2,4-D and 100 ppm 2,4,5-T) leaves fed to reindeer indicated no adverse health effects due to exposure.			
1,	N.A.			68
	Six fold increase in soft tissue cancer.			

ermal, gestion.	a. 5 total: 1-six yr. old girl	Possible chloracne, headaches, diarrhea, nose-bleeds, painful mitriculation, blood in urine (hemorrhagic cystitis).	85 horses exposed, 61 became ill, 48 died.	Emaciation, acne dermatitis, blood in urine, edema, conjunctivitis, lameness, abortions, liver dysfunction, reduced spleen size, lymph nodes small & inactive, ascites, bowel hemorrhages.	2,6,11,12,18,39,68,76,86
	1-10 yr. old girl	Possible chloracne, abdominal pain., diarrhea, recurrent headaches.	Many mice, cats, dogs.	Dermatitis, loss of hair, weight loss, death.	

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TABLE 3: Summary of Incidents Resulting in Possible Environmental Contamination with 2,3,7,8-TCDD or other Polychlorinated Dibenzo Dioxin

DATE OF INCIDENT	LOCATION	INCIDENT RESULTING IN ENVIRONMENTAL CONTAMINATION	SOURCE OF CONTAMINANT	CONTAMINANT LEVELS	EXPOSURE ROUTE
1966	Columbia	Spraying of weed killers	2,4,5-T	N. A.	
1968	Yusho/Japan	Contamination of rice bran oil with PCBs containing TCDFs. • Oil incorporated into chicken feed. • Oil used for home cooking.	PCBs and TCDFs	1ppm TCDFs in the oil; average dose to humans was 2.1-3.0 ug TCDF/kg.	Ingestion
1969	United States	Chick Edema Disease. Adulteration of chicken feed with low cost fats to increase caloric value of feeds.	Soapstock or by-product from refining crude vegetable oil contaminated with chlorophenols.	N. A.	Ingestion
1969	Globe, Arizona/ United States	Forestry management by spraying of defoliants.	2,4,5-T; Silvex	54kg. 2,4,5-T and 1,670kg Silvex in the Kellner Canyon Russel Gulch Project. Contained approximately 1ppm TCDD.	

CDDs)

# PERSONS EXPOSED	SYMPTOMS	# ANIMALS EXPOSED	SYMPTOMS	REFERENCES
# PERSONS AFFECTED		# ANIMALS AFFECTED		
5	Chloracne	—	—	86
2,500 exposed; 1,665 affected	Chloracne, eye discharge, edema of upper eyelids, asthenia, visual dis- turbance, vomiting, diarrhea, jaundice, increase in cholestrol & triglycerides, no birth defects.	2x10 ⁶ chickens 0.4x10 ⁶ chickens	Illness Death	38,76
None reported due to consumption of contaminated chickens.	None reported	Many chickens	Same as before; dioxin shown to accumulate in edible tis- sue of chicken.	90
Not Given	Alleged illness Studies showed no evidence of increased illness or reproductive effects due to spraying 2,4,5-T.	Not Given	Alleged illness, and birth defects. Studies showed no evidence of increased illness or reproductive effects due to spraying 2,4,5-T.	86

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TABLE 3: Summary of Incidents Resulting in Possible Environmental Contamination with 2,3,7,8,-TCDD or other Polychlorinated Dibenzo Dioxins (PCD)

DATE OF INCIDENT	LOCATION	INCIDENT RESULTING IN ENVIRONMENTAL CONTAMINATION	SOURCE OF CONTAMINANT	CONTAMINANT LEVELS	EXPOSURE ROUTE
1971 - Missouri continued				b. 0.22-.85 ppm TCDD in soils. c. No data d. 0.12ppm TCDD in arena soil. 0.61ppm TCDD in road soil.	Possible dermal, inhalation, ingestion. Possible dermal, ingestion.

Dioxins (PCDDs)

EXPOSURE ROUTE	# PERSONS EXPOSED	SYMPTOMS	# ANIMALS EXPOSED
	# PERSONS AFFECTED		# ANIMALS AFFECTED
Possible dermal, inhalation, ingestion.	1-adult, male	Severe headaches, nausea	
	1-adult, female	Severe headaches, nausea, diarrhea	
	1-adult male, (both at arena A & C collecting soil samples)	Chloracne	
	b. 2-three yr. old boys	Chloracne	25 horses exposed
	c. None reported		37 horses exposed
Possible dermal, inhalation.	d. None reported		70 chickens

SYMPTOMS

REFERENCES

12 deaths; severe emaciation, toxic hepatitis, gastric ulcers, splenic atrophy, skin lesions. 28,39,68

7 deaths, 30 illnesses; conjunctivitis, skin ulcers, anorexia, weight loss, alopecia. 39,68

Death 28,39,68

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C23841

TABLE 3: Summary of Incidents Resulting in Possible Environmental Contamination with 2,3,7,8-TCDD or other Polychlorinated Dibenzo Dioxins (PCDDs)

DATE OF INCIDENT	LOCATION	INCIDENT RESULTING IN ENVIRONMENTAL CONTAMINATION	SOURCE OF CONTAMINANT	CONTAMINANT LEVELS	EXPOSURE ROUTE	# PERSONS EXPOSED
						# PERSONS AFFECTED
1972	France	Exposure to baby powder containing 6% hexachlorophene.	Hexachlorophene*	6% hexachlorophene in baby powder	Possible dermal, inhalation.	145 41
1972-1977	Alsea, Oregon/ United States	Forestry management by spraying of defoliant.	2,4,5-T	N. A.		13 cases reported
1975	Canada	Pentachlorophenol release into rivers: • Overflowing of PCP dip tank for lumber treatment • Spraying of telephone poles.	PCP PCP	Levels not known; PCP contains hexa, hepta, octa, chlorodibenzo-dioxins.	Ingestion Ingestion	
1976	Varmland/ Sweden	Forestry management by spraying of defoliant.	2,4,5-T	N. A.		
						Not reported

*There are no published references that report positive analysis of dioxin in hexachlorophene, although it is believed to be there in concentrations <15ppb.

SYMPTOMS	# ANIMALS EXPOSED	SYMPTOMS	REFERENCES
	# ANIMALS AFFECTED		
Illnesses Deaths			21,28
Alleged increase in rate of spontaneous abortion. Study showed no demonstrated increase in abortions for the area and no conclusive evidence linked to 2,4,5-T.			68
	15 massive fish kills	Death	15
	5000 coho salmon	Death	15
Alleged increase in perinatal death and birth defects (spina bifida).			68
Study showed no such increase or correlation with 2,4,5-T use.			

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TABLE 3: Summary of Incidents Resulting in Possible Environmental Contamination with 2,3,7,8-TCDD or other Polychlorinated Dibenzo Dioxins (PCDDs)

DATE OF INCIDENT	LOCATION	INCIDENT RESULTING IN ENVIRONMENTAL CONTAMINATION	SOURCE OF CONTAMINANT	CONTAMINANT LEVELS	EXPOSURE ROUTE
1976	N. A.	Exposure to detergent containing 3% hexachlorophene.	Hexachlorophene*	3% hexachlorophene in detergent.	Possible dermal
1978 reported	Sweden	Nurses working in hospitals during pregnancy; use of hexachlorophene.	Hexachlorophene* Other exposures not mentioned.	N. A.	Possible dermal
1978 reported	Love Canal, N.Y./ United States	Hazardous waste landfill violated resulting in chemical leaks. (Hooker Chemical Co. buried TCP, 2,4,5-T wastes ~200 tons between 1942-1952).	2,4,5-T; TCP; positive analysis for TCDD	Levels in water reported for various areas.	Possible dermal, ingestion, inhalation
1979	Sturgeon, Missouri/ States	Railway accident resulting in chemical spill.	"o-chlorophenol contaminated with <0.1% TCP, and 37ppb 2,3,7,8-TCDD.	~37ppb 2,3,7,8-TCDD.	Possible dermal and inhalation of contaminated dusts.
1979	Montague, Michigan/ United States	Hazardous waste dump site (Hooker Chemical Co.).	Waste residues.	760ppb TCDD	—

*There are no published references that report positive analysis of dioxin in hexachlorophene, although it is believed to be there in concentrations <15ppb.

PERSONS EXPOSED	SYMPTOMS	# ANIMALS EXPOSED	SYMPTOMS	REFERENCES
PERSONS AFFECTED		# ANIMALS AFFECTED		
reported cases in children	Death	—	—	21
5 children	11 malformations, 5 were severe.	—	—	21
NOTE: Out of 68 children born to unexposed mothers, 1 malformation occurred.				
any exposed, number affected not given; 63 families re- located.	N.A.	—	—	21, 68
affected	1-chloracne; both had low levels of 2,3,7,8-TCDD in their blood.	—	—	21
one reported	None reported	None reported	None reported	68

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TABLE 3: Summary of Incidents Resulting in Possible Environmental Contamination with 2,3,7,8-TCDD or other Polychlorinated Dibenzo Dioxins (PCDDs)

DATE OF INCIDENT	LOCATION	INCIDENT RESULTING IN ENVIRONMENTAL CONTAMINATION	SOURCE OF CONTAMINANT	CONTAMINANT LEVELS	EXPOSURE ROUTE	# PERSONS EXPOSED
1979	Jacksonville, Arkansas/ United States	Vertac Inc.-chemical dump site on plant premises containing 2,4,5-T residues contaminated with 110ppm TCDD: leaking into rivers.	50 lbs TCDD buried on site.	82ppt TCDD found in fish downstream of plant: water effluent 0.2-0.6ppb TCDD. Other data are available.		Only rep plant pe industri
1981	Binghamton, N.Y./ United States	PCB transformer fire in an office building.	PCB; 2,3,7,8-TCDD	3-10ppm PCB; 3ppm 2,3,7,8-TCDD in soot		160 expo return t after cl